Interview with Kjeld Kirk Kristiansen

Kjeld Kirk Kristiansen

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Frontcover by Hoexbroe

Backcover by Arqu medes

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Editorial: A new phenomenon

by car_mp

This year will probably be remembered by many fans of LEGO® as the year of the minifigs. LEGO has jumped on the bandwagon of surprise bags and has decided to explore the market of compulsive buying. The bait: minifigs that are completely different from anything we have seen so far in official sets and that appear to fit in with the customization so common among fans of minifigs. Add to this a number of original complements and put them in a small bag at a reasonable price. The result: rivers of ink in all the blogs and forums of this little world. We already know there will be a second edition and we bet there will be a third and fourth in 2011.

We however will not give up any space in this magazine to these minifigs... well... except for this introduction of the editorial (%&*#@!!). In this edition we have decided to take a good look at MINDSTORMS just like we did with Technic in the previous edition. This line (MINDSTORMS) is possibly the most different one from the rest of the LEGO universe, but personally I see it as one of the most important and intelligent steps taken by the company (together with the Star Wars license ;D ;D). I believe it is the natural evolution of the world of LEGO towards technology, the most appropriate road to modernization this toy could have taken and something that, without a doubt, sets it apart from other construction toys. There is no doubt about the educational and training capacity of LEGO in many areas of the intellectual capacity of children, but MINDSTORMS opens the door to the world of robotics. A world that has always been surrounded by a halo of elitism and science fiction and which LEGO has managed to demonstrate is accessible to all ages.

I know it has taken us some time, issue 008, two years, … , too much time avoiding or only slightly touching on lines like Technic or MINDSTORMS. We hope that from now on there will be no lack of articles about these two lines, and as always, and as for everything else, we turn to you, the community, to keep us informed of all those subjects you would like to see reflected in this magazine for posterity. Greetings to all of you
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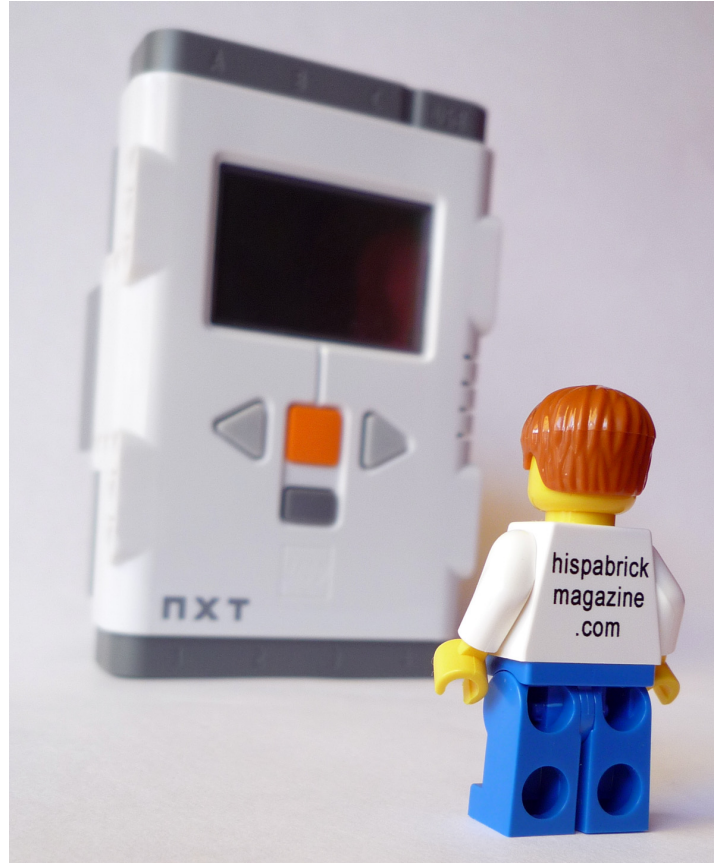
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Mark Twain

By the Mississippi...

Text and pictures by Hoexbroe

Description: Stern wheel paddle steamer as used in the Disneyland theme parks.
Scale: 1:49 (minifig). However; as the Disneyland Mark Twains themselves are miniatures (5/8 scale) the MOC´s scale relative to the Disney model is 1:31. In other words; This MOC is a model of a real-life steamer, not the Disneyland® model.
Length: 103cm (130 studs)
Width: 26,5cm (33 studs)
Height: 52cm (54 bricks)
Pieces: 20.000 (estimate)
Building time: 35 days.
Made by: Henrik Hoexbroe (http://www.mocpages.com/home.php/19323)

The idea of building a paddle wheel steamer has always been present, as it is a spectacular type of transport. So when I saw Team Morente´s "King of Mississippi" MOC on the HispaLUG forum, I knew that eventually I would have to do one too. Now, some 9 months later I am proud to present my latest MOC; The Mark Twain paddle steamer!

The choice fell on the Mark Twain only after some time. Firstly I "mocked" around with different basic ideas; front style, paddle wheel(s), width, chimneys, etc.

The first decision was that the boat had to be a sternwheeler, as I only had material to build a single paddle wheel. Searching on the internet, different ships were investigated, and finally I decided on the Mark Twain, which was a good thing, as it is the only paddle wheel steamer I have actually been on myself. (In Disneyland Paris)
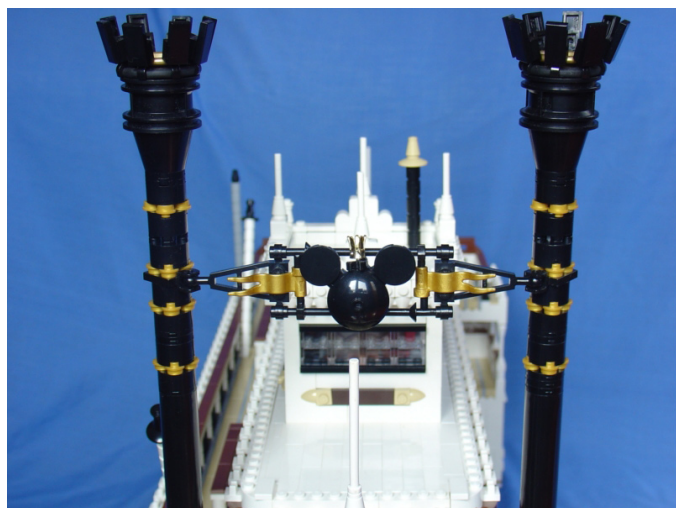
Construction

The building techniques used for this MOC are very similar to the ones I used for the Calypso MOC (Presented earlier, in Hispabrick Magazine 006), with the exception that this time I didn't see the need to do the entire bottom and underside of the boat, as river boats are extremely flat anyway. So this MOC is "just" a water-line model.

The decks are built using tan 1 stud thick bricks (some 2 studs thick ones used for the lower deck) placed sideways (SNOT)

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with grey plates between each layer of bricks. –Thus giving the characteristic "wooden" look. The white roof on top is done in the same way. Actually I used surprisingly few tiles, compared to the total number of pieces in the MOC.

The curved front consists of 1x2 plates bend to fit. Note that the pieces are not stressed; the minuscule gap/tolerance between pieces is enough to get the desired effect when using enough of them.

The single most difficult part of the construction was the paddle wheel. The real Mark Twain actually has 12 scoops, each divided into 4 sections. The best I could do was 8 scoops in 3 sections.

The solution of connecting a brick on the end of a Technic X-axle was discovered by trial and error. Only bricks with hollow tubes inside work in this configuration! (See the photo)

The 4 black rings "lock" the whole construction, and keep it very sturdy.

Special care was taken during the construction of the boiler, conducts and chimneys, as these are some of the most characteristic points of a river boat. It should be noted that all these parts are perfectly and correctly aligned and connected to each other, passing though tight openings in the decks.

Interior

During the construction of the boat, I published some WIP (Work In Progress) photos on the HispaLUG forum. (Normally I finish my MOC´s in a week or two, but as this MOC was taking much longer than anything I had ever built, I wanted to let the guys there know that I was still alive and active…)

There on the forum, there were repeated requests for "interior decoration" for the MOC – a point I normally don't worry too much about when I build. But it turned out to be a good suggestion, as that way I could design the MOC as a "cut-away" model, totally open on one side (to allow the interior to be seen easily). This solution was very practical in order to save lots of bricks and plates, which would otherwise have made the MOC too big for my current LEGO® collection, and thus too expensive to complete.

Also, the interior construction was a lot of fun to do! (and my two daughters love it, as it allows them to play with the minifgs aboard.)

Even with the cut-away savings, the MOC hugely surpassed

the amount of bricks available in my collection, so a PaB order was needed. I have bought bricks from PaB a couple of times before, but always grouping together bricks of general use and interest, never for a specific MOC, and never for such a huge amount.

By way of comparison, the pieces bought specifically for the Calypso MOC were around €15. This order was more than 10 times that amount! So this MOC kind of marks a new high for my constructions.

The photos series published – and the presentation of the MOC in real-life – is always done in such a way that the discovering of the interior detailing comes as a surprise, only after looking twice!

Much care has been taken with the MOC in relation to the colours used. All walls for the cabins are 2 studs thick. All windows and door-ways are doubled, to allow the model to have window frames and walls of different colours on the outside and the inside. As the model is so huge, sufficient space is available on the inside to allow a decent detailing of the interior, even though the walls are two studs thick.

The interiors includes: boiler-room, bar, luxury cabin, sleeping cabins #1, #2 and #3, captain's cabin with office and finally the pilot's steering cabin.

In order to be sure about the accuracy of the MOC, I had to study a little about how a river boat works. For example I learned that the two impressive smoke-stacks are only for the smoke from the furnace, while the vapour outlet from operating the pistons are at the back of the boat, where the cylinders are, and that not everything is installed in the boiler-room as I originally thought. It can all be seen on the MOC, if one looks closely!
#

Discovering LEGO® Space

"..stars to fill my dream I am a traveler of both time and space"

Text and pictures by Jig

For over 30 years I have loved construction toys within a very specific subject: spaceships. Only five years ago I came back to LEGO® thanks to LEGO Star Wars™. I recently discovered LEGO Space, and I went back almost literally to my childhood. LEGO Space started in 1978 and until 1987 we can talk about a golden age. This period is known as Classic Space. Simple ships and vehicles, friendly smiling astronauts, and there you had the whole of space to explore. Few pieces, but well used with imagination. Those who lived through those days remember it with enthusiasm and nostalgia.

However there was a later stage, which involved an evolution between 1987 and now, of which I have always found few references, since this stage has not been appreciated enough and, with the exception of a few ships, nearly forgotten. In fact, after having played with LEGO for the last five years, less than six months ago I discovered this 'new' stage. We are talking about sets from 20 years ago. The number of parts is not equivalent to a set today. A set could be considered big at around 400 pieces.

I'd like to highlight three key differences between Space and Classic Space:

1 - The evolution of their cute and adorable minifigures: one-color astronaut, yellow smiley face, with the Space logo on the front of the torso, the loss of innocence / smile which was the all time standard (featured in all previous sets). This implies a kind of nostalgia that makes some people still prefer Classic.

2 - The introduction of two sides of the coin. Initially we had only explorers. With the arrival of Blacktron, we will have both "good" and "evil" sides (not so evil, by the way).

3 - Modernization of ships. The ships were extremely simple, and they became larger. We began to see more "Space" parts and the evolution of ships. Each line will have its hallmark. Let's take a closer look to get into the subthemes that came after Classic and meet some of their key features.

1) Blacktron (1987-1988)

It was a revolution to change the once nice single color astronaut minifigure (blue, red, white or yellow - (including gloves, torso, helmet and bottles) – with a smiley face, logo space on the front torso, to a minifigure in a black suit, military pilot style, with black helmet and black visor too. Its much more intimidating and aggressive look broke with Classic Space. Its biggest ship, "Renegade" 6954 was only 302 pieces and two minifigures.

2) Futuron (1987–1990)

From classic Space and inheriting the colors, the "Futuron" minifigures share evenly in several colors, still carrying the space logo on the upper left of their torso. They are the natural evolution of Classic and the clearest continuation.
This idea was moving into a kind of Space City, and clearly it is focused on monorail and bases, lacking of large ships.

3) Space Police (1989)

In 1989,LEGO decided that Blacktron, previously living in a world with no moral inclination, were declared LEGO Space "bad" boys, and, facing them and defending Futuron, LEGO introduced the Space Police. The characteristic features of Space Police are black with blue bricks and red transparent parts. LEGO reintroduced the idea of modularity. The sets came with a Police capsule-cell, and a Blacktron prisoner occupying it.
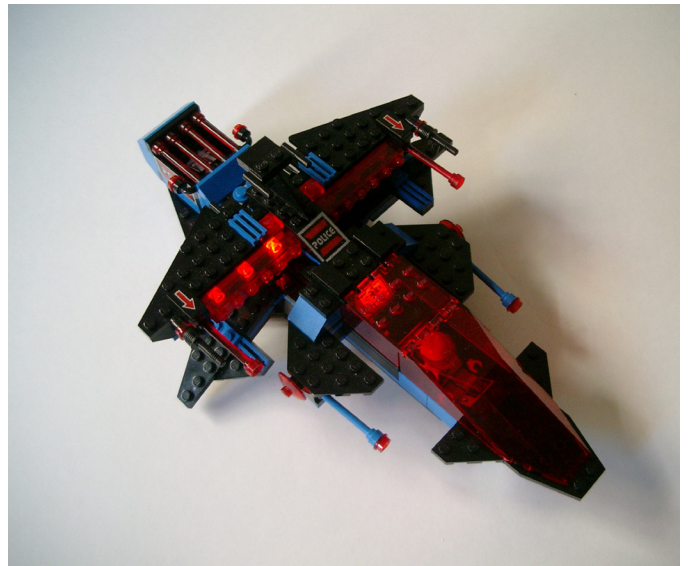
The star ship of this series is the "Mission Commander" 6986. This is the first really big ship which would be in a position to shine brightly. With nearly 500 pieces, 3 minifigures and lots of accessories make this playable ship a true jewel. The 6781 "SP-Striker" would really shine by adding some light bricks turning it to a light system and making this ship of 230 pieces and two minifigures unforgettable. True to its line but breaking schemes with a modular fitting system (as opposed to adding). LEGO was doing well.

4) M-Tron (1990–1991)

To add interactivity, LEGO® introduced the scrap dealing M-Tron, whose minifigures would be peaceful civilians. Vehicles were red and black, with distinctive neon yellow transparent elements. There were magnetic cranes for transporting large and heavy boxes. Classic minifigures were still smiling and all bearing the "M" logo.

They could be considered as the natural evolution of Futuron. The most interesting vehicles are the "Stellar Recon Voyager" 6956 and "Mega Core Magnetizer" 6989 (1990). The last one was a massive 6-wheeled vehicle, the biggest and best space vehicle of its time. Interestingly, the M-Tron had no bases, all sets were vehicles and a few ships (The Stellar Recon Voyager being of average size is truly remarkable -230 pieces-). The M-Tron guys were not prepared to fight, they were peaceful and carried no weapons. A nod to "Classic Space?

5) Blacktron II (1991–1992)

In 1991, Blacktron evolved. Blacktron minifigures turned into black and white, printings and a new logo with a "B" letter in neon green, similar to the M-Tron logo. Losing aggressiveness but improving elegance and design ... Black and white with neon yellow transparent elements as identity.

Top Blacktron II starships included the "Spectral Starguider" 6933 and 6981 "Aerial Intruder" (1991). Today they would be of a medium size as both do not exceed 300 pieces and two
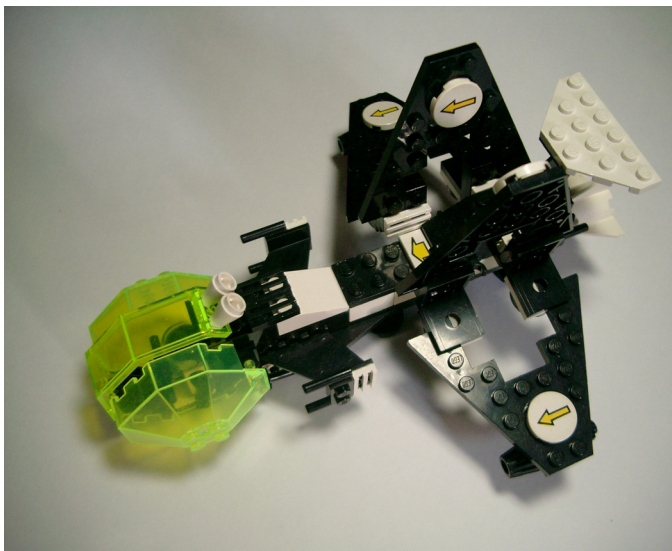
minifigures. They do not have a real 'star' ship. Nevertheless its smallest ship 6887 "Allied Avenger", was the one which most reached the hearts of people. With only 100 pieces and 1 minifigure, the playability, modularity and operability of this ship are hard to beat, and with some very interesting parts.

The Blacktron cabin set the standard for all Blacktron ships.

6) Space Police II (1992–1993)

Space Police also evolved. And with it the colors (blue-gray became more serious, transparent elements in the red became green), uniforms, their prison cells (which would be in each set) ... and the classic simple, smiling face also evolved, adding hair, eyebrows and even pilot headsets. Modularity continued and also expandable elements, but there is a loss of color. The Space Police are not armed to their teeth eitherl, so the Blacktron were not so bad.
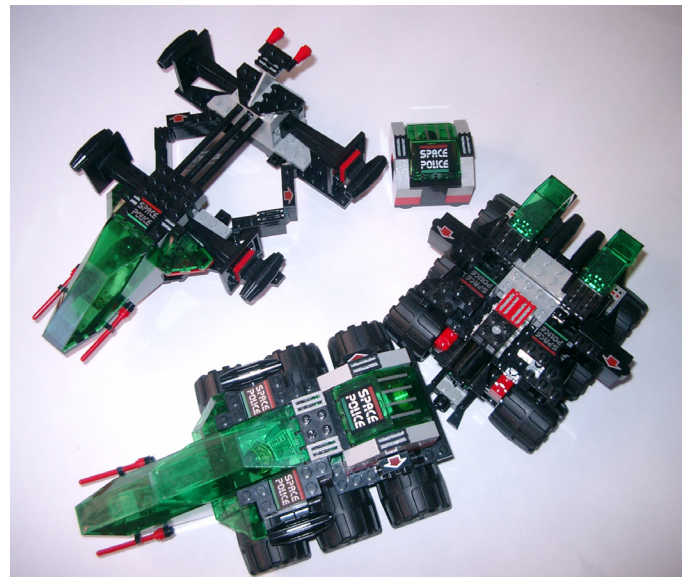
The best ships of Space Police II are the 6897 "Rebel Hunter" and 6984 "Galactic Mediator" (1992), 400 pieces. As another interesting vehicle we have the 6957 "Solar Snooper".

7) Ice Planet 2002 (1993–1994)
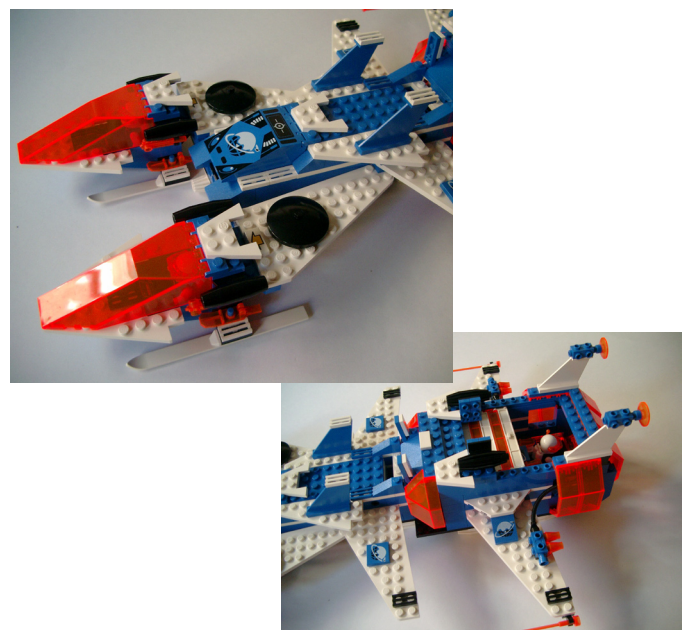
Ice Planet remembered the emblems of Classic Space, as you can see their similarity. It incorporated new elements that would be its trademark: an icy planet "Krysto", skis, neon orange transparent elements, cabins, and even chainsaws. Most sets are vehicles (and a base), but there was also a large space shipl (400-odd pieces) that many consider the best space ship of all time, the 6973 "Deep Freeze Defender" (1993). This was the first ship of this period that I constructed, and in my opinion, this conclusion is merited.

8) Exploriens (1996)

We return to the pristine white and blue Futuron transparent cabins, to make way for Exploriens. They were explorers/ archaeologists in search of fossils, and they made holograms. Peaceful. They also had a robot (Ann Droid), and Real Girl minifigures. The "Explorien Starship" 6982 (1996) is the largest starship so far and is noted for its many accessories and spectacular size. With 662 pieces, it was unrivaled in size and competes for supremacy with the 6973.
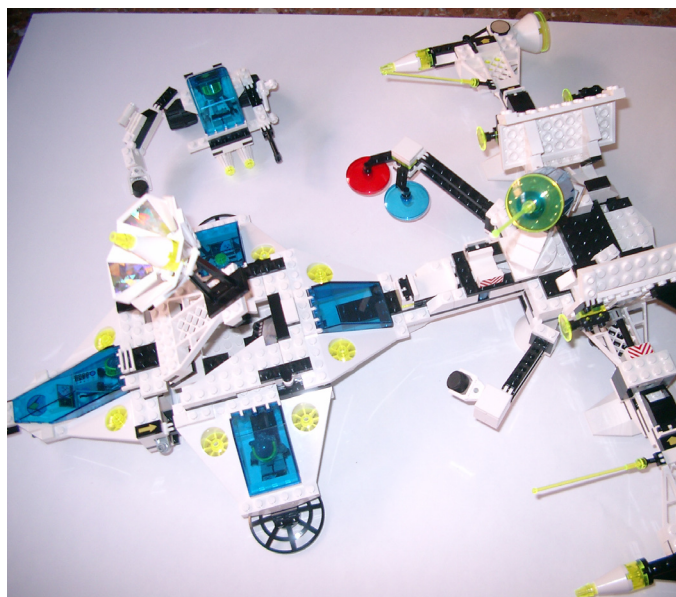
The "Explorien Starship" 6982 is truly spectacular: it has a significant number of pieces, a good design and lots of possibilities. Many have considered it the best ship of Space and I must admit that it fulfilled my expectations, which were high when I got it. A set that certainly is mandatory for every fan of Space.

