# Total Educational Solution: Combination of STEM & Robotics

STEM education is the latest trend in pedagogical science. STEM curriculum is based on the principle of educating students in 4 major disciplines - Science, Technology, Engineering and Mathematics - in an interdisciplinary and problem solving, creative approach. Rather than teach the 4 disciplines as separate and discrete subjects, STEM integrates them into a unified learning system that is based on real-world applications. This philosophy is well incorporated into ENGINO® STEM & Robotics education series, covering a broad area of subjects, including Robotics, Mechanics, Physics and Renewable Energy.
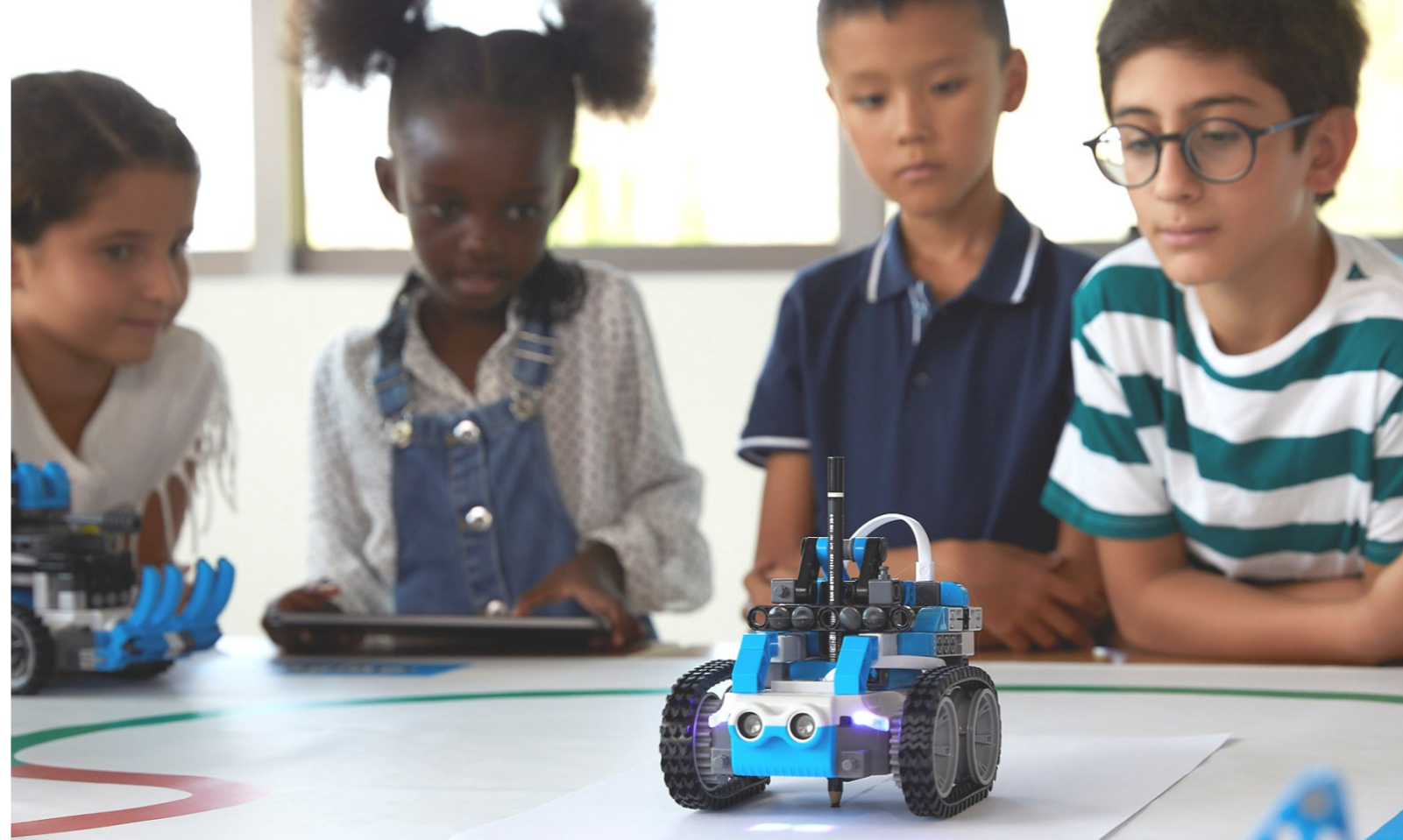
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Engino® EDUCATION
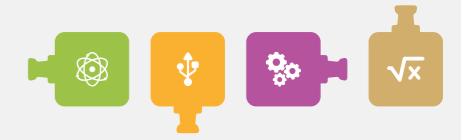
Educational Catalogue **2024**