9) UFO – Insectoids – "Life on Mars"

These minor subthemes, were less successful. Condemned to oblivion because of the onset of SW LEGO® which completely annihilated them ... Strange Space minifigures, strange colors (Purple Sand, Red Sand ...) and new pieces with strange shapes ...they failed to engage people who turned massively to SW.

10) Mars Mission (2007-2008)

With a slightly more attractive appearance it revives the space theme, wanting to capture the image of the good years of Space. SW was in full swing, so Mars Mission prices dropped and it is not hard to find them at an interesting price still. Recovering pristine white from Exploriens and adding some orange transparent elements. The opponents, aliens, were strange-looking, dark green and transparent. Modularity is still the dominant feature.

It is interesting for fans of Space, but without any pretensions. Ideal to recapture fans because of the reasonable price.

11) Space Police III (2009-2010)

Almost 20 years later Space Police reappears. And this time the differences between Part I and II are more prominent, not in vain 15 years have passed since the last space police. This time the bad guys are aliens (again not too attractive ...). Interestingly, this theme shares characteristics from its predecessors: modularity, transparent elements (blue this time), prison cabins ... The biggest starship, the "Galactic Enforcer" 5974 has everything to be considered the best LEGO starship ever. Doubling the number of pieces from the 6986 or 6984, it has the elegant white, the details that were missing the 6984 and great playability. The quality of the parts is the only possible drawback, but that can happen to any model with over 15 years of history...

Conclusions:

LEGO Space is quite unknown, and unfortunately forgotten and underrated.

I know nostalgia plays a big role when choosing for the Classic line, and it relegates its successors to oblivion, but in my opinion Space should be a basic line in LEGO. It has enough potential.

However, despite the potential that Space possessed, perhaps at the time it was not appropriate or the right time, or something else failed, but Space is a good line - with its ups and downs, of course - that deserves a little more recognition or perhaps my enthusiasm as a Space fan is just not shared enough.

It is true that SW has taken too much prominence over Space and maybe some people would not understand that the two lines could coexist, but from my point of view, they are completely different... Fans of spaceships like me, mostly have had SW as their only option for 10 years, and although it is true that we can not complain, Space represents the LEGO spirit better than the franchise of George Lucas, despite it being a bestselling line. SW ships are so well-known and LEGO has turned to them and made models that are quite faithful to the films -increasingly so over the years and with the new editions- while Space relies only on your imagination. Even we Space defenders surrender to the evidence that it is very difficult to compete under these conditions. I left my "Dark Ages" due to LEGO SW...

My enthusiasm for Space is clear, because when I was 7-8 years old what I really liked was science fiction and spaceships. I was not interested in fire trucks or police cars. Neither did I have any any attention for Technic or City. And, although I have always liked Castle and Pirates, Space was always a couple of steps ahead, and gave me the foundations and parts for my imagination to fly. To infinity and beyond. I am convinced that there are old classics and new generations, adults and children, waiting for new and better ideas in Space.
#

"Dome Creator"

Designing Domes

Text by Jero

Pictures by Jero and Arthur Gugick

There is a large variety of software tools that can help us design our MOCs and many of them are well known and much used, like for example LDD and MLCAD. But there are also other less know tools, which are no less useful, like Brickin by Ignacio Lorenzo or the one I will tell you about now.

Dome Creator was created byArthur Gugick, a US AFOL and professor of mathematics who has used his knowledge in the field to create this tool that helps you design domes and towers.

The software is easy to use. Based on data like the type of construction, the diameter and/or the shape of the base and the height, it indicated the amount of plates that are necessary to in each column to achieve the desired shape. It is especially recommended for big constructions since in smaller ones the pixel effect is quite obvious.

The data is introduced in a single screen and the calculations appear right next to it. You can see it in photo 1.

The following information is required:
- Base: Circular or Polygon. This serves to determine the shape of the base.
- Dome: Spherical, Elliptical or Planar. To indicate the shape of the dome.
- Diameter: You need to enter the diameter (in studs) of the circle or the diagonal length in case of of a polygon.
- Height: To establish the height in bricks.
- Sides: If the base is not circular you need to indicate the number of sides..

After introducing this data and clicking on «Run» a series of numbers will appear, forming a square These numbers indicate the height of each column that is necessary to create the desired shape. Remember the height is indicated in plates. There are no

building instructions and the only available information is the number of plates that is necessary at each location.
In the following examples you'll get a better idea of what this means. These are medium sized designs and the pixel effect is noticeable although for smaller designs it is much more evident.
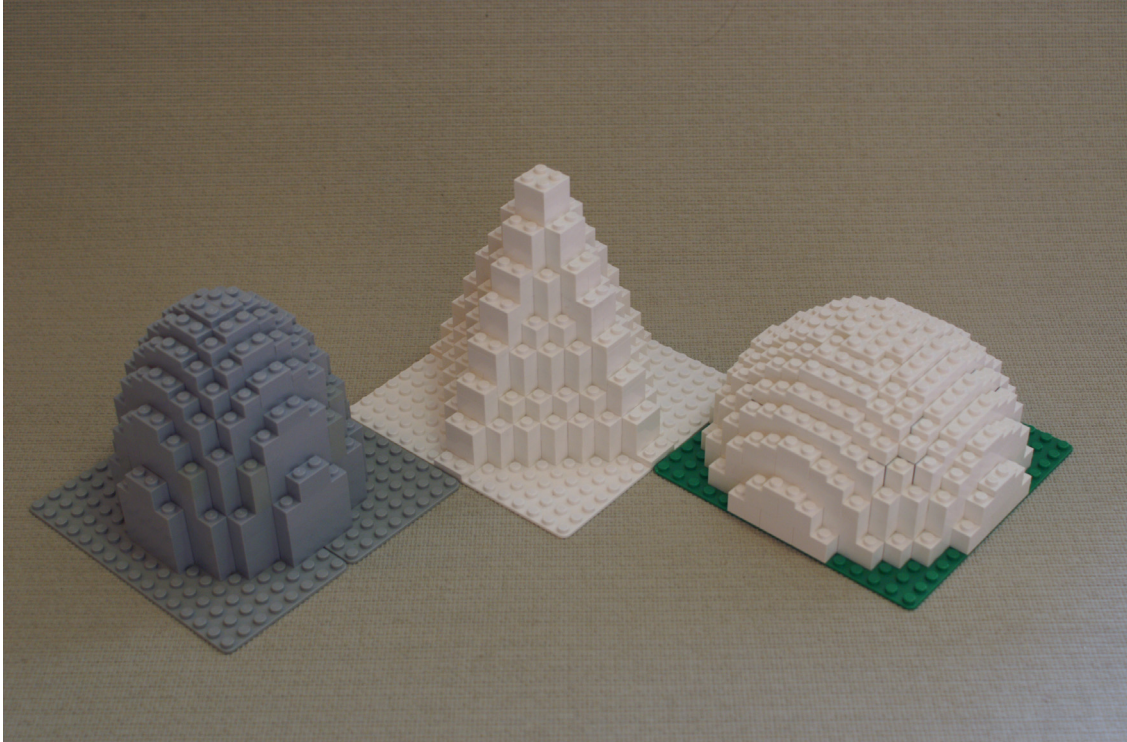
The white dome was built with the following data:

- Base: Circular
- Dome: Spherical
- Diameter: 16
- Height: 12
- Sides:

You can also see some designs by the author of the program, which are are of a larger scale and the pixel effect is much less noticeable.
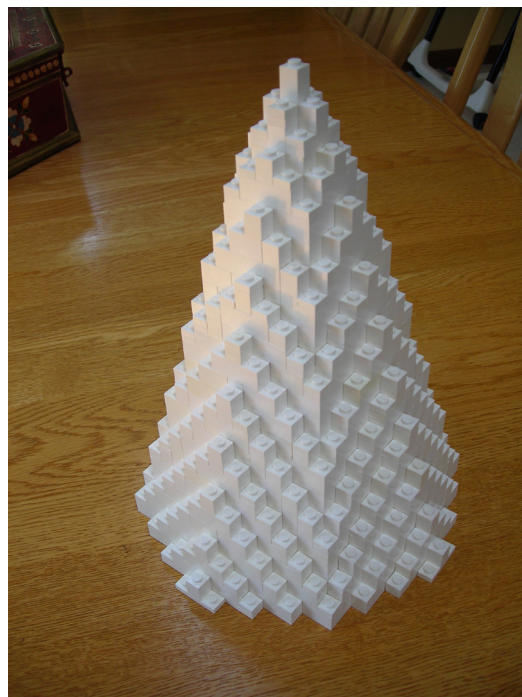
If you are interested in getting a copy of this application you can request it from the author at: arthur@gugick.com. We would like to thank him for his collaboration in the preparation of this article.
#

MCP - The Ambassadors of MINDSTORMS

You probably know a bit about the LEGO® Ambassador program – you will probably know at least one of the current Ambassadors either directly or indirectly. But do you know what MCP is?

Text by Jetro

The MINDSTORMS Community Partners program was designed in much the same way as the Ambassador program, but instead of focusing on the whole LEGO® fan community it is specifically directed at MINDSTORMS. There is a good reason for this 'limitation'. LEGO MINDSTORMS (LMS) is without a doubt the single most 'different' LEGO product in existence and it has a very specific fan-base. Additionally, LMS is not only used by both kids and adults, but serves as a teaching aid in many educational institutions (primary and secondary schools, universities, etc). Add to that the fact that LMS involves some pretty sophisticated electronics and software and you'll understand why it makes sense to have a program specifically designed for the needs of the LMS community.

Like the LEGO Ambassador program, the MCP is made up of AFOLs with a passion for the product who love to share their passion with the world-wide LEGO community and the public.

Their mission is to work together with the LEGO Group in the development of the LEGO MINDSTORMS Community. There is no time-limit to the membership – some of the members have been in the group since the very beginning – but from time to time new members are added to the group and others leave it, due to different circumstances.

MCP members are selected by the LEGO Group after an application process that is announced periodically in the most relevant MINDSTORMS related forums. The selection criteria are many, but some of the important factors The LEGO Group keeps in mind are that the selection be culturally divers and global as possible. The age of the current MCP members ranges from under 18 to well over 60 (the average is 30+) and there are both male and female participants. There are a total of 50 MCP members. In this way the group represents a significant and varied section of the actual MINDSTORMS community.

The members of the MCP are of course expected to actively contribute to the MINDSTORMS community and they do so in a large variety of ways – participating in the different on-line communities, at LUG events, helping out with FLL teams and competitions, developing and testing software and hardware, publishing LMS related contents and a long etcetera.

The MCP also interact with TLG on a special 'internal' forum to which they get access only after signing an NDA… which means that's as much as I can tell you about it. Additionally there are special MCP meetings at some of the bigger events so the members of the community can meet face to face with the representatives from LEGO.

The benefits of this program are many. For TLG it means a direct line to the community and input from their final customers. For the MCP it means being able to discuss their ideas and concerns directly with TLG and getting to see and sometimes even test new hardware and programs before they are released. It also means that when these products are released they can put out the word and provide information and support from first-hand knowledge. In this way they do the same for the MINDSTORMS community as the Ambassadors do for the general LEGO Fan community:

• Help extend and improve the connections between the worldwide LEGO MINDSTORMS community and the LEGO Group

• Actively cooperate with LEGO employees, LEGO User Groups and FLL teams

• Post feedback, guidance, and other types of support to their favourite on-line and off-line LEGO User Groups

• Help the LEGO Group keeping up with activities going on across the LEGO MINDSTORMS community

• Help giving LEGO User Groups as well as individual LEGO MINDSTORMS Fans a voice towards the LEGO Group.

In order to get a better understanding of the MCP, I'd like to present a few of them so you can learn a little more about who they are and what they do:

Interview: Laurens Valk

By Hispabrick Magazine
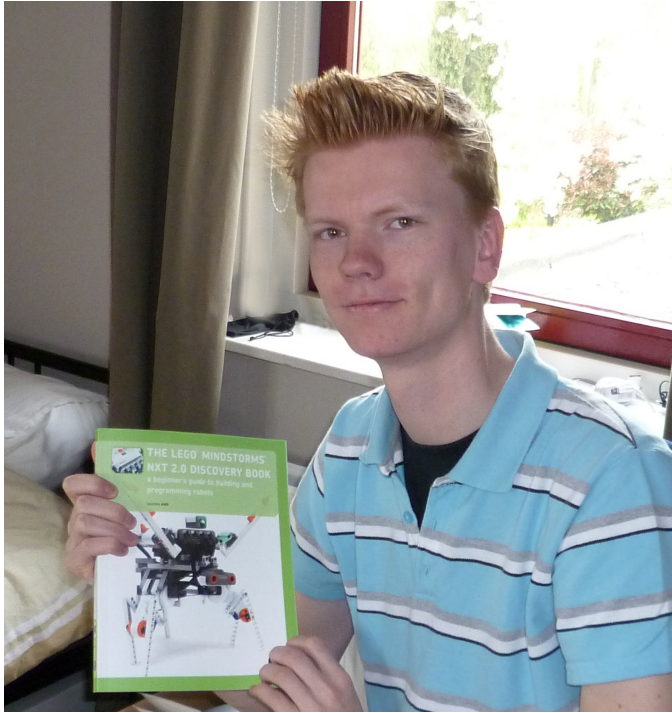
Name: Laurens Valk
Age: 17
Occupation: Student
Nationality: Dutch -- The Netherlands
Website: laurensvalk.com

How did you get involved in MINDSTORMS?

The way I got started with LEGO® MINDSTORMS (LMS) was rather common, but what motivates me to use MINDSTORMS five years on is a more interesting story. But let's begin at the very beginning. As a young kid I always played with LEGO system and the 9V trains, inexhaustibly creating new layouts and little cities. As I grew older, I started saving for LEGO TECHNIC sets, which started to become more interesting. My first real TECHNIC set was the well-known #8421 crane from 2005.

Later that same year, I moved forward and purchased a LMS Robotics Invention System 2.0. I think I read about it in a brochure, but I don't really remember what drove me to buying this set. At the age of 13, I found it to be a very expensive set, but I soon found out it was well worth the price. And from that moment on, I never stopped playing with MINDSTORMS. Instead I became increasingly involved in this community, and 5 years later this resulted in a book I wrote about MINDSTORMS NXT 2.0.

How do you contribute to the MINDSTORMS community?

As I used the RIS kit more and more, I started creating my own inventions, rather than following the instructions in the box (around 2006 or so). At the time, I posted my findings and creations to a very basic website, but the responses where motivating, enough to keep me going.

Meanwhile, I started building robots with the NXT version of LMS, and I began publishing step-by-step building instructions of my designs so that other LMS fans could recreate the stuff that I made. I still find this a very fun thing to do, and other LMS fans tell me they appreciate it. Ultimately this led to the invitation to write on the NXT Step Blog (thenxtstep.com).

On this blog I met similar minded people and we all shared (and still do) our LMS knowledge with the community. Before I became a contributor, the blog members wrote the LMS NXT Idea Book. In 2008, the team (this time including me) wrote another book: LMS NXT One-Kit Wonders, a book full of building and programming instructions for robots that could be built with just the pieces in the original NXT set. It wasn't only fun to co-write this book, but it also gave me some insights on the process of writing a book.

Fast forward to 2009, when LEGO released the NXT 2.0 kit. Being a member of the MINDSTORMS Community Partners, I was lucky to have early insights in this new set, and to contribute a bonus model for the set, shown at the back of the NXT 2.0 box. I combined this opportunity with my recently gained book writing insights and I began writing my own book to cover this new set: The LEGO MINDSTORMS NXT 2.0 Discovery Book, A Beginner's Guide to Building and Programming Robots.

It took a lot (!) of time to get this book done, but I'm very happy with the final result, and recent customer reviews have shown that the public has much interest in this book. Basically, it's a complete how-to guide for people who want to get started with the MINDSTORMS NXT 2.0 or do more with this kit. It's not a book with just theory or just ready-made projects, but more like a workbook that combines explanations about programming with instant activities like building a new robot or solving one of the book's many robotic challenges.

With this book, I hope to make it possible for kids (and adults!) to have just as much fun with LEGO MINDSTORMS as I had when I just got started!
#

Interview: Fay Rhodes

By Hispabrick Magazine

Name: Fay Rhodes
Age: 60
Occupation: Designer/Educator
Nationality: American

How did you get involved in MINDSTORMS?

How did I get started? It was through my husband, who was looking for something he could do with his very-intelligent teenage son. Rick, a Presbyterian minister, lived in Massachusetts, while Connor resided in Oklahoma with his mother, so they each had a kit. Rick often reminds me that my first reaction to the NXT was, "$250?!!!!" (x 2) We laugh about it now.

Now, neither Rick, nor Connor use the NXT, but I'm still using it—and hoping it will inspire my granddaughter to be all she can be. I'm happy to report that her favorite activity is building with the Duplo blocks I gave her. (She's 3 years old.)

How do you contribute to the MINDSTORMS community?

Unlike the other MCP members, I have no advanced degree beyond as BS in Education (título de grado en educación) which was earned many years ago. What I do have is curiosity, a love of problem-solving, a lot of perseverance and a little artistic talent.

I've found that there can be benefits to not knowing all of the mathematical formulas and scientific "laws". Like Isaac Newton, I learn by 1. observing and 2. following that observation up with experimentation and research.
I suppose another difference is that I view building NXT robots as a form of kinetic art. From that perspective, I see the NXT as an opportunity to engage students who aren't normally interested in math or science---and, also, to keep the fine arts integrated into any classroom curriculum. Also, people don't often think about the fact that scientists need to be able to think creatively, in order to solve problems. Inventions are creative applications of not just textbook knowledge, but of observation and creative thinking.

My first reason for writing was to provide material that would appeal to girls and non-competitive boys---or be gender-neutral. I suspect that's the reason most elementary school teachers buy my animal robot books.

I think of my books as inspiration, primarily. For teachers, that seems to be a primary use, as well. I even heard from the folks in charge of the Darwin anniversary event in the UK, saying they were using the Zoo! book for inspiration.

My newest book, Robots Alive! Endangered Species, is self-published. Commercial publishers don't publish full-color books, and people on the NXTStep Blog have been saying they'd willingly pay more for color books; so I thought I'd test that. The results are that most people really don't want to pay for full-color. (My 110-page book is priced at $22.95 on Amazon.) So, that's why you only find black-and white instructions in the bookstores....

I've earned back the cost of publishing, and received a very small profit, in order to keep the price a low as possible. But it's still expensive. It's good I'm not doing it for the money!

#
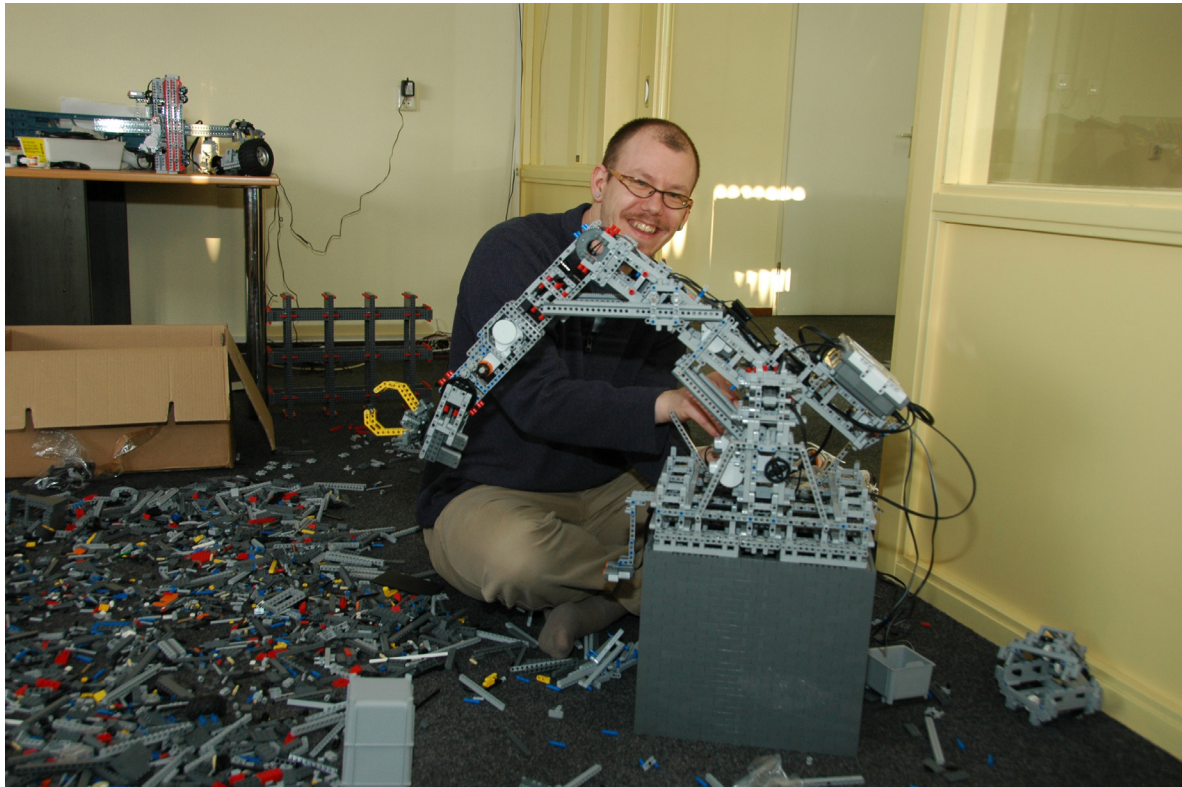
Interview: Xander Soldaat

By Hispabrick Magazine

Name: Xander Soldaat
Age: 35
Occupation: Infrastructure Architect/Sr Linux Project Engineer
Nationality: Dutch

How did you get involved in MINDSTORMS?

In February 2008 I bought my first NXT set. This wasn't my first robot and not my first LEGO® set. The NXT set marked an end to my 20 year dark age. Two months later I had bought the second set. Not long after that I started tinkering with home brew sensors and writing software to make those work. I had bought a HiTechnic IR Link sensor which I found to be unsupported by ROBOTC. I had an itch and it needed scratching. I started asking HT all sorts of questions and it wasn't long before I was asked to write drivers for the rest of their sensors. Thus was born the ROBOTC Driver Suite. I have since built up a good relationship with most of the sensor companies such as Mindsensors, Dexter Industries and Holit Data Systems. They support me and I write drivers for them. It's a great privilege to be able to work together with these people.

How do you contribute to the MINDSTORMS community?

I write and maintain a suite of ROBOTC based drivers for just about every sensor available for the NXT platform. I also do a lot of beta testing for new sensors and programming

environments like ROBOTC and NXC. I have good knowledge of sensors and I2C and am comfortable with electronics. I write tutorials and other documents that I publish on my own blog or NXTasy. I'm quite active on the various NXT related forums like The NXT Step, ROBOTC and NXTasy.

One of the things I enjoy most is going out to LEGO and robot-related events and showing people what the NXT is capable of. I helped some of my friends with the large LEGO High Bay Storage system that was built for LEGO World 2009 in Zwolle and later also in Copenhagen. I programmed and partially rebuilt one of the robot arms and helped build some of the other bits of it. Now I'm part of the MCP4 which allows me to promote the Mindstorms NXT platform in a more "official" capacity, with the support of LEGO. It's a real honour for me to have been selected to be part of this small group of people with such diverse talents.

[1] http://mightor.wordpress.com/
[2] http://nxtasy.org/
[3] http://thenxtstep.com/smf/index.php
[4] http://www.robotc.net/forums/index.php
[5] http://forums.nxtasy.org/

#

A PID Controller For LEGO® Mindstorms Robots (Part 1)

We present you the first tutorial suggested by one of our readers, we hope you find it of interest and you'll send us suggestions.

Text and pictures by J. Sluka

A PID Controller is a common technique used to control a wide variety of machinery including vehicles, robots and even rockets. The complete mathematical description of a PID Controller is fairly complex but a much simpler understanding is really all that is needed to use a PID effectively.

This document is a description of how to create a PID Controller for use with LEGO® Mindstorms Robots using the NXT-G programming language.

It will be easier if we have an actual task in mind so I will describe how to create a PID to do line following. Once created, the same PID can be used, with only minor modifications, with any other Mindstorms application such as getting a robot that can drive as straight as possible, or even for a robot that can balance with nothing but 2 wheels touching the ground like a Segway. A PID is really pretty straight forward and the typical description of a PID is easily understood by anyone that has had Calculus. This document is targeted towards First LEGO League kids in third through eighth grade. *Since there aren't many kids that have had Calculus I'll try to build the whole concept up from a very simple starting point without using any Calculus.*

So lets start with the basic layout of a robot that would be suitable for line following. At the right is a simplified drawing of a top view of the robot with all the details we need. The robot is a differential steer robot with two motors, each connected to one of the wheels A and C. The robot has a light sensor mounted at the front that points straight down so it sees nothing but the mat (floor, ground, table top, whatever the robot is on). The red circle represents the fairly small spot on the mat that the light sensor can actually "see". The rest of the robot is the large rectangle with an arrow, the arrow shows the normal direction of travel.
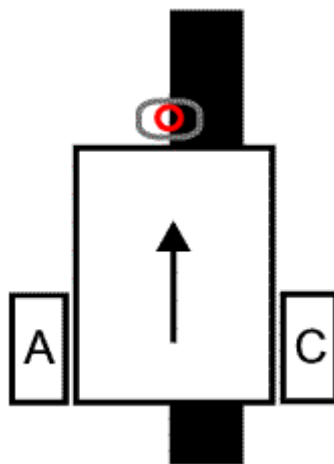
Figure 1

Our goal is to get the robot to follow the fat black line. Line following is a basic robotic behavior and is often one of the first things people learn. A mobile device that can follow a line displays all the characteristics of a true robot. It uses sensor to gather information about the world around it and changes it's behavior depending upon that information.

Line followers can be built with one light sensor, or two, or a dozen or however many you happen to have. In general, the more light sensors you have the better you can follow a line. Here we'll limit ourselves to a single Mindstorms light sensor. Even with a single sensor we should be able to build a robot that can track the line very precisely even if the line has curves in it. The thing you usually loose with a single sensor is the ability to follow the line while moving fast. Often, the more sensors you have the faster the robot can move while it follows the line.

The first trick we'll use, which is unrelated to a PID, is that we won't try to actually follow the line. Instead, we'll try to follow the edge of the line. Why? Because if we follow the line itself (the black) then when the robot drifts off the line and the sensor "sees white" we don't know which side of the line we are on. Are we left or right of the line? If we follow the line's edge then we can tell which way we are off the <u>edge</u> as the robot drifts off the line. If the light sensor "sees white" then we know it is left of the line's edge (and the line). If it "sees black" then we know it is to the right of the line's edge (and on the line). This is called a "*left hand line follower*" since it is following the line's left edge.

We need to know what values the light sensor returns when it "sees white" and when it "sees black". A typical uncalibrated sensor might give a "white" reading of 50 and a "black" reading of 40 (uncalibrated, on a 0 to 100 scale). It is convenient to draw the values on a simple number line to help visualize *how we convert light sensor values into changes in the robot's movement*. Below are our made up light values for white and black.

Figure 2
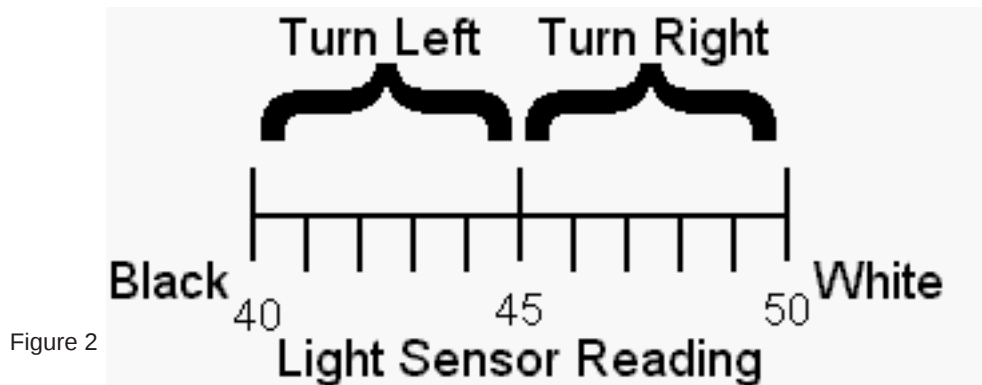
We'll just divide the range into two equal pieces and say that if the light level is less than 45 we want the robot to turn left. If it is greater than 45 we want to turn right. I won't go into how exactly the turns should be done. I'll just say that gentle turns work well for a fairly straight line. A line with lots of curves usually needs to be making sharper turns. For gentle turns you might use Power levels of 50% on the fast wheel and 20% on the slow wheel. For sharper turns on a curvy line you might need to use 30% power for the fast wheel and coast or brake the slow wheel. Whatever power levels you use the numbers will be the same for the two turns, you just switch which motor gets the big number and which get the smaller number (or a stop command).

This type of a line follower will follow a line but it isn't very pretty. It looks OK on a straight line with with the motors programmed for gentle turns. But if the line has any curves then you have tell the robot to use sharper turns to follow line. That makes the robot swing back and forth across the line. The robot only "knows" how to do two things; turn left and turn right. This approach can be made to work but it is not very fast or accurate and looks terrible.

In the above approach the robot <u>never drives straight</u>, even if it is <u>perfectly</u> aligned with line's edge and the line is straight. That doesn't seem very efficient does it?

Lets try to fix that. Instead of dividing our light value number line into two regions lets divide it into three.
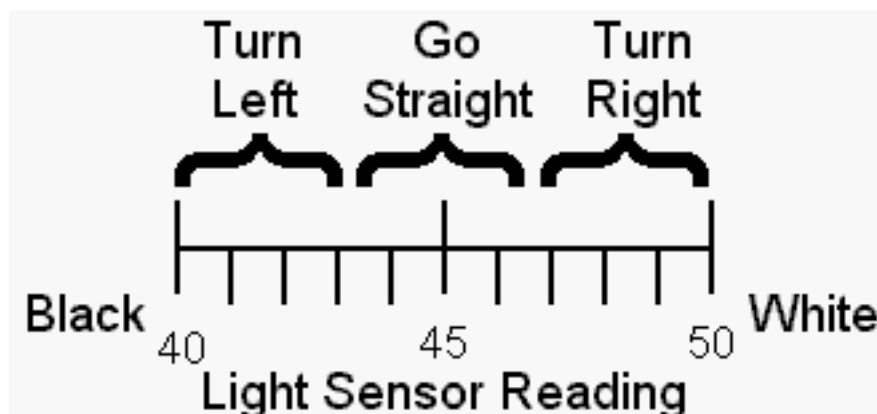
So now if the light level is less than 43 we want the robot to turn left. If the light value is between 44 and 47 we want it to go straight (zoom zoom). If the light level is greater than 47 we want to turn right. This can be easily be implemented in Mindstorms NXT-G with a switch (yes/no) within a switch. You actually only have to do two tests not three.

This approach works better than the first one. At least now the robot is sometimes moving straight forward. As with the first approach you still have to decide what kinds of turns you need and that usually depends on the characteristics of the line you are following. The robot will probably still hunt back a forth a fair amount.

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The astute reader will probably have thought "*well if three light ranges are better than two than what about adding even more?*" That is the beginning of a PID.

The "P" in "PID": Proportion(al) is the key

So what will happen if we add more divisions to our light scale line? Well the first thing we have to deal with is what does "turn" mean with more than three light ranges? In our first approach the robot could do just two things, turn left or right. The turns were always the same just in opposite directions. In the second approach we added the "go straight" to the two turns. If we have more than three ranges then we need more "kinds" of turns.

To help understand "more kinds of turns" we will redo or number line a bit and convert it into a graph. Our X-axis (horizontal) will be our light values just like on the number lines. The Y-axis (vertical) well be our "turn" axis.

Figure 3
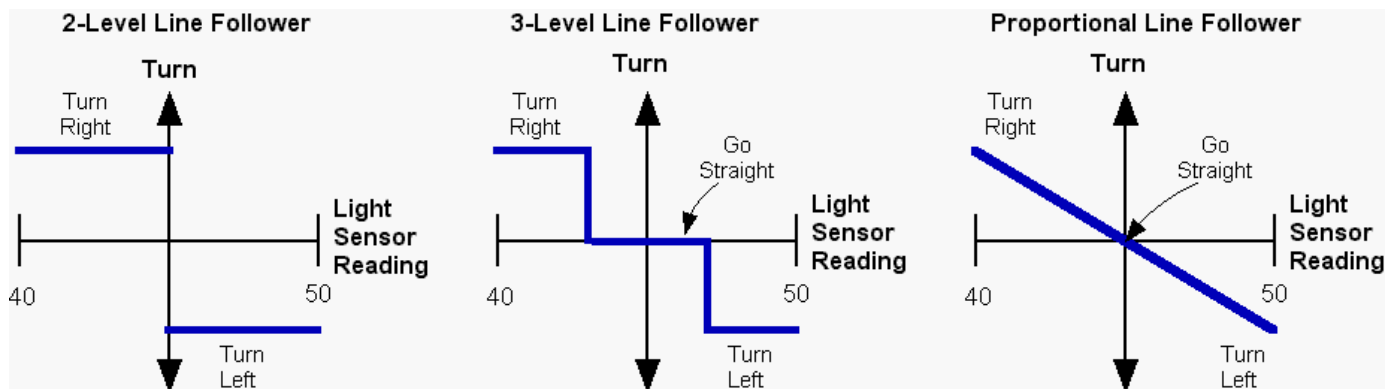
On the left is our original two level setup expressed on a graph. The robot can only do two things (shown by the blue lines), turn right or left and the turns are always the same except for their direction. In the center is the three level follower. The added center range is where the robot drives straight (Turn=0). The turns are the same as before. On the right is a **Proportional** line follower. In a proportional line follower the turn varies smoothly between two limits. If the light sensor reading says we are close to the line then we do a small turn. If we are far from the line then we do a big turn. Proportional is an important concept. Proportional means there is a linear relationship between two variables. To put it even simpler, proportional means a graph of the variables against each other produces a straight line (as in the right hand graph above).

As you may know, the equation of a straight line is:

$$y = mx + b$$

Where y is the distance up (or down) the Y-axis, x the distance on the X-axis, m is the slope of the line and b is the Y intercept, the point where the line crosses the Y-axis when x is zero. The slope of the line is defined as the change in the y value divided by the change in the x value using any pair of points on the line.

If you don't know much about lines (or have forgotten what you once new) I'll expand a bit and make some simplifications to our graph and equation. First, we will shift the center of our light number line (the X-axis) to zero. That's easy to do. For our 40 and 50 light value range we just subtract 45 (that's the average of 40 and 50, (40+50)/2) from all of our light readings. We will call that result the **error**. So, if the light value is 47 we subtract 45 and get an **error**=2. The error tells us how far off the line's edge we are. If the light sensor is exactly on the line's edge our **error** is zero since the light value is 45 and we subtract 45 from all of our readings. If the sensor is all the way out into the white our **error** is +5. All the way into the black the **error** is -5.
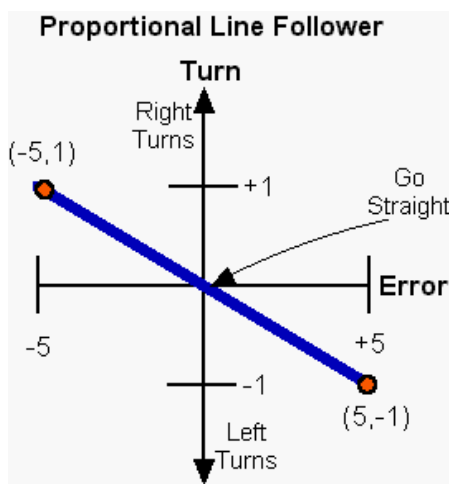
Figure 4

In the above graph I have shifted the axis by converting it to an error scale. Since the line now crosses the Y-axis at zero that means b is is zero and the equation for the line is a bit simpler;

$$y = mx$$

or using our labels

Turn = m***error**

We haven't yet defined what the turn axis means so for now we will just say the turns range from -1 (hard turn to the left) to +1 (hard turn to the right) and a zero turn means we are going straight. The slope of the line in the graph above can be calculated using the two points marked in red (any two points on the line will work);

slope = m = (change in y)/(change in x) = (1- (-1)) / (-5 - 5) = 2/10 = 0.2

The slope is a **proportionality constant** and is the factor that you have to multiply the **error** (x value) by to convert it into a **Turn** (y value). That's an important thing to remember.

The "slope" has a couple names that all mean the same thing, at least in this context. In the PID literature slopes (proportionality constants, m in the equation of a line) are called "**K**" (from misspelling of the word "constant"?). Various **K**s show up all over the PID literature and are a very important. You can think of a **K** (or m or slope or proportionality constant) as a conversion factor. You use **K** to convert a number that means one thing (light values or error in our case) into something else like a turn. That's all that a **K** does. Very simple and very powerful.

So using these new names for our variables the equation of the line is;

Turn = K*(error)

In words that's "take the **error** and multiply it by the proportionality constant **K** to get the needed turn. The value **Turn** is the output of our P controller and is called the "**P term**" since this is only a proportional controller.

You may have noticed that in the last graph the line does not extend outside the **error** range of -5 to +5. Outside the range of -5 to +5 we can't tell how far the sensor is from the line. All "white" looks the same once the sensor can't see any black at all. Remember that this range is arbitrary, your range will be determined by you light sensor setup, the colors of the mat etc. Once the light sensor gets too far from the line edge it starts to give a constant reading, that means the light sensor reading is no longer proportional to the **error**. We can only judge how far the sensor is from the line's edge when the sensor is actually pretty close to it. Over that narrow range the light sensor reading is proportional to the distance. So our sensor setup has a limited range over which it gives proportional information. Outside that range it tells us the correct direction but the magnitude (size) is wrong. The light sensor reading, or the **error**, is smaller than it should be and doesn't give as good an idea of what the turn should be to fix the **error**.

In the PID literature the range over which the sensor gives a proportional response is called the **"proportional range"** (go figure :D). The proportional range is another very important concept in PIDs. In our line follower the proportional range for the light sensor is 40 to 50, for the **error** it is -5 to +5. Our motors also have a proportional range, from -100 (full power backwards) to +100 (full power forwards). I'll just say a couple things about it the importance of the proportional range:

(1) You want the proportional range to be as wide as possible. Our light sensor's proportional range is pretty small, that is, the sensor has to be pretty close to the line edge to get proportional information. Exactly how wide the range is depends mostly on how high the sensors is above the mat. If the sensor is very close to the mat, say 1/16 inch, then the sensor is seeing a very small circle on the mat. A small side to side movement of the light sensor will swing the error from -5 to +5, that's all the way through our proportional range. You might say the sensor has "tunnel vision" and it can only see a very small part of the mat. The sensor has to be very close to the line edge to get a reading that isn't either "white" or "black". If the sensor is moved higher off the mat then it sees a larger circle on the mat. At a height of about 1/2 inch the light sensor appears to be looking at a circle on the mat that is about 1/2 inch across. With the sensor up this high the proportional range is much wider, since the light sensor only needs to stay within +/- 1/2 inch of the line edge to maintain a proportional output. Unfortunately, there are two drawbacks to a high light sensor. First, a high light sensor "sees", and responds to, the room lights much more than a low sensor. A high sensor also has less difference between black and white than a low sensor. At a sufficiently large distance black and white will give the same reading.

(2) Outside the proportional range the controller will move things in the correct direction but it will tend to under correct. The controller's proportional response is limited by the proportional range.

From P to actual motor power levels

How can we implement the turns? What should the actual motor power levels be? One way to do the turns is to define a "**T**arget **p**ower level", which I'll call "**Tp**". <u>**Tp** is the power level of both motors when the robot is supposed to go straight ahead, which it does when the **error**=0</u>. When the **error** is not zero we use the equation **Turn = K*(error)** to calculate how to change the power levels for the two motors. One motor will get a power level of **Tp+Turn**, the other motor will get a power level of **Tp-Turn**. Note that since our **error** is -5 to +5 that means **Turn** can be either positive or negative which corresponds to turns in opposite

directions. It turns out that that is exactly what we want since it will <u>automatically</u> set the correct motor as the fast motor and the other one as the slow motor. One motor (we'll assume it is the motor on the left of the robot plugged into port A) will always get the **Tp+Turn** value as it's power level. The other motor (right side of robot, port C) will always get **Tp-Turn** as it's power level. If error is positive then **Turn** is positive and **Tp+Turn** is greater than **Tp** and the left motor speeds up while the right motor slows down . If the error changes sign and becomes negative (meaning we have crossed over the line's edge and are "seeing black") then **Tp+Turn** is now less than **Tp** and the left motor slows down and the right motor speeds up since **Tp-Turn** is greater than **Tp**. (Remember that the negative of a negative is a positive). Simple eh? Hopefully it'll be a bit clearer as we go on.

Pseudo Code for a P Controller

First we need to measure the values the light sensor returns for white and black. From those two number we can calculate the **offset**, that is, how much to subtract from a raw light reading to convert it to an error value. The **offset** is just the average of the white and black readings. For simplicity I'll assume that the **offset** has already been measured and stored in a variable called **offset**. (A nice upgrade would be to have the robot measure the white and black levels and calculate the **offset**.)

We will also need a storage location for the **K** constant, we'll call that **Kp** (the **K**onstant for the proportional controller). And, an initial guess as to what **Kp** should be. There are a lot of ways to get that first **Kp** value. You can guess and then refine it by trial and error. Or, you can try to estimate a value based on the characteristics of the sensor and robot. We'll do the latter. We will use a **Tp** (target power) of 50, when the error is zero both motors will run at power level 50. The error ranges from -5 to +5. We'll guess that we want the power to go from 50 to 0 when the error goes from 0 to -5. That means the **Kp** (the slope remember, the change in y divided by the change in x) is;

Kp = (0 - 50)/(-5 - 0) = 10.

We will use the **Kp**=10 value to convert an **error** value into a **turn** value. In words our conversion is "for every 1 unit change in the **error** we will increase the power of one motor by 10". The other motor's power gets decreased by 10.

So, in pseudo code ("pseudo code" means this isn't actual NXT-G, or any other type of program code, instead it is just a detailed listing of what we want the program to do):

```
Kp = 10                    ! Initialize our three variables
offset = 45
Tp = 50
Loop forever
   LightValue = read light sensor     ! what is the current light reading?
   error = LightValue - offset        ! calculate the error by subtracting the offset
   Turn = Kp * error               ! the "P term", how much we want to change the motors' power
   powerA = Tp + Turn                ! the power level for the A motor
   powerC = Tp - Turn                ! the power level for the C motor
   MOTOR A direction=forward power=powerA ! issue the command with the new power level in a MOTOR block
   MOTOR C direction=forward power=powerC ! same for the other motor but using the other power level
end loop forever                ! done with this loop, go back to the beginning and do it again
```

That's it, well almost. There is a subtle problem that should be corrected. But give it a try anyway. If your robot appears to avoid the line edge, instead of trying to find it, the most likely cause is that you have swapped the turn directions. Change Kp to -10 and see what happens. If that fixes the turn directions then change Kp back to +10 and change the signs in the two power lines to;

powerA = Tp - Turn
powerC = Tp + Turn

There are two "tunable parameters" and one constant in this P controller. The constant is the **offset** value (the average of white and black light sensor readings). You'll need to write a short program to measure the light levels on your mat with your robot. You need a "black" and a "white" value. Calculate the average and put it into the P controller program in the **offset** variable. Almost all line followers require that you (or code written by you and executed by the robot) do this step.