MADE IN CYPRUS

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# Contents

Company History

A System Emerging from Education

Engino - net Limited was founded in 2004 by Costas Sisamos in Cyprus. With degrees in Mechanical Engineering and Education, Costas worked for 10 years in Primary schools teaching Design & Technology. With a vision to inspire his students to become better problem solvers and future innovators, Costas started designing a new system of modular connectors that would enable students to build fast and easy fully functional technological models. The first ENGINO® sets were launched in 2007 attracting the interest of international toy buyers and educational specialists. The patented ability of the system to snap fit on multiple locations while maintaining simple manufacturing methods was a feature that unleashed great potential. Since the launch, the system has received several local and international awards, while the company's R&D team continues to develop new innovations taking ENGINO® to the 3rd generation of construction toys. Now, with a product range of more than 100 different sets, ranging from simple structures and mechanisms to solar energy sets and wireless robotics, ENGINO® is one of the global leaders in the industry. This success is reflected in the recent expansion to a new fully automated factory in Cyprus, setting new standards for production in Europe by introducing vertical integration from conception to manufacturing and retail.

Research & Development

Transforming Innovative Ideas into Successful Products

Since its inception, ENGINO® has been focused on innovation and creativity. From drawing board to market shelves, several skills are required and a team of exceptional professionals has been assembled. This includes academics, engineers, product designers, illustrators, educational specialists and marketing experts. All research is carried out in house which assures effective communication between the team members and faster development time. In fact R&D has been a key element to ENGINO®'s success, with multiple research projects running simultaneously. Several patents and industrial designs have been issued while new ideas are continually developed. Our factory is equipped with the most modern software and CNC machinery to prototype and create new parts, while everything is tested vigorously to meet the highest standards of quality and functionality.
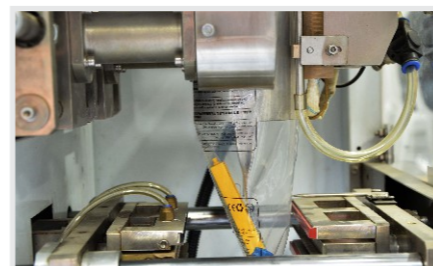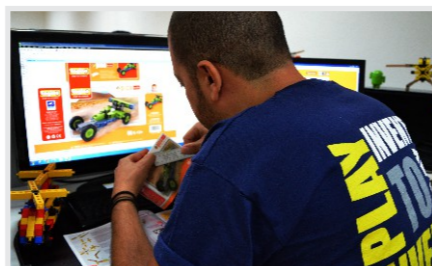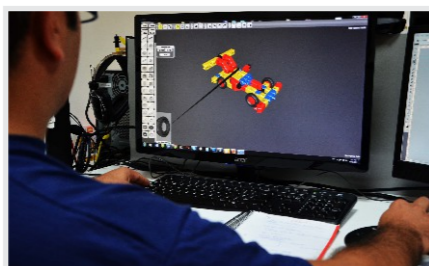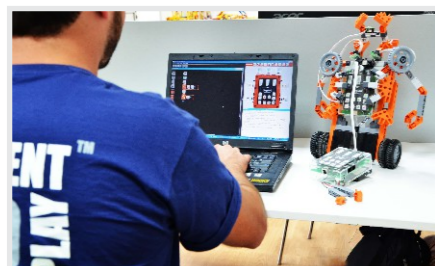
Manufacturing

Producing Effectively in Europe

Since 2012, all manufacturing of ENGINO® has been taking place in Europe, Cyprus, at our own fully automated factory. The factory has 3 sections: tool making, injection molding of plastic parts and automatic packaging, allowing smooth control of the entire production process. The implementation of lean manufacturing methods and high level of quality control has led to the minimization of the production cost while also assuring fast lead-times and consistent quality.