The **Kp** value and the target power **Tp** are the tunable parameters. A tunable parameter has to be determined by trial and error. **Kp** controls how fast the controller will try to get back to the line edge when it has drifted away from it. **Tp** controls how fast the robot is moving along the line.

If the line is pretty straight you can use a large **Tp** to get the robot running at high speed and a small **Kd** so the turns (corrections) are gentle.

If the line has curves, especially sharp ones, there will be a maximum **Tp** value that will work. If **Tp** is bigger than that maximum it won't matter what **Kp** is, the robot will loose the line when it encounters a curve because it is moving too fast. If **Tp** is really small then almost any **Kp** value will work since the robot will be moving very slowly. The goal is to get the robot moving as fast as possible while still being able to follow the line of interest.

We had guesstimated a starting value for **Kp** of 10. For **Tp** you might start at even lower than suggested above, perhaps 15 (the robot will be moving pretty slow). Try it and see how it works. If you loose the line because the robot seems to turn sluggishly then increase **Kp** by a couple and try again. If you loose the line because the robot seems hyperactive in hunting back and forth for the

line then decrease **Kp**. If the robot seems to follow the line pretty well then increase **Tp** and see if you can follow the line at the faster speed. For each new **Tp** you will need to determine a new **Kp**, though **Kp** usually won't change too much.

Following a straight line is usually pretty easy. Following a line with gentle curves is a bit harder. Following a line with sharp curves is the hardest. If the robot is moving slow enough then almost any line can be followed, even with a very basic controller. We want to get good line following, good speed and the ability to handle gentle corners. (Lines with sharp corners usually take more specialized line followers.)

It is likely that the best P controller will be different for each kind of line (line width, sharpness of curves etc.) and for different robots. In other words, a P controller (or a PID controller for that matter) is tuned for a particular kind of line and robot and will not necessarily work well for other lines or robots. The code will work for many robots (and many tasks) but the parameters, **Kp**, **Tp** and **offset**, have to be tuned for each robot and each application.

Doing math on a computer that doesn't know what a decimal point is causes some problems

NOTE: This work was done using NXT-G version 1.1 which only supports integers. NXT-G version 2 supports floating point numbers so the following may not be needed if you have version 2 or later.

In the process of tuning the P controller you will be tweaking the **Kp** value up and down. The expected range of values that **Kp** might be depends on exactly what the P controller is doing. How big is the input range and how big is the output range? For our line follower P controller the input range is about 5 light units, and the output range is 100 power units, so it seems likely that **Kp** will be in the vicinity of 100/5=20. In some cases the expected **Kp** won't be that big. What happens if the expected **Kp** is one? Since variables in NXT-G are limited to integers, when you try to tune the **Kp** value all you can try is ...-2, -1, 0, 1, 2, 3, ... You can't enter 1.3 so you can't try **Kp**=1.3. You can't use any number with a decimal point! But there will probably be a large difference in the robot behavior when you change the **Kp** by the smallest possible change of 1 to 2. With **Kp**=2 the robot tries twice as hard to correct the error compared to **Kp**=1. The motor power level changes twice as much for the same change in the light levels. We really would like to have finer control of **Kp**.

It is pretty easy to fix this problem. All we will do is multiply the **Kp** by a power of ten to increase the usable range within the integer restriction. If it is expected that **Kp** might be near 1 then a value of 100 as the multiplier would be a good bet. Indeed, it is probably best to just go ahead and always use 100***Kp** as the number you actually enter into the program. Once **Kp** has been multiplied by 100 we can now enter what would have been 1.3 as 130. 130 has no decimal point so NXT-G is happy with the number.

But doesn't that trash the calculation? Yes it does but it is easy to fix. Once we have calculated the P term we will divide by 100 to remove our multiplier. Remember our equation that defines the P controller from earlier;

Turn = Kp*(error)

We will multiply **Kp** by 100, which means our calculated **Turn** is 100 times bigger than it should be. Before we use **Turn** we must divide it by 100 to fix that.

So, our new and improved pseudo code for a line following P controller is:

```
Kp = 1000                    ! REMEMBER we are using Kp*100 so this is really 10 !
offset = 45                  ! Initialize the other two variables
Tp = 50
Loop forever
  LightValue = read light sensor      ! what is the current light reading?
  error = LightValue - offset         ! calculate the error by subtracting the offset
  Turn = Kp * error                   ! the "P term", how much we want to change the motors' power
  Turn = Turn/100                     ! REMEMBER to undo the affect of the factor of 100 in Kp !
  powerA = Tp + Turn                  ! the power level for the A motor
  powerC = Tp - Turn                  ! the power level for the C motor
  MOTOR A direction=forward power=powerA ! actually issue the command in a MOTOR block
  MOTOR C direction=forward power=powerC ! same for the other motor but using the other power level
end loop forever                      ! done with loop, go back and do it again.
```

Wait, what was the "Subtle Problem" you mentioned with the first version of the P controller?

There are always subtle problems. Sometime they matter and sometimes they don't. ;)
In this case, one problem is that when we calculate the motor power level (e.g., powerC=Tp-Turn) it is possible to get a negative number for the power. We want a negative number to mean that the motor should reverse direction. But the data port on a NXT-G MOTOR block doesn't understand that. The power level is always a number between 0 and +100. The motor's direction is controlled by a different input port. To get the motor to react correctly when the power is negative you'll need to handle it in the program. Here is one way to do that;

```
If powerA > 0 then              ! positive motor power is no problem
   MOTOR A direction=forward power=powerA
else
```