Assuring our Quality

ENGINO® complies with all European toy standards and is being tested by international independent organizations. The production of ENGINO® systems is assured by the ISO9001 and the products are certified for EN71 parts 1-3, ASTMF963-17, CPSC, Pthalates, EN62115, PAHs and other safety standards.
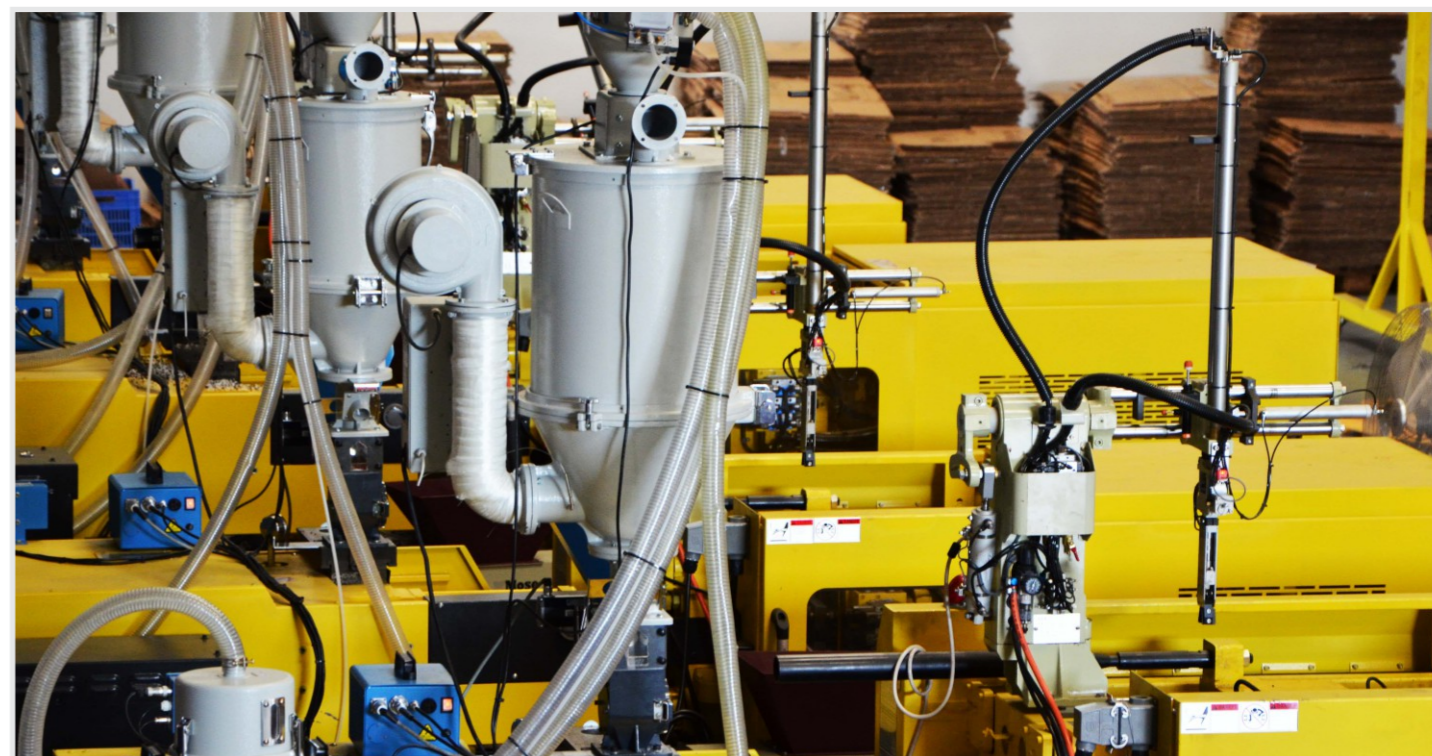
Comprehensive Classroom Solutions for Creative STEM & Robotics Education

ENGINO® comprehensive classroom solutions cover a wide range of STEM subjects that target all levels of education, from Preschool to High school! The unique building system that drives our solutions is fully compatible at all age groups, designed for increased complexity according to the level of each student. The different subjects of STEM are taught in detail through fun and interactive activities that engage and motivate students to learn by doing while acquiring the 21st century skills of problem solving and critical thinking.