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```
powerA = powerA * (-1)              ! negative motor power needs to be made into
   MOTOR A direction=reverse power=powerA  ! a positive number and the motor direction
end If                              ! needs to be reversed on the control panel
```

The MOTOR block receives the power (powerA for the A motor) via a data wire. The direction is set with the check boxes in the motor's parameter window.

You will need a similar chunk of code for the C motor. Now when the calculated power goes negative the motors will be properly controlled. One thing this does is allow the P controller to go all the way to a "zero turning radius turn" and the robot can spin in place if needed. Of course, that may not actually help.

There are a couple other things that might be subtle problems. What happens when you send a power level that is greater than 100 to the motor? It turns out that the motor just treats the number as 100. That is good for the program but not the best thing to have happen in a P (or PID) controller. You would really prefer that the controller never tries to ask the motors to do something they can't. If the requested power isn't too far above 100 (or below -100) then you are probably OK. If the requested power is a lot bigger than 100 (or a lot less than -100) then it often means the controller is spiraling out of control. So, make sure you have a fire extinguisher handy!

P Controller Summary

Hopefully you've picked up enough to understand a P (proportional) controller. It is pretty simple. Use a sensor to measure something that you are trying to control. Convert that measurement to an **error**. For the line follower we did that by subtracting the average of black and white light values. Multiply the **error** by a scaling factor called **Kp**. The result is a correction for the system. In our line follower example the correction is applied as an increase/decrease in the power level of the motors. The scaling factor **Kp** is determined using a bit of educated guessing and then fine tuned by trial and error.

P controllers can handle a surprising wide range of control problems, not just following a line with a LEGO robot. In general, P controllers work very well when a few conditions are met.

1. The sensor needs to have wide dynamic range (which unfortunately is not true for our line following robot).

2. The thing being controlled (motors in our case) should also have a wide dynamic range, that is they should have a wide range of "power" levels with individual "power" levels that are close together (the NXT motors are pretty good in this respect).

3. Both the sensor and the thing being controlled must respond quickly. "Quick" in this case is "much faster than anything else that is happening in the system". Often when you are controlling motors it isn't possible to get "quick" response since motors take time to react to a change in power. It can take a few tenths of a second for LEGO motors to react to a change in power levels.

That means the robot's actions are lagging behind the P controller's commands. That makes accurate control difficult with a P controller.

So where's the code?

I could give it to you but then I'd have to kill you.

Since this document is targeted at older FLL kids, I really don't want to give'm the code. They should be able to write their own.

The pseudo code has pretty much everything you need for the PID itself. You may have to add some setup code and perhaps a suitable way of stopping the line follower loop.

As a little bit of help here's a MyBlock that takes two inputs, the target power Tp and the Turn value, and controls the two motors.

This MyBlock also properly deals with negative power levels. It even beeps when a motor reverses directions, which is handy for tuning. A properly tuned line following PID should rarely have to reverse motor directions.

PID_LF_MotorControl.rbt is the RBT file for NXT-G v1.1.
http://www.inpharmix.com/jps/_images/PID_LF_MotorControl.rbt

A screen shot of the program is at PID_LF_MotorControld.png
http://www.inpharmix.com/jps/_images/PID_LF_MotorControld.png

If you would **really** like to get my PID NXT-G code send me an email to Lego at InPharmix dot com
#

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LDraw Tutorial (VIII)

Buffer Exchange and Ghosting

Text and pictures by Jetro

Have you ever wanted to show where a part or sub-assembly goes the same way it's sometimes done the instruction booklets from LEGO®? The trouble is, if you do, there are two problems: one, the arrow stays in your LDraw file; two, you don't want the part or sub-assembly to turn up twice in your file.

Of course I wouldn't have brought this up if there wasn't a way to overcome both these obstacles, and the title is pretty clear about what you need to do so, but you'll probably appreciate a more detailed explanation so here goes.

Buffer Exchange

MLCad has a special feature called Buffer Exchange. It allows you to, in a manner of speaking, save a snapshot of your LDraw file at a specific moment, so you can retrieve it later on. The way it works is really quite easy, and probably the best way to see exactly how it works is by having a look at a file that uses this function. In this article I'll be using the example created by Michael Lachmann[1], creator of MLCad, a file named Waggon1.mpd[2] (see fig. 1)

When you open the file you will see that it doesn't look very good. This is because in *Edit Mode* you see al the parts in all the locations they are used. But when you switch to *View Mode* or view the file in LDview you'll see it just the way you'd expect it. Let's go to View Mode and advance a few steps. Step 8 and 9 are where you get to see exactly what Buffer Exchange can do for you. In step 8 you see the tank hovering over the wagon and two arrows indicating exactly where it should be placed. In
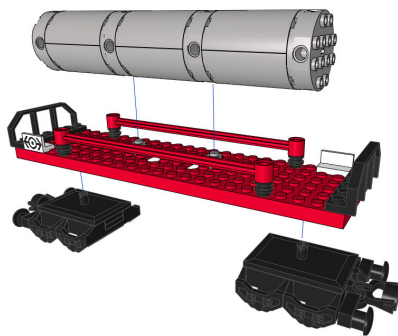
step 9 you see the tank in its final location and the arrows have disappeared.

To see how this works you need to have a look at the text of the LDraw file[3]. Step 8 starts in line 34. In LDDesignPad you can see line 35 reads *0 BUFEXCHG A STORE.* MLCad shows it as *BUFEXCHG* in the Type column and *STORE A* under Part name/Description. What this does is store the way the file looks now and the parts it contains in exchange buffer A (you can use a total of 26 different buffers, A-Z, although you'll rarely need more than one). You can add a buffer exchange in

MLCad either by going to *Edit > Add > Buffer Exchange…* or clicking on the last icon in the object bar, selecting the buffer you wish to use and clicking OK.

After this you make the changes you need to make (add the tank hovering over the wagon and insert the arrows). You then restore the previous state of the file in almost the same way (the only difference is that you need to check the box next to Retrieve in the configuration window). The line *0 BUFEXCHG A RETRIEVE* is then added to the LDraw file, which MLCad displays as *BUFEXCHG* in the Type column and *RETRIEVE A* under Part name/Description. The previously added parts and any indicators (arrows) you may have used have disappeared and you can place the tank in the correct position.

Ghosting

So far so good. There are a few things to take into account though. If you use this technique in a sub-file of an MDP file, when you use the resulting composite part you'll notice it contains too many parts: the parts you added during the buffer exchange are now again visible!

In order to avoid this you need to set a special attribute for the parts you add during a buffer exchange. Since the parts are there but should not be shown outside the buffer exchange, they are ghosted. You can do this by selecting the parts you need to ghost and either go to *Edit > Visibility > Ghost*, or by clicking on the ghost icon – the first in the Visibility bar. If you use LPub4 you may get the impression that this software automatically excludes parts added during a buffer exchange even if you don't ghost them, but this is only partially true. The parts are not shown, but they are counted so they will turn up in the parts list (PLI) and the bill of materials (BOM). This means you shouldn't only ghost parts added during a buffer exchange in a sub-file, but also in the main file. Try unghosting the tank added during the buffer exchange in the main file of waggon1.mpd. Save the file and open it in LPub4. You'll now see that LPub4 tells you to make the tank twice, even though you only add it once. In short, you need to ghost all parts you add during a buffer exchange.

By using a combination of Buffer Exchange and Ghosting you make your LDraw instructions look even more professional and a lot easier to understand. Combining it will sub-assemblies in call-outs it also allows you to place more parts in a single step without making the instructions more complicated.

[1] You can read an interview with Michael Lachmann in Hispabrick Magazine 007
[2] http://www.lm-software.com/mlcad/models/dats/waggon1.mpd
[3] You can do this either in the part list of MLCad or opening the file in LDDesignPad or the text editor of your choice
#

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BUILDING TREES (VII)

The exploration of new techniques, using standard parts, allows us to face build new types of trees.

Text and pictures by Legotron

There are trees that, for the simple fact of drawing our attention, deserve a chance to be recreated with LEGO® pieces, and this is the case with this new article. The weeping willows of my local municipal gardens caught my attention, and I have made many attempts to recreate them so far, but always unsuccessful. It was necessary to find a simple technique to shape the tops of the trees upright. But once I found it, the result has been more than satisfactory.

The traditional construction of classical plant leaves 4x3 placed horizontally is not good for the characteristic shapes of the weeping willow, but placing them vertically you can achieve a perfect appearance. Therefore, the design of our tree should allow us to fit the maximum number of leaves placed vertically and around the entire circumference of the tree.

Parts needed.

The list of parts needed to build such trees is strongly influenced by the large number of leaves needed. You can use many types of trunks, but this time I opted for one made of bricks, slopes and arch bricks, which included the following items, named after the criteria used by the Web portal Bricklink [1]:

For the base:

- A green 6x8 plate.

For the trunk:

- 5 1x1 brown bricks.
- 5 2x2 or 1x2 brown bricks
- 5 2x2 corner bown bricks
- A 6 brown bar 4L for the branches of leaves.
- 12 bricks modified with 1x1 headlight to make the anchors of

the branches of leaves.
- 4 1x5x4 brown arch bricks for the forks of the trunk.
- 5 1x4 brown plates for the main branches.
- 5 2x2 corner brown plates to strengthen the branches to the trunk.
- 5 slopes 33 3x1, 45 2x1 and 75 2x1x3 in total, at the junction of the trunk with the roots.
- A pair of brown inverted slopes 75 2x1x3
To make the branches:
- Between 150 and 200 green plant leaves 4x3.

Construction.

First, it is necessary to mention that the construction of this tree has a greater difficulty than the preceding articles, and requires a good dose of patience and care for its termination. Secondly it should be noted that the required number of plant leaves is very high, but essential to achieve a good result.

The construction of the weeping willow begins with the trunk. One crucial thing is that the trunk should be anchored on the plate, mixing the three brick high slopes with bricks, to ensure the stability of the construction. The trunk doesn't need to be very showy, as almost everything will be hidden, but it is important to make sure it is strong, since during the construction of the tree we will have to continually press the branches against the trunk and must avoid it coming apart. At the height of 6 or 7 bricks we will begin to merge the four arch bricks 1x5x4 at different heights and each looking in a different direction. In the centre we will extend the main trunk more than two bricks high from the highest branch, and with the help of several 2x2 corner plates we will firmly connect all branches with the trunk. Then, on the lower branches, we will place the remaining 2x2 corner plates and prolong them with 1x4 plates placed perpendicular to the arch bricks 1x5x4. The trunk is now ready, but before continuing we need to ensure that the trunk sits perfectly on the base and that it will not be removed easily by pressing the ends of the branches.

The next phase is going to give the tree its characteristic appearance of a crown that looks like a cascade. We will use a pair of 1x1 brick modified with headlight and a 4L bar attached as shown in the detailed picture of the anchor. The first brick, which is the one connected on the tips of the branches, should go with its side stud up, and we connect the second one with its side stud to one side and put a 4L bar through the hole. This combination will be the anchor base of the leaves and it allows many combinations simply turning the bricks slightly. We place the first leaves, one on the side stud above the first brick, which covers the anchor, and 6-9 inserted on the bar, pointing to different directions. We put the anchor at the end of a branch and we repeat the step to put an anchor on the 5 or 6 branches we have in the tree. So far we have resolved the easy part of the construction.

The chains of leaves can be dropped almost to the ground, though this makes the work difficult, making it more convenient to leave the ones nearest to the ground for the end. Once all the anchors are all well-shaped tops with lots of leaves, we proceed with the lining of the main trunk, covering all the studs in the traditional way, putting more leaves on them. With the tree almost finished the most challenging part begins, which is to sculpt the final touches of all the crowns, so that each one of them looks very rounded and voluptuous, and the chains of leaves reach almost to the ground. As you add these last pieces, which are often difficult to access or are not securely fastened, some of the leaves you added previously may come off so the tree is constantly changing shape. With a little care and patience you can explore the myriad of possible combinations to achieve the desired look.

As can be seen, with this technique to anchor leaves we can build really leafy trees, without having to make them very large, but it requires a huge amount of leaves. Anyway, these willows are very showy and can be the perfect addition to a park or garden.

References:
[1] Portal selling unofficial LEGO® parts online: http://www.bricklink.com
#

One of the characteristics of the leaves of the weeping willow is that its branches full of leaves hang down, even to the floor, to form many clusters in some points, which appear superimposed waterfalls. We start the extension of all these first leaves placing as many leaves as necessary, so they draw a gentle curve towards the ground. This construction is superimposed, so that the thickness of the leaves on each anchor grows horizontally and the leaves are added vertically.

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An introduction to Robotics with LEGO® MINDSTORMS (V)

Actuators for the NXT

Text and pictures by Koldo

In the previous issue of Hispabrick Magazine, we talked about ho a robot feels, i.e. how it gathers information from its surroundings by means of sensors. But in addition to a sensor system, in order to be able to interact with the surroundings, it also needs some system that allows it to carry out the task it will be assigned.

The NXT has different ways for doing things:

- A small screen that can show messages: text, numbers or even drawings and animations.
- A speaker that can reproduce sounds.
- A wireless communication system by BlueTooth that allows it to send and receive messages from a total of three other NXTs.
- A high speed port (S4) by mean of which it can communicate with another next through a cable and
- Three motor ports.

In addition to this it is possible to increase the number of outputs for motors by using a multiplexor. The one you can see in the image can be used to connect two motors to s sensor port (in addition to the sensor) although this requires an external power source.

This article is about actuators, i.e. elements that will produce circular or linear movement or effort.

Circular movement

The most common actuator is the continuous current motor. The characteristics that define it are the speed and torque.it can produce. You can connect both the original NXT motors as well as PF motors to the NXT. You can also connect the older Technic motors, but ever since the introduction of the PF system these are much less useful with the NXT.

-NXT Motors

What differentiates the NXT motors from other motors is the fact that they incorporate an encoder. What is an encoder? It is an optical device that allows you to measure the turning of a motor. In the case of the NXT, it is capable of measuring turns with a 1º precision. This device, together with the program that controls the motor, makes it possible to make the motor turn the fraction of a full turn you wish: a quarter of a turn, half a turn, 37º...

This system also solves a problem that occurs with other motors: the NXT continuously receives information about the turning of the motor, which makes it possible to synchronise two motors in such a way that when you mount them on either side of a vehicle, both will turn the same amount and the vehicle will drive in a straight line (this is difficult with othr motors that don't send information about their position to the NXT because even if they are similar, they probably won't turn at exactly the same speed).

-PowerFunctions Motors

When LEGO® started changing the type of parts it used in Technic models -and as a consequence in MINDSTORMS - it had to design new motors as it wasn0t easy to adapt the old ones to the new models. The result was the PowerFunctions (PF) system, with two motors of different size (M and XL) and a system that allows you to remotely control them by means of infra-red communications.

Contrary to the NXT motors, these motors don't give any feedback about their position to the NXT so it isn't possible to control their turning in the same way. In many cases this won't be a problem, especially when a robot uses other sensors to gather information. These motors need two adaptor cables in order to be able to connect them directly to the NXT (LEGO references 8528 and 8886).

-Controlling PF motors by infra-red communications

What's interesting about the PF motors is that they can be remote controlled by infra-red signals This means that if you use an "IR link for PF motors" (as can be seen in the image of all the elements of the system, with the aspect of a sensor) you can control up to 8 PF motors independently, using an NXT sensor port. In this case, the motors need an independent power supply.

Rectilinear Movement

Although it is possible to convert a circular movement into a rectilinear movement using gears (something we do each time we use a car), there are constructions that for a number of reasons (space, characteristics of the movement, ...) why this could turn out to be problematic. In these cases we use linear actuators, which allow you to generate a linear movement of limited length.
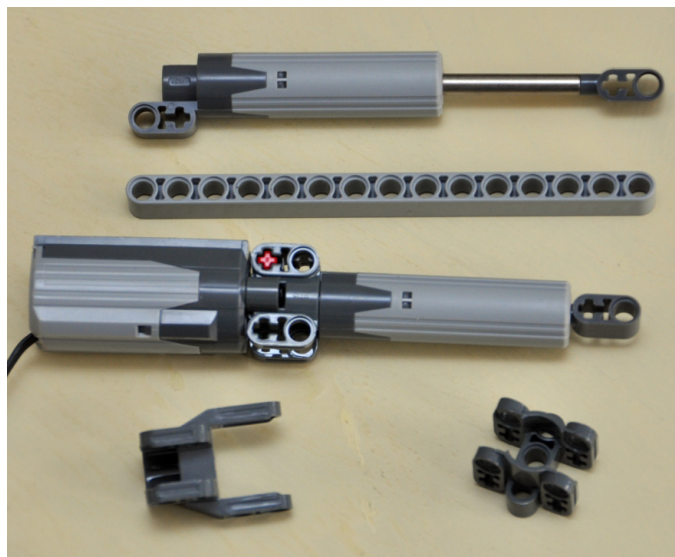
-Pneumatic cylinders

Pneumatic cylinders, commonly used in industry and automation were the first linear actuators produced by LEGO®. The LEGO Pneumatics system consists of the following parts: air compression elements, an accumulator to store air, a valve for air distribution and the control of different elements and cylinders to carry out the work. Recently LEGO has produced a manometer to measure the air pressure.

In order to use these elements with the NXT you must keep in mind that there are no motorized valves and I don't recommend this system to anyone just starting out with LEGO MINDSTORMS.
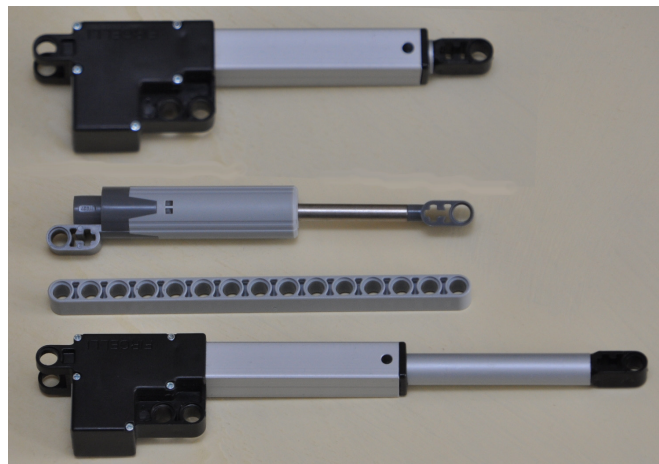
-PF Linear Actuators

PF linear actuators are a good alternative to pneumatic cylinders, especially because, contrary to pneumatic elements, they allow for intermediate positions in their travel. In order to control them from the NXT, they must be fitted with a motor, for example like in the following image.

In this case the only way to precisely control the position of the piston rod is to use an NXT motor or placing a rotation sensor between the motor and the cylinder.

The only inconvenience of this element is its price: 50$ and 55$ for the 50 and 100mm versions respectively.
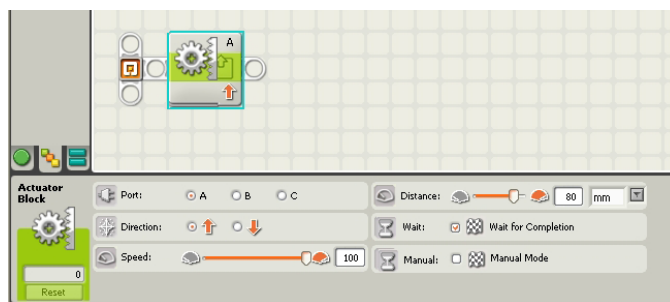
Others

If you want to go even further, there are elements that allow you to connect other types of actuators to the NXT. Among these are the servomotor controller that you can see in the following image. By means of this controller you can connect up to 8 servomotors as used in radio controlled models to the NXT, which generate turns of 90º, 180º and continuous turns.

An excellent website or more technical information about LEGO motors is Philo's web http://www.philohome.com/ #

### -FIRGELLI Linear Actuators

The FIRGELLI linear actuator - you can see one in the following picture - has an internal motor that can be directly connected to the NXT. It is available in two sizes, 50mm of expansion (the one in the picture) or 100mm. Using the corresponding programming block you can control its movement both in millimetres and in studs.
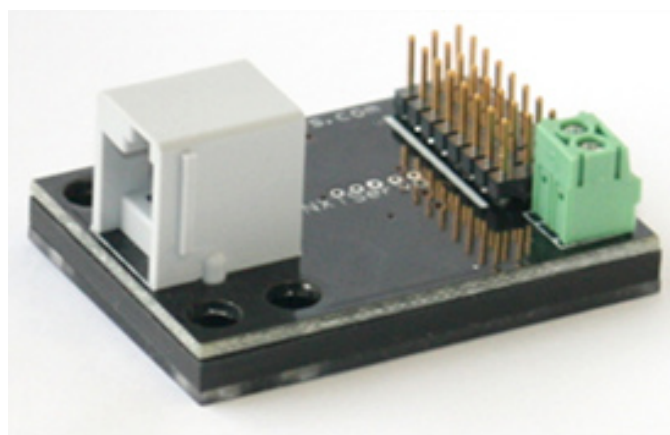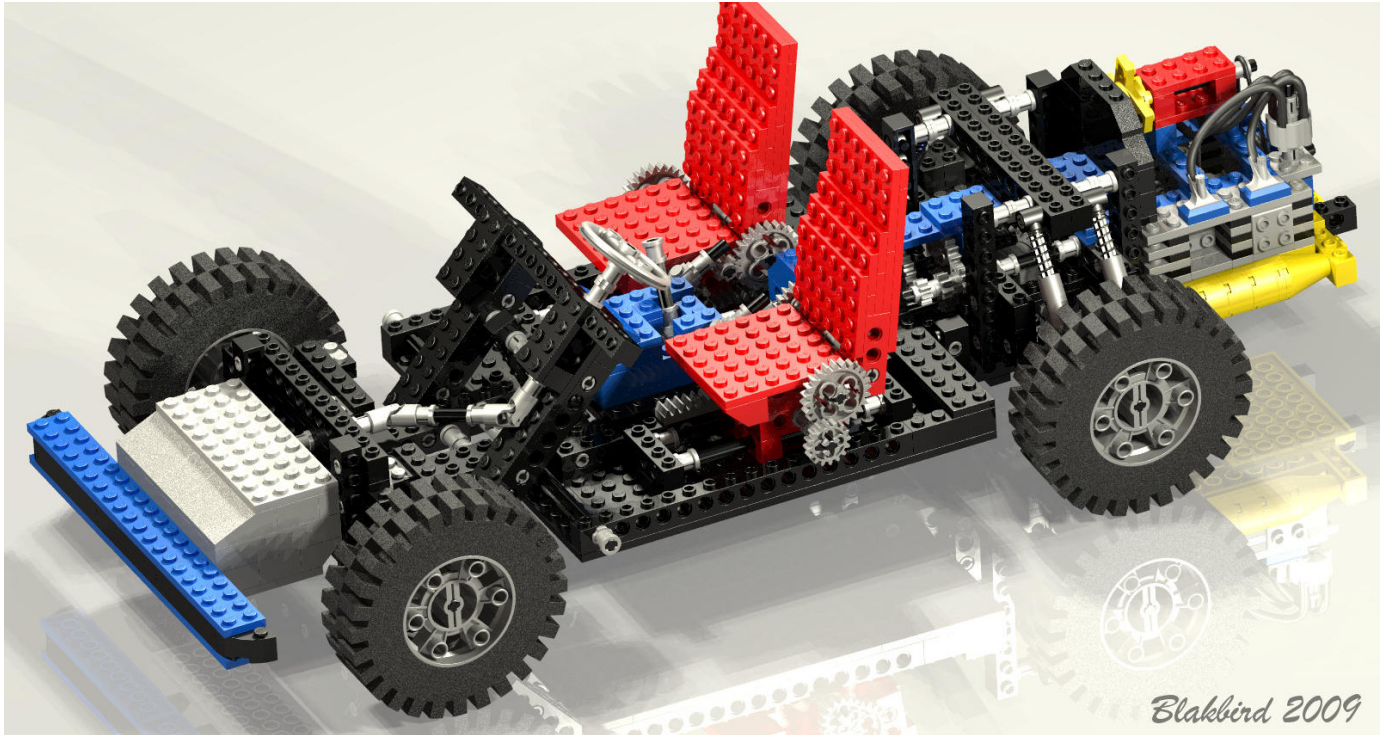

Lrobotikas.net
Robótica Educativa y Recreativa

SuperCar 8860

The Auto Chassis 8860, was released in 1980 to replace the 853

Text by Manticore

Images from Blackbird´s Technicopedia

I spent a year dreaming of this car until finally, one night in January it "appeared" in my living room. Since then I have lost count of how many times I have built that set. I could describe all the mechanisms with my eyes closed. Opening that box was quite an experience for a Spanish kid back in the eighties. The mythical 24x43 wheels placed in the centre, the huge amount of TECHNIC bricks, plates, gears, axles, pins...

Technically, the highlights of this model were the incorporation of the suspension for the rear wheels and the rear axle differential.

The engine went to the rear of the chassis and the four cylinders were positioned horizontally, and it includes aesthetic elements such as air cooling, a pair of exhaust pipes and a screen in front of the engine, which acts as a firewall to protect passengers.

Before my dark ages, I added two more cylinders to the engine, thus increasing the length four studs and the result was spectacular.

As for the front axle, it of course has steering, which makes the set very playable. The times that I have wiped out my LEGOLAND city with the car as if it were Godzilla (misdeeds of a difficult childhood... HispaLUG did not exist yet).

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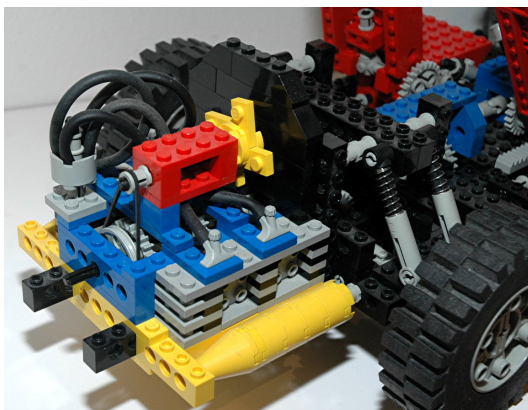
The rear axle incorporated a 3 speed gearbox. Since it was not synchronized it was difficult to fit the transmission shaft as it was almost never correctly aligned. One of the positions of the gearbox acted as a curious handbrake that immobilized the vehicle. I used to leave it on a tilted surface until the pitiful sound of the plastic of a TECHNIC gear or axle aroused my spirit of solidarity.
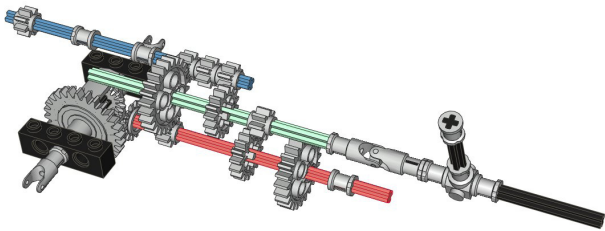
Another innovation was the addition of the rear axle differential, which allows each wheel to rotate at different speed according to the direction in which they take a bend. This improvement allowed the supercar to make smoother turns than its predecessor.

The position and inclination of the two seats could be regulated with a simple mechanism controlled by two TECHNIC gears with 16 and 24 teeth:

Curiously, in the suspension of the rear wheels, in the preliminary model, the TECHNIC Shock Absorber 6.5L did not appear. Instead there were simple springs around axles that act as shock absorbers (you can still see them in the photo that appears in the instructions):
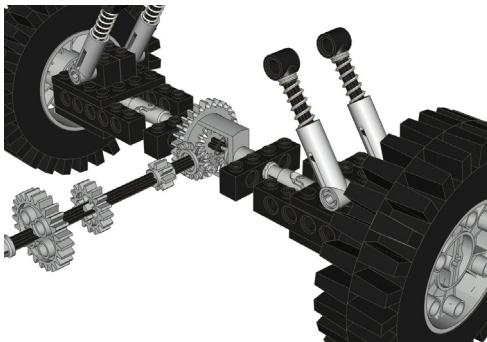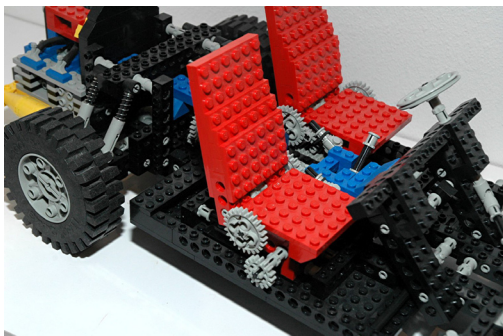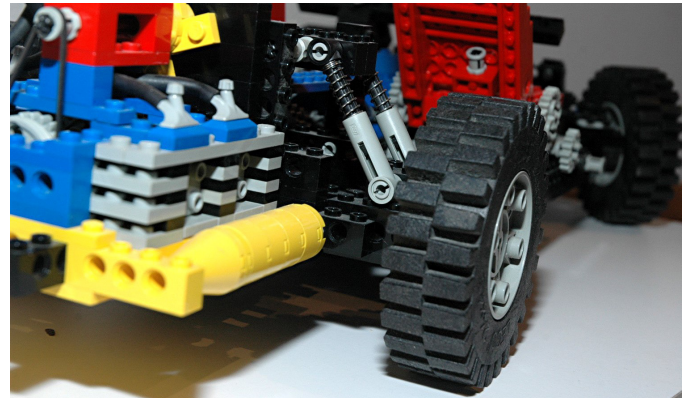

There's no accounting for tastes, but the aesthetics was greatly improved with regard to the previous model. You only have to take a look at the engine, the front bumper and seat design. Without being as "empty" as its predecessor, the set presented an image of a more compact structure, but never stopped being a chassis.

The colour palette is, in my opinion, perfect. I can not imagine this car in a different colour than black and red with blue accents. The aesthetic part of the motor is unsurpassed, and although using very basic parts, the playability and the mechanisms are superb.

I could be talking for hours and hours about this set: what it meant to my hobby and what I learned from its construction. While all the kids of my age were going crazy with España'82 (Football World Cup) and Naranjito (the Spanish Football World Cup mascot), I spent that summer clinging to my box, my 8860, my preciousssss...

The only fault I find with this set is that with it I reached the roof of my technological demands. After it, there hasn't been a single set that has fascinated me like this one. And when it appeared, I was already a bit old for playing with toy cars ... or maybe not

This model remained in the market for eight years, until the year 1988 when the 8865 was released, another collector's item.

PD: Thanks to Eric Albrecht for the pictures

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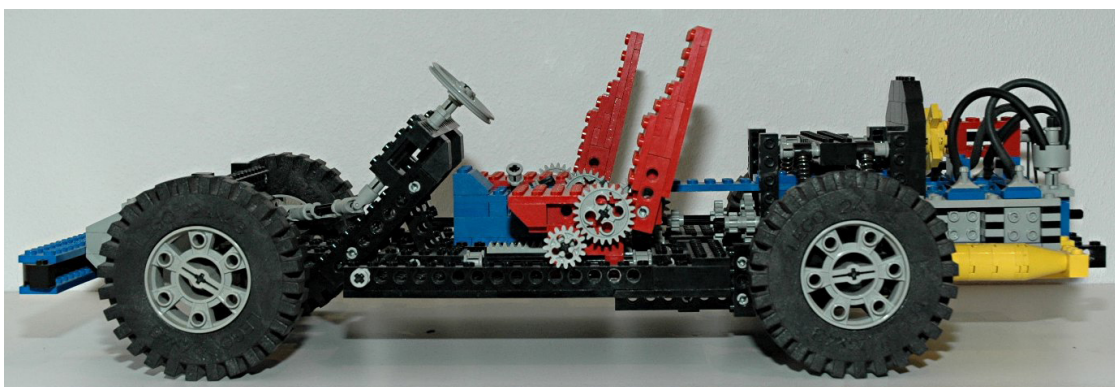
Japan Weekend 2010

Text and pictures by Satanspoet & Bitxa

Last 13 and 14 of March, HispaLUG was present, for the second consecutive year, in the third edition of the Japan Weekend in Barcelona, held at the Palau Sant Jordi. So the presence of our community is consolidated in the most complete festival of urban leisure, electronics and Japanese culture in Spain.

An example is the participation of 16 AFOLS, coming from different parts of the country and the increase of space given by the organization for our bricks.

Our adventure at the Japan Weekend started on Saturday March 13, 9 am., when we started our usual ritual of placing tables and equipment. At 10 am. the doors opened to the general public and the parade of costumes and freaks of all kinds began.

Our stand was showed models from different lines: Star Wars™, Indiana Jones™, Spiderman™, Batman™, SpongeBob SquarePants®, Harry Potter™, Toy Story™, Ninjas, modular buildings and a few MOCS.

The people who came to our stand had the opportunity to see a majestic cathedral with great detail, both inside and outside, that pedro-reus brought along.

Our colleague Otum, in addition to bringing Indiana Jones™ sets, delighted us with his Millennium Falcon, which surprised everyone due to the huge dimensions of this set.

Young hispalugniano94, Axel and lego_hades completed the Star Wars theme with their ships and lluisgib put the icing with the Death Star.

Nebur and Pablo3998 deployed an army of EXO-FORCE and Pol brought us some of his creations, like the Vanship. There were also superheroes, both Batman and Spider-Man™ as well as their archenemies, the Joker and Dr. Octopus, attended thanks to contributions from Vrykolakas, w3ird, Bitxa and Satanspoet. We had another abduction, this time the victim was the poor Batman.

The stand was animated by the two Vestas, contributed by Rick83 and Satanspoet, placed at each end, that simulated generating the electricity necessary to move the trains, property of manticore, which during the exhibition suffered more than one derailment.

We also had the opportunity to see, for the first time for many of us, the Grand Emporium in all its details, together with the Green Grocer and the Fire Brigade.

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This event confirmed the great attraction and fascination people have with SpongeBob® sets and characters, and with Bikini Bottom which was also represented.

Thanks to the material released by LEGO® there was a draw among the participants, including a golden C-3PO and other sets .

Our appointment with the Japan Weekend lasted until 19pm. Sunday, when we started collecting our things while humming the song that was present with us throughout the event and stuck in the subconscious of many of us... ... turutututu, turutututu, tuturututurututu...
#

LEGO® themed room at the VIII Memorabilia Fair at Mungia, Vizcaya

Text and pictures by Legotron

From April 18 to April 19, 2010 the eighth edition of the Collectors Fair was held in Mungia, Vizcaya, organized by the association Bitxikiak (www.bitxikiak.org) in collaboration with the local municipality.

On this occasion, there was an entire room dedicated to the exhibition of LEGO® constructions because there were several members of HispaLUG attending the event with their collections. Thanks to the perfect organization the exhibition could show numerous buildings on various themes which received a large number of visitors that highlighted the variety and quantity of material presented.

The room was divided into several booths in which the following materials could be seen:

The side stand, where the 'Panzerbricks" serie was deployed, with more than two dozen historic military vehicles and a collection of TIE spaceships and minifigs from Star Wars™, all built by A. Bellon (Legotron).

The central stand, were a number of sets and dioramas belonging to the Castle, Indiana Jones and Star Wars lines were displayed, all of them assembled by R. Vaquero (Rafa) and A. Cagigal, among which we can highlight several castles, the Medieval Market Village and some of the most emblematic spaceships from the Star Wars line. In one corner there was a small city diorama designed and built by I. Pernia (Koska), which was much discussed by the audience due to its beautiful buildings.

Finally, the stand of the entrance, where the Imperial Hangar and Maxifigs from Star Wars were displayed, designed by A. Bellon (Legotron), which were the focus of many fans of the

Star Wars saga who visited the fair.

Overall more than 50,000 pieces were exhibited, the staging of which had a great reception from the audience. In addition, there were many people who shared their own experience about LEGO with the exhibitors, and asked about the designs and construction techniques that could be seen in the exhibition.
#

FANA´BRIQUES 2010

Text and pictures by car_mp

Location: Rosheim (France)
Dates: 26-27 June
Exhibition: 2500 m2
Exhibitors: 85 from 6 different countries
Visitors: 5150

Taking advantage of the fact that on our vacation we were near Rosheim on the dates indicated (my wife thinks it has been pure chance ;D) we were able to visit this event. The town has a certain medieval charm, and the truth is that it isn't the typical place where you'd expect to find a lot of AFOLS enjoying their hobby.

The weather was good, perhaps too good, the high temperatures made me suffer for a few bricks that were in the open. Most of the exhibition was located in a sports hall and several tents contained additional services (shops, bar, lockers ,...) and a small part of the exhibition.

All official LEGO® lines were represented to a greater or lesser extent, both official sets and MOCs and dioramas. In the Star Wars™ area we could find all official UCS and some MOCS of which LEGO would have to take note, such as the Venator that everyone would like to have with our ISD. There were also several dioramas of Space and Castle, but as always, City was the most numerous. Off course Mindstorms, Technic and GBC, which has become an essential in all events, were also present.

I personally want to thank Thierry Meyer for the time he spent with us during our visit.
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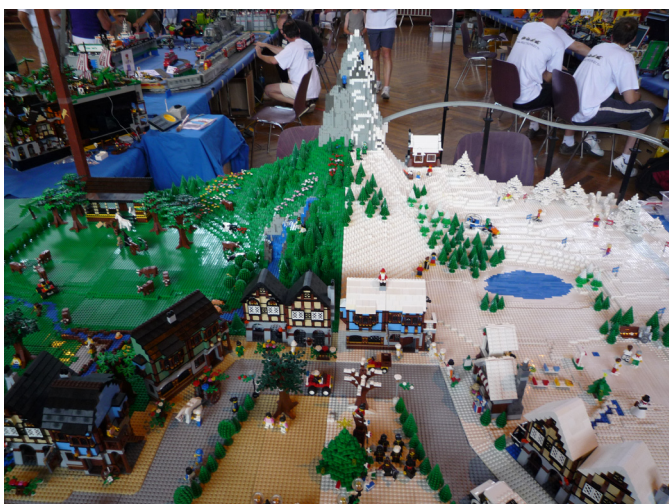
Interview with Eric Albrecht

The Technicopedia creator and LEGO® Technic Blog member

By Hispabrick Magazine

Pictures and renders by Eric Albrecht

HM: Name

Eric Albrecht (aka Blakbird)

HM: Age

EA: 38

HM: Occupation

EA: Aerospace Engineer

HM: Nationality

EA: USA

Technicopedia

HM: How did the idea of creating Technicopedia come about? (how did you get started on Technicopedia?)

EA: I started buying Technic sets in the late 1990's. I quickly bought all I could find on the store shelves and found that I was not sated and still wanted more. I knew almost nothing of the AFOL community at the time, but I found Lugnet and was able to search the set database there to see what other Technic sets existed. Based on nothing but the small images available there, I made a list of the other sets I wanted to acquire. At the time, I used mostly eBay to start collecting those sets from around the world. As I went along, I found that many of the sets were not what I expected from the picture, and were almost always better. This led me to expand my wanted list gradually until it included everything.

Once I finished the collecting aspect I actually built a structure on my property which was part woodworking shop and part LEGO® display room. I put all of them on shelves and tried arranging them different ways, either by year of release or by topic. As I did this it occurred to me that it would have been very helpful to me when making my wanted lists to have had access to some sort of list or database that actually compared the FUNCTIONS of the sets and not just pictures of their appearance. After some more checking on the Internet I found Jim Hughes wonderful Technica site. This was the only site I could find which was fully dedicated to Technic. I found the element registry marvelous and although the site also had a listing of sets, it still did not have the kind of details and comparisons for which I was looking.

Since I had spent so much time and effort collecting and was finally done, I felt that I needed an outlet for my LEGO energy and I wanted to give something back to the burgeoning LEGO community that had given so much to me. It also occurred to me that there may be very few people (if anyone) on the whole planet who actually had all the sets and would be capable of documenting all of them, and my engineering background put me in an excellent position to understand and describe the mechanics of the sets. Therefore in some way I felt it was my responsibility to take on this task in gratitude for being given the ability and resources to acquire all the sets in the first place.

Once I decided to document all the sets, I very quickly knew I wanted the site to be the most complete, technically accurate, and useable resource that I could produce. I always intended to do the whole thing on my own, although since then a number of people have contributed their help in various ways. I purchaed the domain name and started work almost immediately after coming up with the idea. The original concept was to describe each set, organized by year, and explain in detail each function with a corresponding stop-motion animation. The scope has expanded since that time, and I contiuously find myself going back to add improvments to the existing years such as more computer renders, LDraw files, and revolving animations. Other improvements are still planned.

HM: How many Technic sets do you own?

EA: The short answer is "all of them".
The longer answer is more complicated. According to my Lugnet set list I own 287 sets although not every one of those is Technic. The other complication is what you consider to be a Technic set. I always considered the Expert Builder series to be on the list, but what about all the supplemental sets? From a collectibility standpoint I want to get all of them, but most of them aren't very interesting from the point of view of functionality since they are just extra parts. Later years get even more confusing because the Technic logo was put on various other products such as Star Wars™, Racers, and some of the first Bionicle sets. I have all of the Star Wars Technic sets and all of the Racers that I personally consider to be Technic whether they actually have the logo on them or not. I consider Bionicle a wholly different product than Technic and I no longer have any of those. I also don't consider Mindstorms to be Technic even though it uses Technic pieces. These are my own decisions and other people no doubt have different opinions.

I also own about another 75,000 parts worth of Technic MOCs which I have on display designed by such people as Jennifer Clark, Crowkillers, Han, and Grazi.

HM: How long did it take you to get all of them?

EA: I started purchasing Technic sets ~1998, although I didn't have the goal to get all of them until several years later. It was about 2006 when I considered my set "complete", although to this day I still occassionally find a unique set that I never knew existed. Between that and the fact that new sets keep coming out twice a year, I will never be done. Don't tell my wife.

HM: Which one was most difficult to get?

EA: There were several times during my collecting when there was a "Holy Grail" that I just couldn't find and focused all of my energy. In the early days I did not know about Bricklink (or it didn't exist yet) and I was doing all my searching on eBay.

I remember that I had an active search open for the 8862 Backhoe loader for 6 months before I was able to find a copy that was almost complete. Even then it was missing one of the big rear wheels (24x43). It turns out that particular part only exists in yellow in this one set so I thought I had no hope of replacing it. It sat on my shelf with no rear wheel for over 2 years until I found Bricklink. I now have 2 copies of this set but still don't have a box.

The 858 Auto Engines were also extremely difficult to find, even on Bricklink. This set cost more money per part than any other set I have even though none of the parts are very unusual.

HM: Asking you for your all-time favourite Technic set would probably be asking for the impossible, but could you narrow it down to maybe 5 or so?

EA: You're right, that is a very difficult request! Since I have so many, I tend to favor sets which are unusual or special in some way. I love all of the Auto Chassis sets although 8880 is my favorite. 8480 is near the top of the list because of its tremendous functions, beautiful looks, and unique subject. Both Control Centers (8094 and 8485) are incredibly clever and unusual as is the 8479 Barcode Multi Set. I can't neglect the 8868 Airtech Claw Rig with its pneumatic compressor. All 3 of the big F1 cars (8458, 8461, 8674) are magnificent and have incredible tires. Among the newer sets, I really like the 8421 Mobile Crane and the 8265 Wheel Loader.

That's more than 5 isn't it?

HM: And you favourite mechanism?

EA: For gear systems, I love any of the sets with synchronized transmissions like the 8880, 8448, and 8466 cars. The 8480 uses the same transmission for switching functions instead of switching gears, and so does the much newer 8258 Crane Truck. The 8258 was also the first time in an official set that dual concentric gear functions were passed through a rotating turntable. Bravo.

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For pneumatics, the 8868 Airtech Claw Rig and 8455 Backhoe Loader are the best.

For mechanical linkages, I really like the lift mechanisms on the 8292 Cherry Picker and the 8289 Fire Truck. The geometry is just perfect to allow both primary and secondary booms to stow in the correct position and also to extend to full height with only one input.

HM: What mechanism would you like to see in an official LEGO® set?

EA: The dual functions passing through a turntable I mentioned above is something which AFOLs had used for several years and many people were waiting for in an official set. Now that it has been done, another long time request is an electrically operated pneumatic valve.

Personally, I would like to see some sort of planetary gear set (the Power Miners gets close,but is very specific). Technic introduces kids to many different kinds of gearing including spur, bevel, rack, and worm. The LEGO differential first taught me how such a device worked. Planetary gear sets are some of the hardest to grasp conceptually, and are yet among the most useful. I'd like to see a real planetary gear set in which the sun gear, the ring gear, and the planetary carrier can all be used as either input or output. This would allow you to properly simulate an automotive automatic transmission as well as making large gear reductions very compact and efficient.