3-6
Junior Engineers

Our Junior Engineers, both boys and girls, are just starting to explore their physical world and they are full of curiosity and determination! They are extremely active, have short attention spans, lower control of small muscles in their fingers, and still develop their hand-eye coordination. The products and solutions by ENGINO® for this age group have been specifically designed to increase spatial awareness and enhance their dexterity skills. Our QBOIDZ™ innovative building system can lead to increasing complexity as Junior Engineers grow, facilitating a smooth transition from practical to logical thinking.

6-9
Young Engineers

At this age children have gained finer motor skills and enter the stage of logical thinking development. They move away from random trial and error and are able to visualize their solutions more methodically. As they grow, they apply inductive reasoning and can relate a specific experience to a more general principle. This ability enables them to carry out basic experimental activities and gain basic knowledge around STEM disciplines. Young Engineers can now construct more elaborate models using the ENGINO® Classic building system. This patented system comes with a library of finer-detailed snap-fit parts and simple mechanisms, and sets the foundations for coding!

9-12
Master Engineers

At this age children develop a more global, integrated, and complex self-image. Succeeding in creating functional models with ENGINO® is something that fuels a strong, positive self-image that lasts for a lifetime. Children contemplate about their future careers and begin to explore their innate talents, and it is very important that they are provided with a wealth of experiences, gained through engaging and smart, interdisciplinary STEM activities. The products for Master Engineers combine the classic ENGINO® rods and connectors with our high-precision technical parts, leading to open-ended advancements that spark critical thinking and innovation.

12-16+
Professional Engineers

After 12, children move into adolescence and as young adults begin to develop abstract thinking. They can use deductive reasoning and follow the Scientific method to test their hypotheses. At this stage, teens can think multiple potential solutions to problems and can be guided to apply the Engineering Design method. Starting from a real-life problem, they will identify constraints, research to gain background knowledge, design their own ideas and use the ENGINO® mechanical parts to develop a prototype which they can test, evaluate and modify. Professional Engineers are mature enough to learn complex coding techniques to program advanced robotic models.

Total Educational Solution: Pedagogical Methodology

Trying to effectively incorporate STEM in any classroom can be an overwhelming challenge! At ENGINO® we have developed a new, **Multi-level teaching methodology**, that builds on the latest Academic research results while also taking into account the tremendous benefits of using a construction system as the main teaching tool. This method is presented below, in the form of a circular diagram that consists of several interdependent layers.
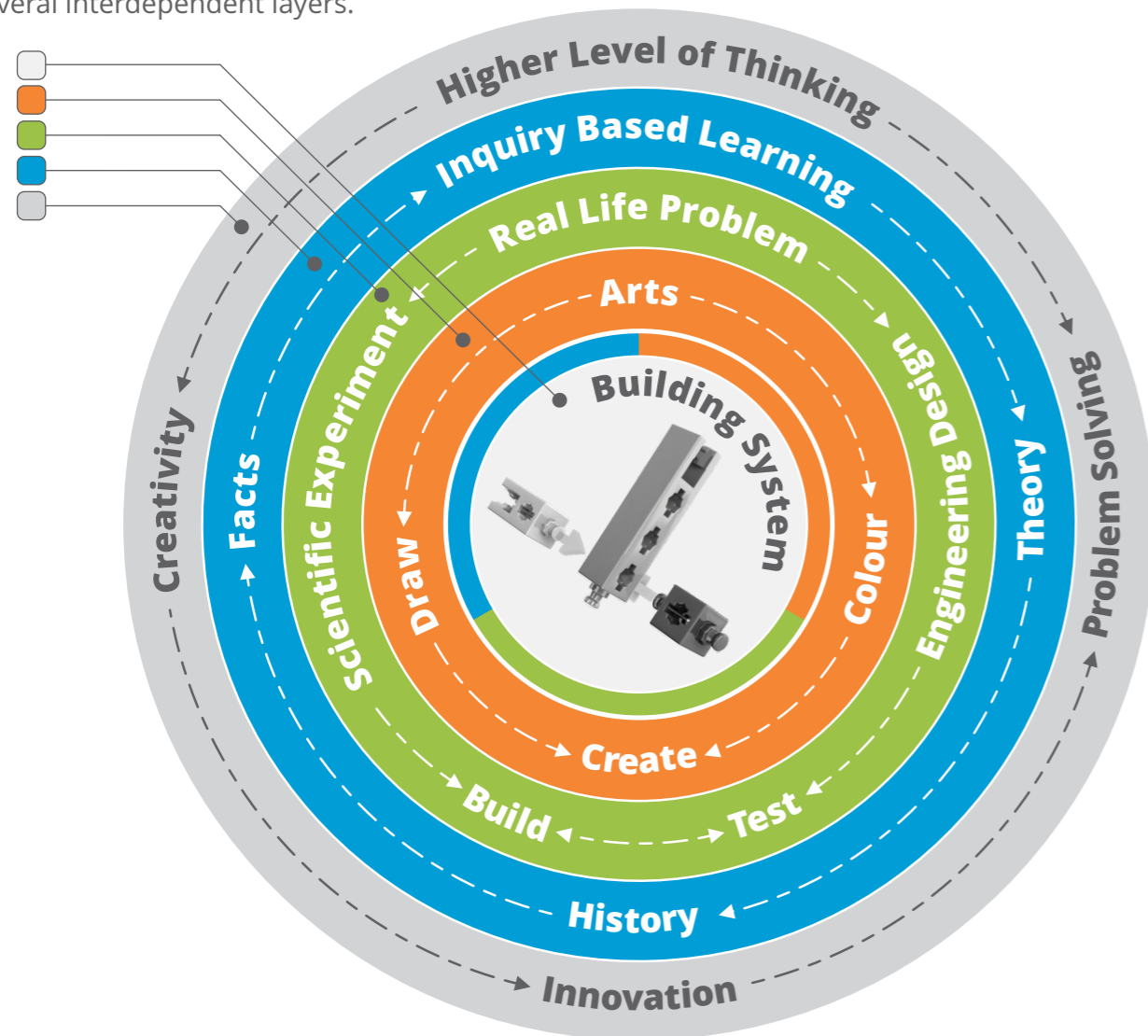
At the center of all layers we place the "heart" of the entire methodology, the ENGINO® building system itself! The unique ability of the particular system to easily build and modify technical models can lead to enhanced dexterity skills and perception of the 3D space, while providing the platform to extend learning through each of the outer layers.

The next layer represents the latest trend in education science that incorporates "Arts" within the STEM curriculum. Even though Art is an inherent part of the engineering design process, for ENGINO®, "A" stands for one of the highest brain functions of human beings, that of **inspirational creativity**. "Inspiration" has been the driving force behind all humanity's masterworks, either inventions, architecture, music, painting or literature.

Besides the traditional ways to include "Art" to communicate and refine ideas, ENGINO® system has organically embedded such functions during the "making" stage, where students can snap colored surfaces of their own designs on the assembled models!

The next layer engages students more deeply in STEM learning as they now need to solve a real-life problem. Problems are approached either as Engineering design challenges or as Scientific experiments or as a combination. During these processes, students build a model, modify it to meet the challenge requirements, test it and observe the results and draw conclusions. This is an iterative process that leads to a higher level of learning and to the acquisition of "engineering design skills".

Deep learning comes as a natural evolution of the previous layer. Once students complete their challenge or experiment, they are more eager to learn more about the underlying Technology (or Science and Maths) that supports their solution. ENGINO® curriculum material contains a wealth of theory and facts about each subject, but students can also seek their own answers, a process that will help teachers implement "inquiry based learning".

The final layer: Ultimately, by guiding your students through this interactive, multi-level approach, they can attain higher levels of thinking, acquire inventive skills and become true problem solvers of enhanced creativity and imagination!