HM: When do you expect to finish the Technicopedia project?

EA: As I mentioned above, I don't think it will ever be truly done. When I started, I was covering about 1 year of models every month. With about 30 years to cover, I would have theoretically been done in less than 3 years. However, later years have more complex models and more of them, and I find that I have less and less time to spend on it. So far this year, I have released only one update. I have been "almost done" with 1995 for the last 4 months! Realistically, I would be pleased if I could catch up to present releases within the next 3 years.

HM: In one word, Liftarm or Technic Brick?

EA: Technic Brick is two words. I like them both and both have their optimum uses. Liftarms are better for trusses and linkages, bricks are better for rigid structure and chassis. I hope the old bricks never go away completely.

HM: Are you a fan of any other LEGO product lines?

EA: Yes. Before I collected Technic I collected Space and I had every Space set from Futuron through Star Wars of 2008. At

about that time I had some major life changes and was forced to sell almost all of them to live. I still have the Star Wars UCS sets and several of the Sculptures like the Taj Mahal and Statue of Liberty.

LDraw

HM: Why do you enjoy making LDraw instructions of MOCs?

EA: Because I have serious mental problems. ;-) I had actually never used an LDraw tool prior to starting Technicopedia. I found that I could not get all of the images I needed of the mechanisms through traditional photography. I needed to be able to strip away the structure and just see the mechanisms. I quickly found that most of the Technic sets had never been modelled in Ldraw (that I could find), so I had to start creating much of the material myself. At first I was terrible at it. MLCAD is not really set up for Technic since the parts often do not align to a stud grid and may be placed at odd angles. In the early days, I spent about 75% of the time for documenting each year of Technicopedia on the computer images. Later I had some generous help from Owen Dive and Benjamin Wendl who contributed Ldraw files for many sets, and I also got MUCH better with the tools.

As for why I like making instructions, I guess it is just because it is a major challenge and there aren't very many people doing it. Technic instructions are hugely complicated to produce and there is a sense of satisfaction I get from completing a complex model. One of the first models for which I made instructions was the 4000 piece tow truck from Grazi, so obviously I didn't start small. I've also done a couple of secret projects which may some day be revealed.

HM: What is the secret to your fabulous renders?

EA: I've only been rendering for 1.5 years. There's no secret that I could describe in this space except that it is all about lighting.

Just a few years ago, it was quite complicated to get a model converted from LDraw to POV-Ray. These days, if you have Travis Cobbs' LDView and Lutz Uhlmann's LGEO library (both of which are free), getting a very good quality render is trivially simple. Just export from LDView and the result is very, very good.

I take it a few steps farther by changing the part color definition, replacing the default point lights with area lights, and using a high dynamic range light probe with radiosity. You can read about most of that in Koyan's excellent tutorial on Brickshelf. Occassionally I do even more and add trees, mountains, clouds, etc. I spent a lot of time experimenting with different types of and numbers of lights to get what I thought was an optimum result.

One little secret I'll reveal is that there is virtually no such thing as white light. By default, POV-Ray uses white lights, but in the real world virtually no light source produces every part of the visible light spectrum. I always reduce the blue on my lights by 10% to give a slightly yellow tint which seems much more natural.

HM: Do you have any tips or advice for people who wish to make their own instructions with LDraw?

EA: If you are doing Technic instructions, you have to think very carefully about the build order. System models can just build from the bottom up, but you can't do that with Technic.

Blakbird 2009
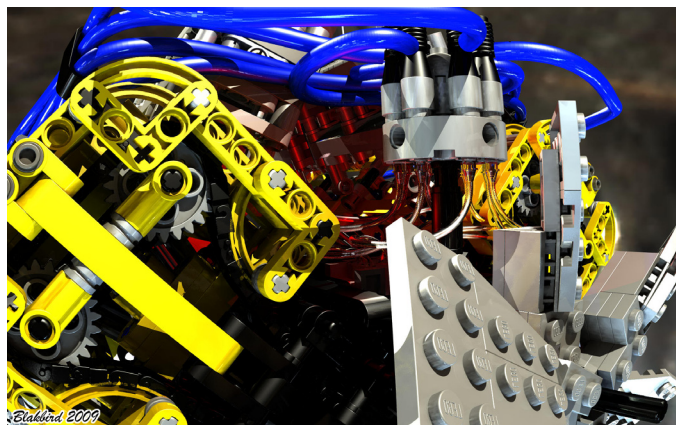
I use the latest version of LPub which makes the process reasonably simple, but some concepts like Buffer Exchange are very difficult to learn and not intuitive. I recommend using lots of submodels so smaller assemblies can be shown as callouts on the page. But really, the only way to learn is to experiment for yourself. Don't be afraid to ask questions if you get stuck. Lugnet still has a pretty active CAD forum. There's always more to learn. Kevin Clague's LPub is truly a marvelous work, but it is still free software developed in his spare time! Sometimes there are problems. Right now for instance I am doing a 100+ page set of instructions and for some reason LPub is totally ignoring one of my submodels. I have no idea why.

LEGO Technic Blog

HM: In November 2009 you and two other AFOLs (Fernando "Conchas" Correia and Paul "Sariel" Kmiec) started participating in the LEGO® Technic Blog. So far, what do you think of the experience? Have you received any feedback?

EA: That was a big surprise to me and has been a very positive experience. LEGO is one of the best companies in the world at community outreach, and Monica with the Technic team has been truly inspiring with which to collaborate. It is exciting to be able to reach the audience that the Technic site allows, and it is humbling to realize that a large company like LEGO is willing to let non-employees contribute in such a public way. I even got a Christmas card from the whole LEGO Technic team!

Miscellaneous

HM: What do you think about the use of custom parts in Technic MOCs, like some famous builders have done?

EA: Personally, I have no problem with it. LEGO is an outlet for creativity, but not everything can be accomplished with stock parts. In these cases, I can understand why people choose to extend the medium to make their creations fully come to life. On the other hand, my preference would be to try to find a full LEGO solution whenever possible since that is part of the challenge of model building.

HM: Some people were a bit critical when you decided to sell instructions for the Crowkillers Gallardo. Would you like to

comment?

EA: A bit? ;-) From what I have seen, the single biggest request from commenters on MOCpages and Flickr is for instructions. Everyone wants them and practically no one wants to make them. The reason is that making instructions is significantly more time consuming than building the model itself and at the end you don't really have anything for your efforts. It took me a couple of hundred hours to do the Gallardo which I mostly just did for myself. But I thought I would put the instructions out there and see if the interest level was high enough to do that more often. I am surprised that some are so critical of what other people choose to do with their time and talents. Each person can make the choice of sharing their work for free or for profit, and each person can choose whether or not to buy it.

HM: If you had the chance, would you leave your job to become a LEGO Technic Designer?

EA: That would certainly be a dream come true, but at the moment I would not be able to leave the Seattle area since I only get to see my kids part time and I would not see them at all if I moved to Denmark. But in the future after they are older I would be very interested. My wife and I have even talked about the possibility.
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Review 7948: Outpost Attack

LEGO® KINGDOMS presentation

Text by lluisgib

Pictures by lluisgib and LEGO® Systems A/S

Set: Outpost Attack
Set number: 7948
Number of parts: 194
Recommended retail price: 19,99€

After the last Castle series, which appeared in 2007 and mixed medieval nights with fantasy creatures like trolls, gnomes and skeletons, LEGO® has decided to go back to the origins of one of its most classic (and most loved) themes.

Under the name KINGDOMS, a total of 7 sets are launched in 2010, with the main theme of two opposing bands of bands of knights defending their shields. As always, there are the 'good guys' and the 'bad guys'. The first are represented by a lion and the prevailing color of their shield is red. The other band shows a dragon on a green background. In addition, the expressions on the faces are different from one band to another. The lions have a nice and friendly expression while the dragons are more aggressive. The good thing about this characterization is that the only difference is in the faces so roles can easily be changed. This was a lot more complicated in the previous setup, especially in the case of the skeletons.

As a presentation of the new KINGDOMS theme, let's have a look at this small set which represents the defense of a tower, attacked with a trebuchet. It isn't a new set as over the years it has turned up in different forms though with the same background, but it gives us a perspective of what is to come in this series: more detail and similitudes with the classic Castle.

We can see that - as is starting to become usual – both sides of the minfigs are decorated. The helmets and other accessories of both parts are of a different shade of grey. Those of the lions are lighter. As for the construction, much attention has been paid to detail. Although it is a simple construction, it is well finished and the perception is not that of a simple set. There is a small trap in the tower which allows part of the wall to collapse in case of impact from the trebuchet. In turn, the trebuchet, although simple, has some coloured finishing on the wheels , indicating what side it belongs to and which, just like the tower, give the feeling that you build a good quality set.

With KINGDOMS, LEGO has gone back in time, reintroducing a classic of the 80s with an up to date design. The fans of the different Castle series will be happy with the new turn the theme has taken and I foresee great medieval dioramas in upcoming LUG events.

Thanks to: Jan Beyer for making the set available.
#

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Review 8214: Lamborghini Gallardo LP560-4 Polizia

LEGO® RACERS presentation

Text by lluisgib

Pictures by lluisgib and LEGO® Systems A/S

Set: Lamborghini Gallardo LP560-4 Polizia
Set number: 8214
Number of parts: 801
Recommended retail price: 59,95€

LEGO® has fascinated fans of scale models of sports cars for many years. After its Ferrari license (from 2004 to 2009), which resulted in some marvelous sets, like the F430, the Enzo or the FFX, 2009 started with a new license: Lamborghini, another one of the mythical brands in the history of sports cars.

The first car to appear on the market was the Gallardo LP560-4, a beautiful yellow car with soft curves and an aggressive character. In 2010 LEGO surprises us again with a special version of the Gallardo.LP560-4 Polizia. In May 2004 with the occasion of the 152th anniversary of the Polizia, Lamborghini donated a Gallardo and in 2005, after this very positive experience, it donated another one. The cars are used primarily used for surveillance on the roads and for health emergencies, so each one of them caries an automatic defibrillator and special equipment for transporting organs and blood plasma [1].

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Like all the cars in the RACERS line, the shape of the car is very well reproduced. Using curved slopes and tiles that fit with the curves of the car together with plates modified with clip and plates modified with handle, the design of the car is faithfully reflected in this model. The interior is superb. The seats, panels, manual brake.... every detail has been incorporated. In this case stickers are necessary to be able to reproduce the small gadgets in the interior. The interior can be accessed through the opening doors. The hood, located at the back, can also be opened to access the powerful V10 engine with a power of 550CV. The boot, at the front of the car opens up to show the fire extinguisher and – as a curious detail - the ice-box for donor transport.
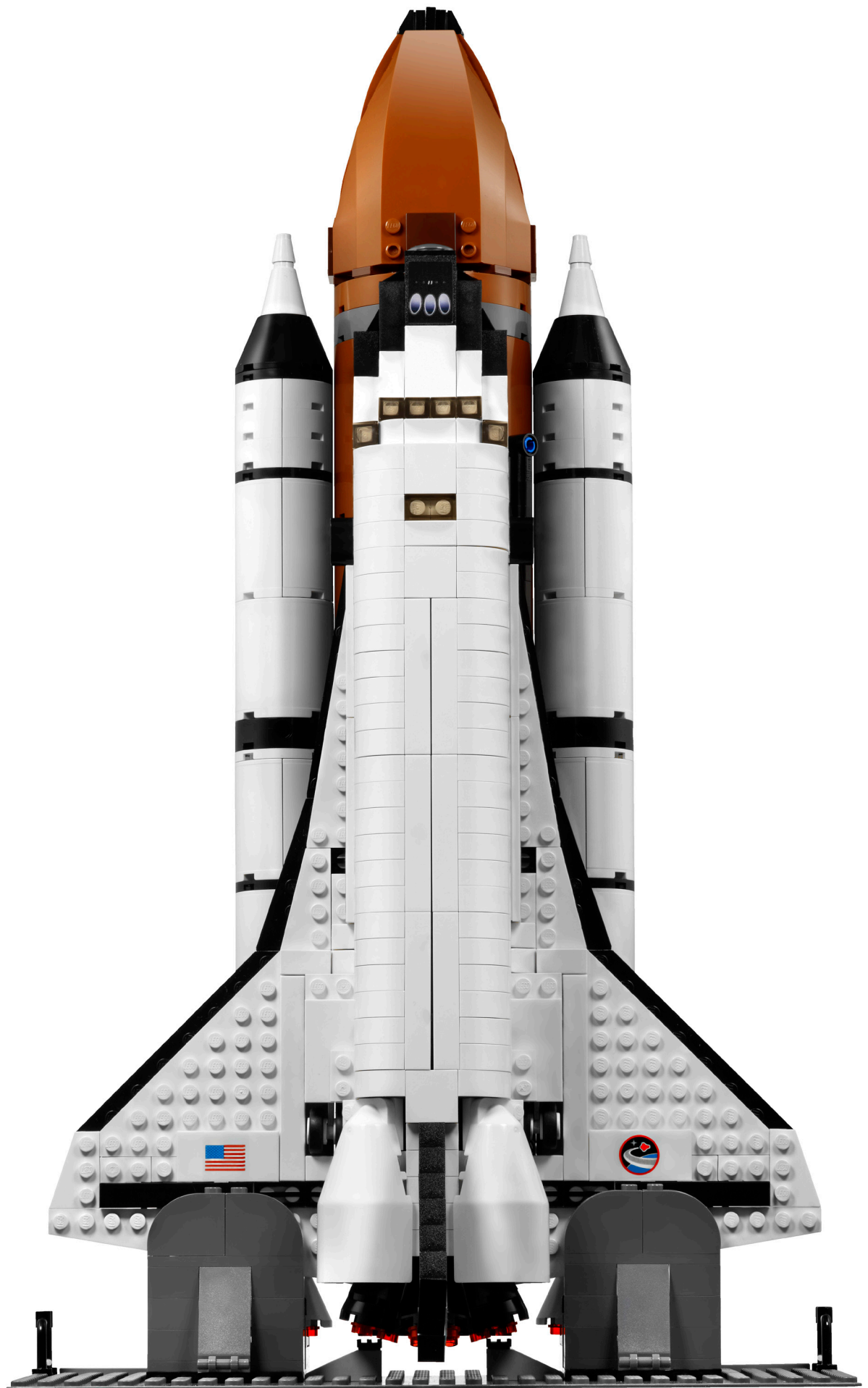

The box is also special as it shows the car in the foreground and in the background an image of a typical Italian palace and stone paving.

The Lamborghini Gallardo Polizia combines a fantastic design with an original and interesting replica which will satisfy both those new to the car and collector of the RACERS theme.

Thanks to LEGO® Iberia for making the set available.

[1] source: http://en.wikipedia.org/wiki/Lamborghini_Gallardo #

Review 10213: Shuttle Adventure

3.. 2.. 1.. IGNITION!!!

Text by lluisgib

Pictures by lluisgib and LEGO® Systems A/S

Set: Shuttle Adventure
Set number: 10213
Number of parts: 1204
Contains: Space Shuttle, fuel tanks for launching, two astronauts (a man and a woman), support vehicle, operator, launch pad.
Recommended retail price: 89,99€

During the last 20 years there has always been a link between space and bricks. There have been four sets that have directly reproduced the NASA space shuttle at TOWN/CITY scale. Two of these were launch areas (1682, which cam out in 1990 and 6339 in 1995), a terrestrial transport for the shuttle (6346 in 1992) and a reproduction of the transportation method used to take the shuttle from one of it's landing areas to the launch area.(6544 in 1995). All of these were characterised by their small scale and angular design which were a marvel to us when we were younger, and perfectly fitted the design objective, but which has always left us wanting a more elaborate shuttle design. Later on more space theme sets were launched, but moving away from the shuttle design. Other lines also took inspiration here like the famous Technic shuttle (8480 in 1996) and later Discovery Channel sets, which reproduced several NASA rockets and satellites in varying scales.

In 2010, coinciding with the last trip in the NASA shuttle program (and this is no coincidence) this magnificent reproduction of the shuttle appears, at a scale that allows many elements to be reproduced with a good level of detail.

The NASA Shuttle Program [1]

April 12, 1981 was a historical day, because it saw the first launch into space of a manned Space Shuttle, after 9 years of development. The name of the shuttle was Columbia and it was one of 4 shuttles, together with the Challenger, the Discovery and the Atlantis. It was the first time a "rocket" shaped like a plane went out to space and came back. After re-entry, the shuttle was to glide to the landing strip where it would land the same way a plane does.

From the launch of that first mission, the space shuttle has been used to transport heavy loads into different orbits, to bring supplies and additional modules to the International Space Station (ISS) and to carry out maintenance missions (for example for the Hubble space telescope).

The characteristics for each of the shuttles are as follows:

· Total length: 56,14 m.
· Shuttle length: 37,23 m
· Width: 23,79 m
· Weight at launch: 2,041,166 kg
· Weight after the mission: 104,326 kg
· Maximum cargo weight: 28.803 kg (returning to Earth with around 14,000 kg)
· Orbit: 185 to 643 km (cannot go over 1.000 km)
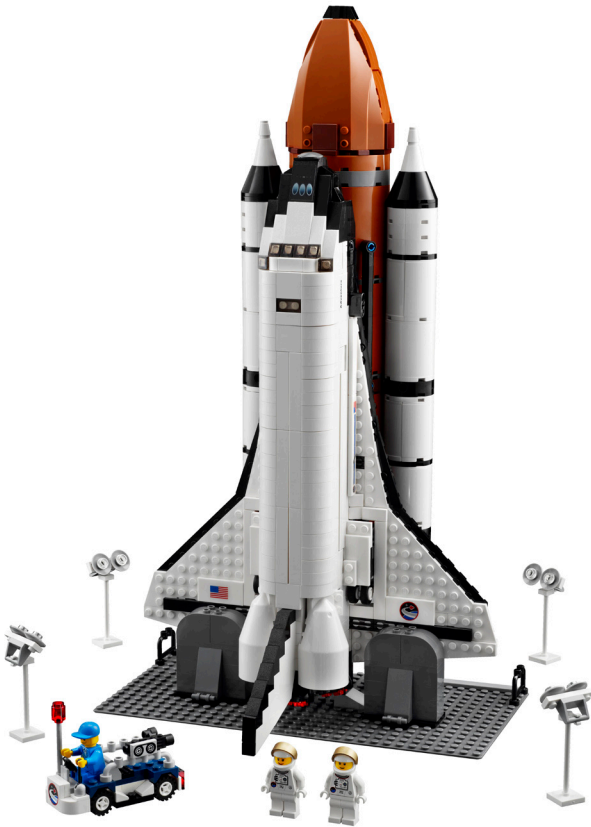· Speed: 27,875 km/h

The history of the shuttles is full of successes and failures, but despite this, they are one of the icons of the space race and, in my opinion, the beautiful machines that have gone out into space.

Building the set

After sorting the pieces in order to be able to locate them more easily, I start by building a small transport vehicle to take the astronauts to the shuttle. It's a nice complement and includes a minifig by way of assistant, although I must say I'm anxious to start building the shuttle.
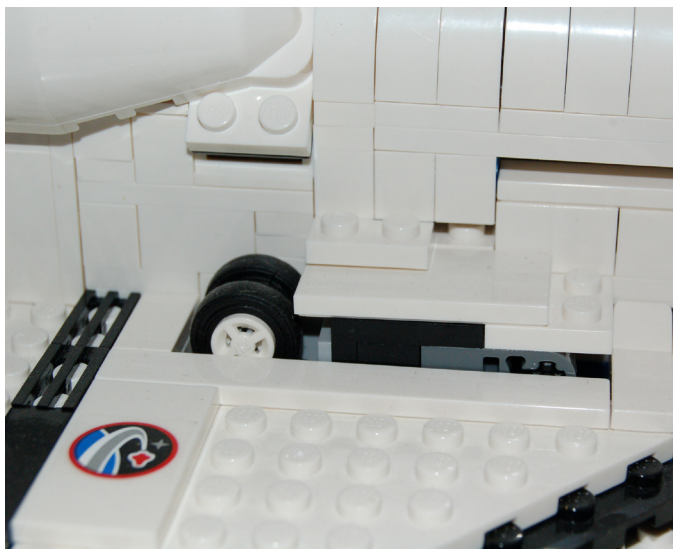
The first part of the shuttle to be built are the wings and the bottom of the hull. As the shuttle starts to take shape, the first characteristics start to stand out. The hull has some holes to hide the gear train. Furthermore, so the shuttle can glide towards the landing, there are flaps on the rear of the wings that can be extended On the rear you find the support for the propulsion engines in the centre.

A remarkable characteristic of the engines is that they are placed at the same angle as the original shuttle, in contrast to
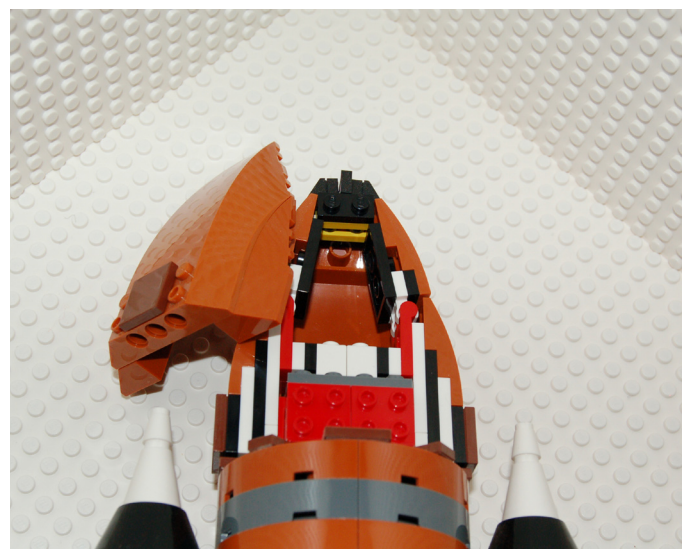
It is at this point that I will explain one of the two aspects that merit criticism in this set. The rear gear, when retracted, is still partially visible. The effect this causes is a bit strange once the whole shuttle has been built. You see a nice, compact model, but with the rear landing gear partially in sight, as if the model wasn't completely finished. keeping in mind the restriction in number of parts and/or price for a set like this one, it would have been preferable not to include the small auxiliary vehicle and add sufficient parts to completely hide the rear landing gear.
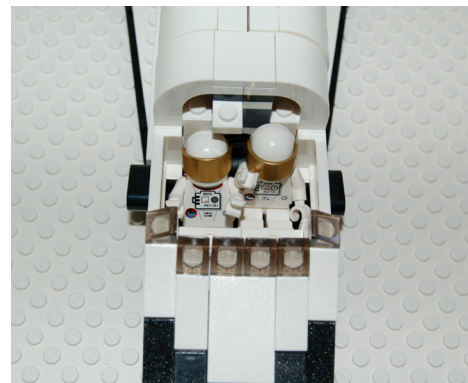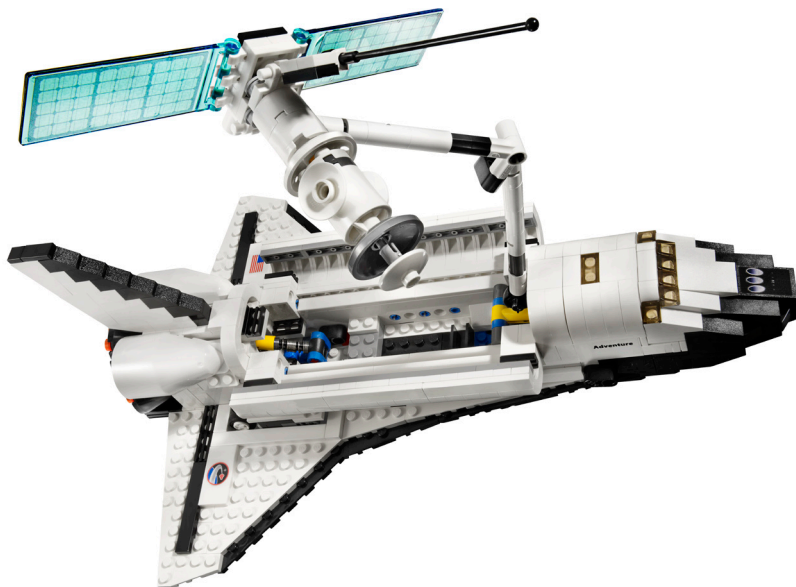
I now have a solid base to build the rest of the model. The next step is the hold, which is quite simple. With some whiteBrick Arch1 x 3 x 2 Curved Top and a couple of Technic Bricks and Technic Pins, the cover (which can be opened) is built.. Inside the hold there is an arm which can be used to place the included satellite in orbit. This satellite is very realistic as it includes solar panels, several satellite dishes and retractable elements. Of course, both the satellite and the retractable arm fit perfectly inside the hold.

In the cockpit there are some nice building techniques as well as some details I don't quite like. In order to fit two astronauts in a 6 stud wide cockpit, some Panel 1 x 2 x 3 have been used, placed horizontally. For the change in orientation, a Brick Modified 1 x 1 with stud on 1 side has been used and a Brick Modified 1 x 1with handle together with a Plate 1 x 1 with clip Horizontal on the other side. The solution is quite effective, but leaves a few narrow cracks, although they don't stand out. The two astronauts (surprisingly a man and a woman - I love this detail) fit snugly inside the cockpit. It's not easy to place them there and if you don't fit them perfectly, the cover of the cockpit won't close correctly.

For the windshield the already famous Slope 30 1 x 1 x 2/3 (or Cheese Slope) have been used in Trans Black. This is the second aspect of the set I don't like. First of all, I need to recognise that in the real model this windscreen is really small in comparison to the rest of the shuttle, which makes it very difficult to find the correct solution. The result on the outside is good and you could say it is "to scale". What I don't like is that when you place the cover on the cockpit you can't see inside. As I said, it is difficult to reproduce everything perfectly and it is by no means a reason to disqualify the set. But you are left with a strange feeling when you place the cover and the interior disappears.

With some Slopes of different sizes the nose of the shuttle is shaped.and after adding the rear rudder the shuttle is finished.

the CITY scale shuttle which due to its limited size could not incorporate this detail. In addition to the three main engines, the designers have included engines for orbital manoeuvring. Two small engines that to make small corrections and manoeuvres in microgravity conditions. These are placed above the two lower engines and on either side of the top engine. Just like in the real model, the engines have fairings made with some White Windscreen 7 x 4 x 2 Round Extended Front Edge

Before I continue building the cockpit and the hold I build one of the functional arts of the model. The landing gear is completely functional and includes a Technic mechanism with a shock absorber in order to keep the gear extended or retracted. The rear landing gear is operated by pushing either one of them after which the other will follow. The front gear however, is operated from the outside which is a more elegant solution.

But the building isn't over. You still need to build the fuel tanks that will carry the shuttle into space. Building them isn't complicated, as they consist of a number of round panels and some bricks with round corners for the central tank, all in Reddish Brown, finished off made of wedges and windscreens to give it the sharply rounded shape. As a curious detail, the tank is reproduced including a pipe that runs the full length of one of its sides.

The lateral tanks are even simpler. They consist of a succession of Cylinder Half 2 x 4 x 4 and bricks round corner 2 x 2 macarroni, finished off with cones to give them their pointy shape. These lateral tanks are connected to the main tank with Technic Pin Long without Friction Ridges Lengthwise which in turn is connected to the to the shuttle in the same way.

To finish the model there is still the launch pad, which serves solely to keep the shuttle with its fuel tanks vertical. A couple of flood lights are placed around the shuttle...

Conclusions

I think this is a long awaited model for many AFOLs who have been dreaming of space since we were kids and have carried many astronauts on marvellous trips with the shuttle from the TOWN theme.

The model is quite true to reality, although as can be expected, the scale doesn't coincide with the minifigs (that would require several thousand additional pieces...) Many details have been incorporated into the model, like the orientation of the engines, the flaps, the engines for lateral manoeuvring or the landing gear.
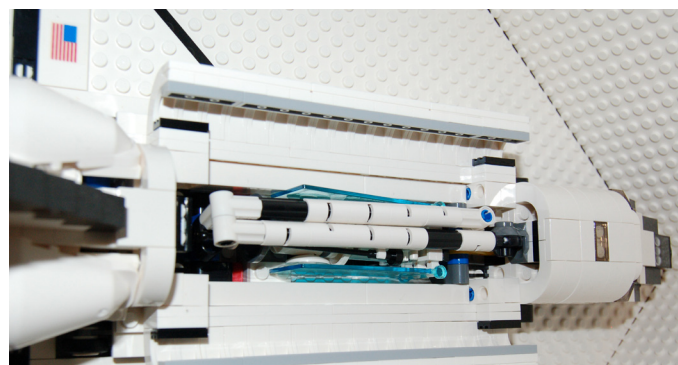
The shape is well represented and the colour scheme, although simple, is perfect in all parts of the shuttle and the tanks.

I like the fact that they have added a female astronaut and hope that if this tendency continues it will soon stop being something to point out in LEGO® sets.

The small auxiliary vehicle is nice and curious. As I have explained before, I would have preferred these parts to be use to cover the landing gear, but the vehicle is OK.

This set is highly recommendable for space fans. I would love to see more reproductions or collaborations with space agencies in the future, so we can add more rockets and space crafts to our collections.

[1] Source Wikipedia

Thanks to: LEGO SYSTEM A/S and Jan Beyer for providing this set and LEGO Iberia S.A., Joachim Schwidtal and Rosa Seegelken for the official images.
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HispaLUG Contests

We present you a short interview with Joaquin, the winner of the best MOC of the first half-year in our community

by Gobernador

Pictures by Joaquín

HM: First of all, congratulations for being the builder of the most voted MOC last quarter, really it is an impressive MOC, no less than a whole section of a pier with a good number of buildings. From where does this idea come?

J: Hello, thank you very much. The idea was brewing slowly after re-build the Green Grocer and Cafe Corner, I thought about making a small scene of modular buildings, something very usual on Internet lately and which I wanted to experiment with. But I wanted to do it in a different way. First of all the block was inverted, forming a sort of square, I think it was a good way to concentrate the scene more, an that´s why I built an inverted Corner Café. Another detail that I wanted to do was the entrance to the basement, forcing the entire block up and that gave me the way to fill what would be a plaza with water, and build the dock. After that, each building was designed depending on the availability of parts and space. As usual, I improvise a lot.

HM: Can you estimate the number of parts and the hours it's taken?

J: That's something I always wonder about, but it is impossible to know, unless you have more patience than Job and disassemble everything part by part. If we consider that the

Green Grocer and Cafe Corner together have 4500 parts, the whole scenemay exceed 10,000. It´s been a long build, about 2 months because I usually build very slowly, but I try to be regular.

HM: You've inverted the Cafe Corner, was it a big problem or was easier than you expected?

J: It was not overly complicated but it is less easy than it seems. Adjusting the position of the walls to the corner was a bit complicated, especially on the roof, as the original roof slopes were not enough and I had to hide the hole with some chimneys. The funny thing is that I tried everything very hard to reverse the "L" in the sign "Hotel" but it was impossible. I had to leave it reversed. The order of the parts is impossible to change, this gives us an idea of the difficulty and the merit of designing these sets.

HM: It is without doubt a great diorama, with the added value that it is raised and we can see even the staircase leading to a basement. Are you going to expand this great diorama and detail the interior of the houses, build a sewage etc. ?

J: Well, as usual for me, after taking the photos the display was completely disassembled. Because I am so slow building

this kind of creations, they end up being somewhat tedious and at the end all I really want to do is get started with a new MOC. It is the problem of making such big things.

HM: Now some more general question, this is not the first time you have surprised us with your creations in this magazine, issue 002 showed us an impressive ship, and in HispaLUG there are other examples where you have left us quite impressed (the funicular or the office building) Can you anticipate some of the ideas you have in mind?

J: Now I'm working on a new MOC. It is a scene of a street, like the one of the modular buildings, though rather peculiar. I do not want to give many details because it is a bit of a risky construction and I don´t know if it will be successful. It is a scene for the Grand Carousel (which I have built recently) and represents an already existing LEGO® building but on a larger scale ...

HM: On the other hand, do you have a dream project, which so far, for different reasons you have not been able to carry out?

J: Projects ... many!! As you know I prefer large MOCs, but I have as a pending task to care more for details and to reduce the size of the buildings. I love modular buildings with great ornate facades, but I recognize this is very complicated and I am very limited when it comes to knowing how to use the parts together as creatively as we are seeing lately. I would like to do more modern buildings or with an industrial aesthetic, similar to the office tower that I showed you recently. I'm also attracted by the world of structures, trying to build bridges, cranes, large infrastructures ... that's what I'm thinking about. My biggest constraint is the number of pieces, I have a good collection but sometimes you don´t have what you want and I don't usually buy on Bricklink, I just use parts from the sets. Maybe I should consider another way of building, I build depending on what I already have, and maybe it´s more logical to try to capture an idea and from there, buy the pieces that are needed. It is something that influences me a lot when thinking about a new MOC. Best of all is that even after a few years out of the "Dark Ages" I keep thinking about a thousand ideas to build new things, mostly unfeasible, but always looking forward, and I hope that will continue!

http://www.brickshelf.com/cgi-bin/gallery.cgi?m=joaquin

Other Contests

Pictures by their respective owners

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VALGARISE FACTORY - FRIGELIA PLANET - MK3 FIGHTER - @ 2010
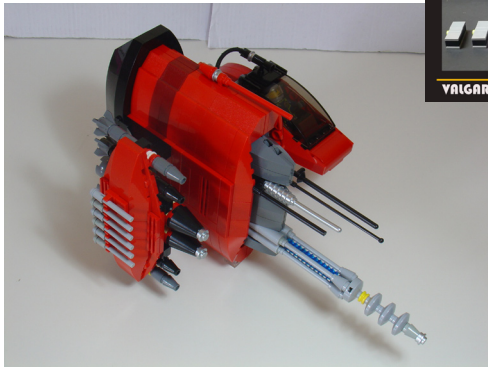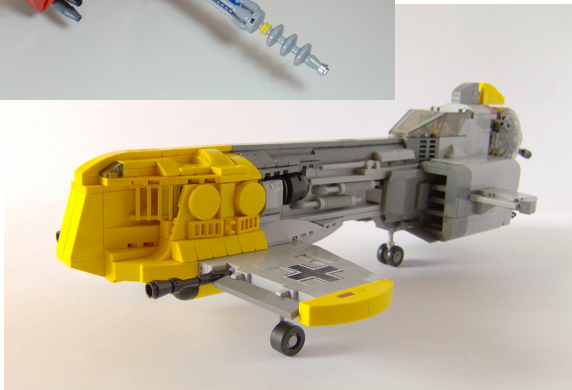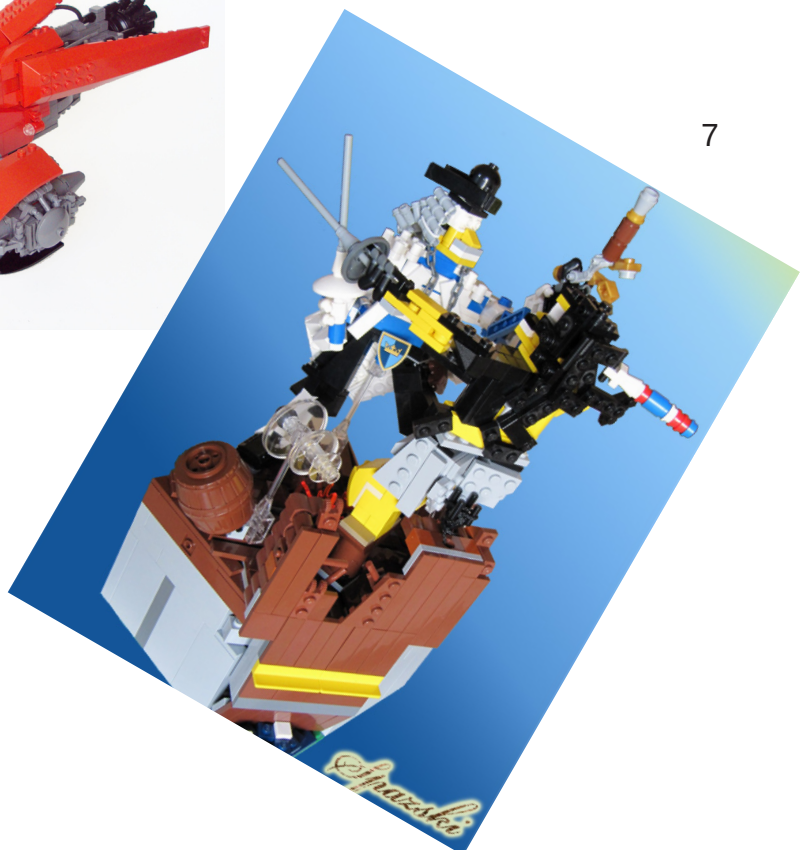
1.- Valgarise
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3.- car_mp
4.- Hoexbroe
5.- Doctor Maligno
6.- Evo
7.- Spazski

Great creators of the world: Jumpei Mitsui

In this issue we go to Japan to bring you a creator who is not afraid of pharaonic projects. Many know him for his reproduction of the Yamato, we present you the rest of his work.

By Hispabrick Magazine

Pictures by Jumpei Mitsui

Hispabrick Magazine: Name?

Jumpei Mitsui

HM: Age?

JM: 23

HM: Nationality?

JM: Japanese

HM: What do you do normally?

JM: I'm a graduate student at the University of Tokyo. I major in material engineering.
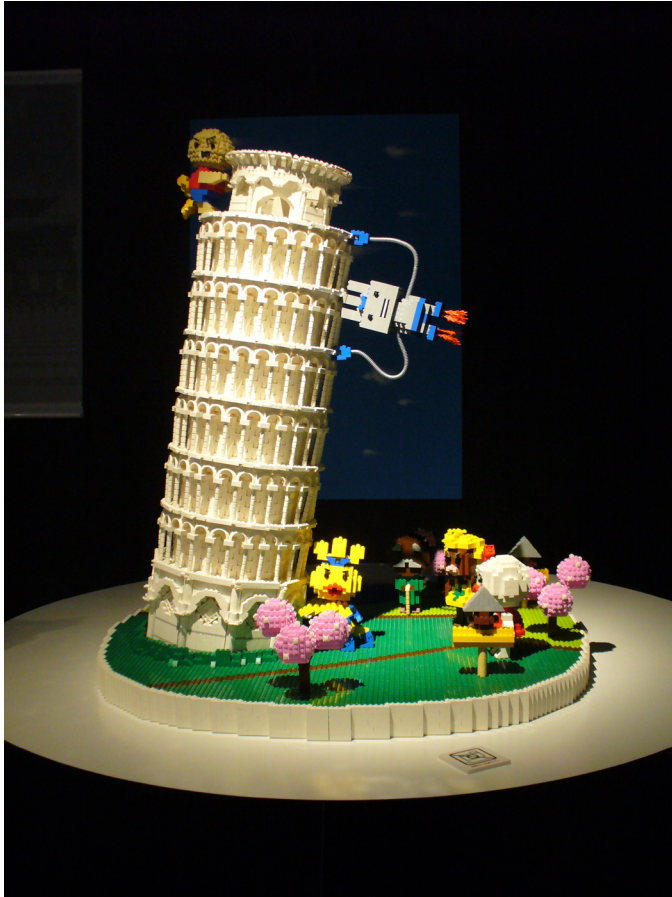
HM: When did you first start building with LEGO®?

JM: I saw a homemade video which showed I had started buliding with LEGO since 4 years old. I always played with my elder brother when I was a child.

HM: Your first set?

JM: 6285 'Black Seas Barracuda', I think.

HM: And your last set?

JM: 7595 'Army Men on Patrol'. I bought dozens of this set for minifigs. I want to take black-and-white photographs of them with my WWII works.

HM: ¿Your favorite commercial LEGO® building theme?

JM: Creator and Star Wars. Both of them have many versatile bricks.

HM: ¿And your favorite non-official building theme?

JM: Military.

HM: What is your favorite LEGO element and why?

JM: I love head light brick (1x1 brick with 1 stud on side) because it's very useful to make details. The point is that it has a length of 1/2 plate.

HM: Which part would you like LEGO to produce?

JM: Nothing. I really enjoy playing with restricted bricks. I prefer basic bricks to special parts as well.

HM: How many hours do you spend building with LEGO?

JM: Although I don't have enough time to build because I'm busy with my study these days, I sometimes make quality time by cutting down sleep. I recently built a MOC for a TV program for 30 hours in a row. I forgot to sleep at that time.

HM: What do your family/friends think about this hobby?

JM: Although my parents always claim there's no more room for stocking LEGO bricks, they are proud of my activity. And my friends look forward to watching my new work.

HM: Do you draw or pre-designs before you start building?

JM: I always draw only two sketches to figure out the exact shape of an object, from front and side view. That's enough for a normal model. When I make a huge one, I draw some more sketches for details.

HM: How long does take you to get from the idea to the finished model?

JM: It depends on its size. Some of them only take one day from the idea to the finished model if I have enough parts to complete. On the other hand, my longest project took more than 6 years to complete. It required much time to find bricks from my stock and check Bricklink for buying new bricks, and of course, it required time to build after a process of trial and error.

HM: The increase of AFOLs and lines like Star Wars create new possibilities not imagined before by LEGO. What do you think about the old school LEGO and the new LEGO?

JM: I like new lines provided by LEGO these days. However,

some of them focus too much on minifigs and lose their charm. I hope LEGO® will continue to focus on building bricks.

HM: While the icons of Japanese culture are widely known and reproduced by AFOLS around the world, Japanese builders are not so much. Tell us a little about the AFOL world in Japan and if you believe that these cultural differences also influence the subjetcs of your MOCS.
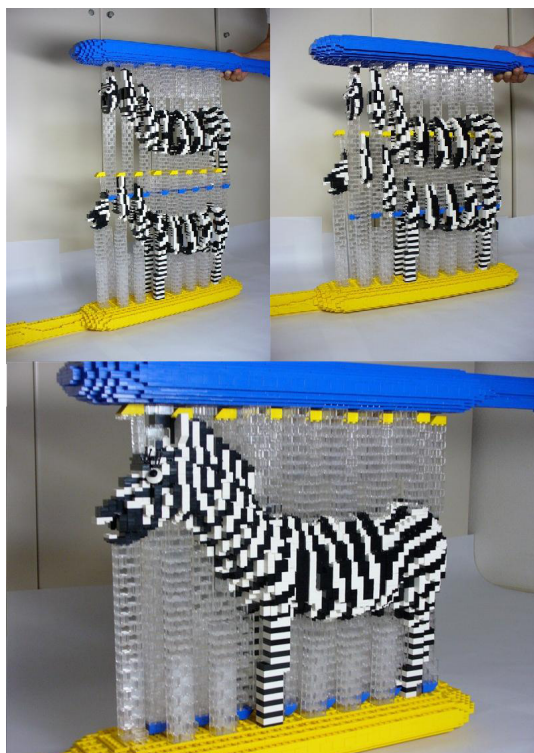
JM: Japanese AFOLs tend to build small works because houses in Japan are really smaller than those of other countries. Thus they prefer to build small works like robots which appear in Japanese animation rather than Japanese building like a temple.

And it's a pity that some good works made by Japanese builders are shared only in the small Japanese community. Some of them won't use English. Although their works are really nice, they lose a chance to show their nice works to people all over the world.

HM: Many of your projects are large constructions. How do you maintain the enthusiasm and constancy over such long projects?

JM: I start building from a detail, then I try to make them look nice when I insert it into a large construction. So I can focus on considering how to make a detail.

Since I usually proceed with more than two projects, I can choose what I want to try now. That's why I can build many large constructions without letup.

HM: What was the origin of a project as big as the Yamato? If you can, give us some figures about the project, like the number of pieces, time spent ...Did you feel at the verge of quitting at some point while you were building it? What was the most difficult point of the construction?

JM: It has been a dream to build the Yamato with LEGO bricks since I was a child. More than 200,000 bricks are used for this project and it took 6 years and 4 months to complete. I love Battleship Yamato, that's enough for me to continue the project for years.

The most difficult point of the construction was creating curves at the bow. I used thousands of small plates in the same way as a sculpture. Although I couldn't create accurate curves, I broke it completely three times. Finally I could get perfect curves at the bow.
#

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5 questions to...

Kjeld Kirk Kristiansen
Owner and Deputy Chairman, LEGO® A/S

I would never have thought that as a start for this new section called "5 Questions to...", we would begin interviewing the owner of the LEGO® Company, Mr. Kjeld Kirk Kristiansen. It all happened in a slightly strange but exciting manner. I sent him the written interview without much conviction that the questions would reach their destination. A few days later I received an answer that left me puzzled. Not only did he agreed to answer Hispabrick Magazine's questions, but he would do it by phone. We arranged a date and time, and after several delays due to problems in Mr Kristiansen schedule, the interview was conducted in a cordial atmosphere.

Here you will read some interesting answers to the questions we asked, that explain some of the reasons that led the company to the success of LEGO in the 80's and 90's and now repeats after the crisis of the beginning of the millennium, and their point of view on one of the most unknown programs by LEGO customers and fans: LEGO Charity.

From Hispabrick Magazine I would like to acknowledge the people who made this interview possible, and especially Mr. Kristiansen for giving me the honor of being able to interview him by telephone. We hope you enjoy the interview.

HM: How was the idea of a system within a system born?

Mr. Kristiansen: It was born in the late 70s. The last years we had been very limited in adding novelties and that was because nobody really felt sure where to go. Following some fantastic early years in the US market, we had over-budgeted and came out much lower than expected, and we also had problems in other markets. I came home to Denmark to take part in Senior Management in 1977 and so for me it was really a question of instilling new belief in the company and in our product idea. I saw the possibilities first of all with the minifigure; that we could put a lot of new life into our assortment with different play themes. So the play themes really started at that time.

I also thought that it was necessary to divide our product program in a clear way so that we could both signal to the consumer that there was a system in the system, meaning that there were different product lines for different age groups and for different interests of our consumers - the children, but also to provide our product developers with clearer directions and more freedom to develop within guidelines for each of the product lines. So in 1979 we then launched for instance DUPLO in its own right as LEGO DUPLO with the rabbit logo, we launched Fabuland, we launched Town, Space and Castle and lots of other products. It was a big year.

HM: How did the appearance of the mini fig influence the company's success?

Mr. Kristiansen: The minifig had and still has a huge effect on our success. It opened up a whole new array of play experiences. The core play experience with our LEGO bricks is of course the satisfaction of building something - whether you have created something yourself or created something according to a building instruction. So what we today call Creator and Bricks & More is of course always the core of our product range, but the minifig added a whole new dimension because there would be more play with what you were building because you added the human touch and the role play element to the LEGO play experience. It gave a lot of possibilities for the company to grow and we really did grow through the 80s based a lot on these play themes with of course Town, which we now call City, but also especially Space, Castle and a few years later Pirates. So it was very important for building up the company and creating new life in our assortment.

HM: Why did the LEGO Group decide to listen to its fans?

Mr. Kristiansen: Well actually, we have always done so, because when we have launched a new product we have listened to the consumers, both to the children, but also talked to parents. But what has been the development, and which is definitely also very much a deciding factor for our present fantastic situation with such nice growth, is the fact that we found out that there were also so many adult fans who would get together and form communities on the Internet and I think that that has been a fantastic development which has given us a lot of opportunities to be in even closer contact with our consumers and specifically within certain areas. The first example where it was really done very thoroughly was with MINDSTORMS where we developed a very

fine cooperation on the NXT, and I think that we have learned from that, also within the train development and within different play themes; that we can gain a lot and get a lot of good ideas from listening to our fans.

HM: What initiatives does the LEGO® Charity promote?

Mr. Kristiansen: I always used the notion that for me LEGO is so much more than a toy. Children learn from playing, playful learning is sort of a very much rooted value in our company and therefore I have always been very happy about the things we do in the educational field . And specifically within LEGO Charity, we look at how we can help children in need, children in poor neighbourhoods and in poor countries who cannot afford our product but who we can help. Not only to have good fun and a happier life with the LEGO experience, but certainly also by giving them a chance to learn and grow from building with our products. So this is really the ideal aim with our LEGO Charity program to donate to a lot of different areas in the world where we know that there are a lot of children who wouldn't be able to afford or get hold of our products if we didn't make a special effort with LEGO Charity.
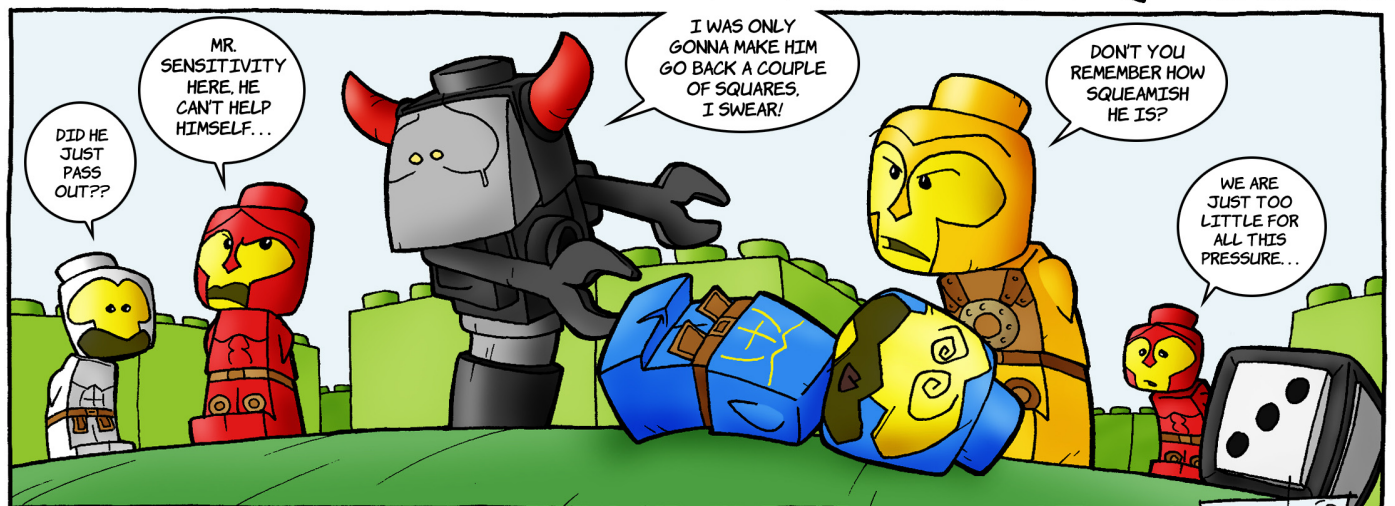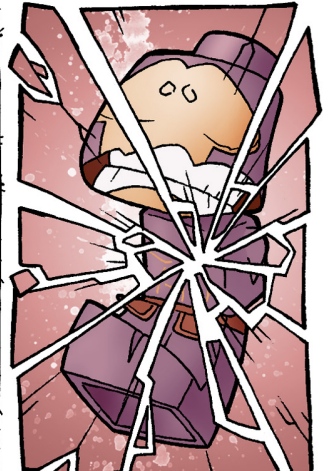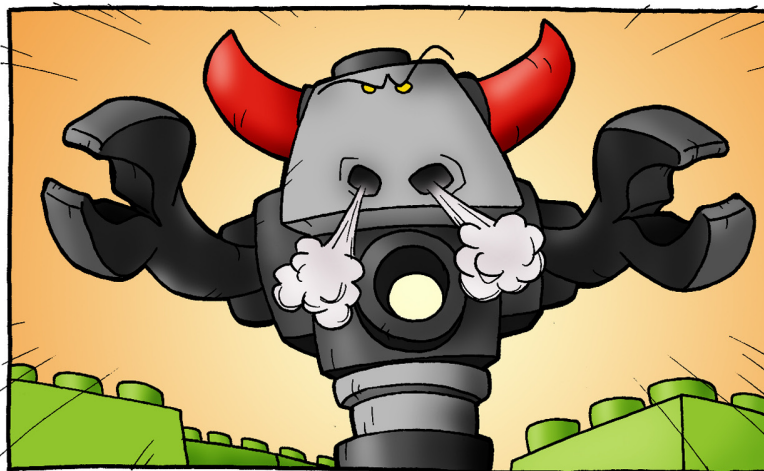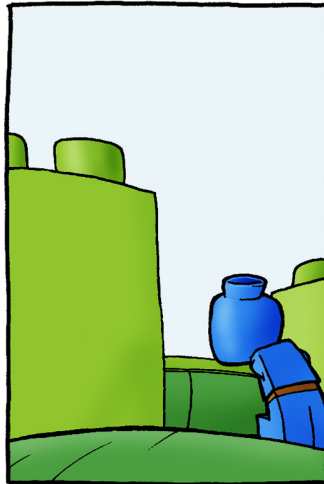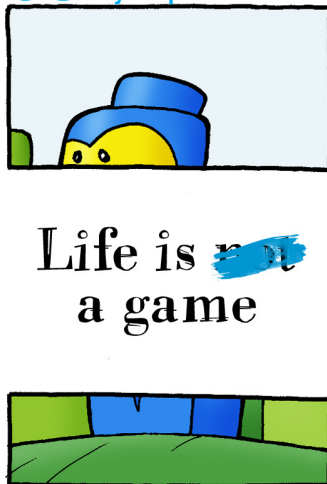
HM: Finally due to the fact that this is a magazine for Spanish fans. Do you know anything about the Spanish community?

Mr. Kristiansen: Not so much, unfortunately, but I know of course that you are our Spanish LEGO Ambassador and now I have also learned that you have this very active community and this magazine and I can only encourage that and say that I feel grateful that you and a lot of other LEGO fans do a lot really to stimulate the overall interest among so many people, so many children and adults, to have a great LEGO experience.
#

Desmontados by Arqu medes

Life is ~~not~~ a game

MR. SENSITIVITY HERE, HE CAN'T HELP HIMSELF...

DID HE JUST PASS OUT??

I WAS ONLY GONNA MAKE HIM GO BACK A COUPLE OF SQUARES, I SWEAR!

DON'T YOU REMEMBER HOW SQUEAMISH HE IS?

WE ARE JUST TOO LITTLE FOR ALL THIS PRESSURE...

How to collaborate with us

Collaborating with Hispabrick Magazine is very easy, just send an email with your ideas to info@hispabrickmagazine.com and we will help you to "build" your article.

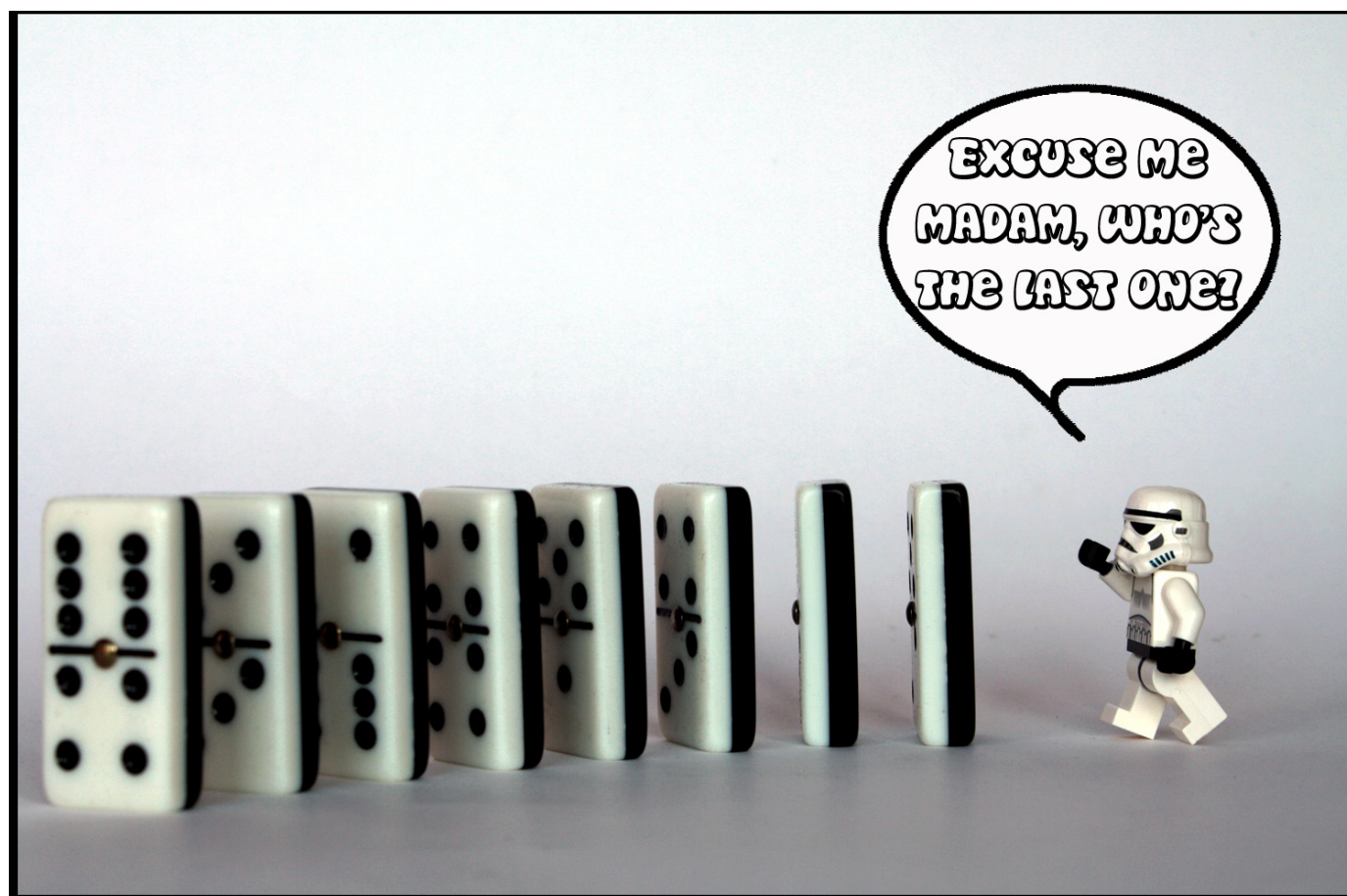If your language is not Spanish, don´t worry, we will find a solution. Contact us now!

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Stupid Studs by Vrykolakas and W3ird

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legotshirts.
eskimoeffect.com

TO BRICK
OR NOT
TO BRICK

WARNING!
These shirts may cause you
to drop everything and go
play Lego. They may also
incite vexed looks in family
and friends. Use at your
own risk