The most critical challenge in modern STEM teaching is how to engage students. This is achieved with open-projects that are based on real-life problems. ENGINO® has developed further the **Engineering Design Method** to best utilize the resources provided through our classroom solutions. The unique ability of ENGINO® building system to be easily reconfigurable, allows students to visualize and model their ideas quite fast. They can test, evaluate and run fast several iterations of their models, optimizing their solutions and acquiring key engineering skills along the way.
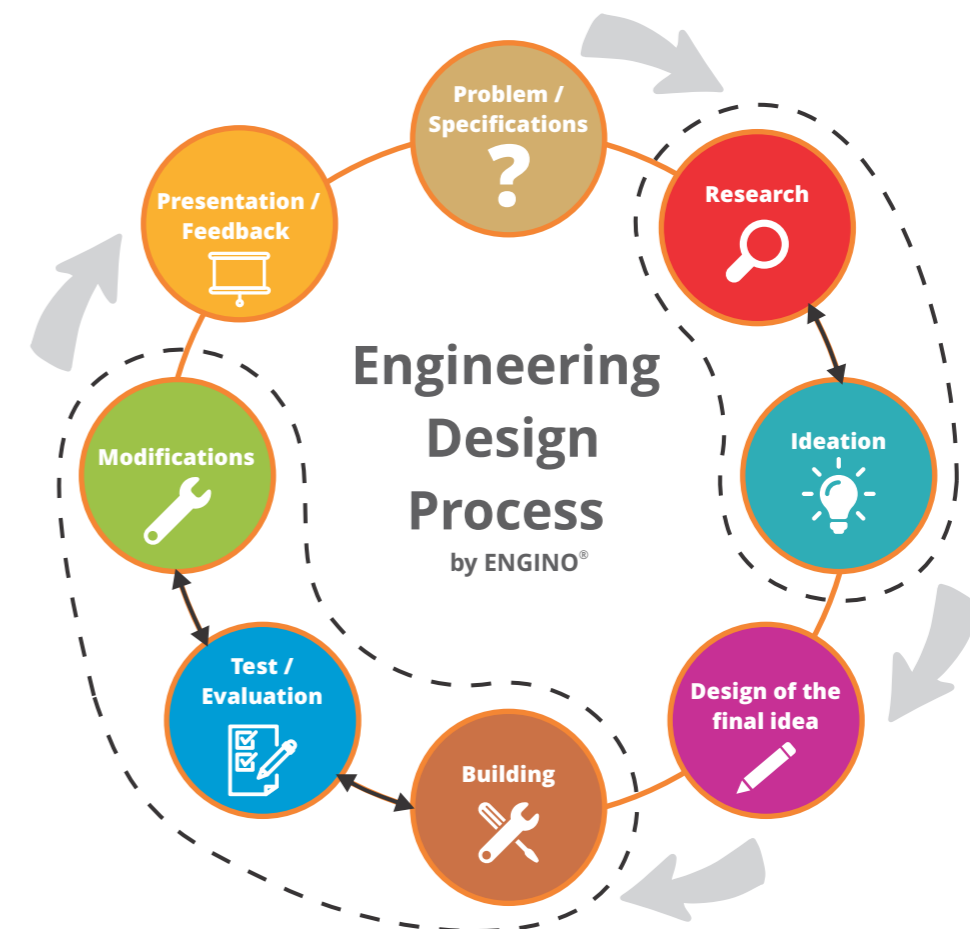
A journey to discovery:
Play to Invent™ ...in 4 steps!

This original motto of ENGINO®, launched back in 2007, tried to capture the true essence of creative play. Since then, STEM has evolved to encompass much of ENGINO®'s philosophy of game-based learning and interdisciplinary approach. The exciting journey towards inventiveness is not left at random; our method has 4 major steps, consistently proven to bring results.

1 **2** **3** **4**

Build **Experiment** **Learn** **Invent**

Step 1: Build your model

Kids love stacking and snapping together our colorful parts to make their very own creations that spin, roll, walk and run. Our patented construction system enables students to actually feel what it's like to build in 3D space, and have fun doing it. ENGINO® has perhaps the only system that is fully compatible from the age of 3 to 12+, starting with the Qboidz™ large blocks, moving on to our multidirectional rods and connectors and advancing to the new mechanical, high-precision parts!

Key outcomes:
Learn to follow step-by-step printed instructions, increase spatial awareness, develop dexterity skills, start using kidCAD software, learn basic CAD commands such as zoom, rotate, explode and implode.

Step 2: Experiment with it

This very unique step is made possible due to the adjustability of ENGINO® building system which allows easy modification and change of variables. By playing with the model and adjusting the parts, students can make observations, take measurements and draw conclusions about the scientific principles and technologies behind every model. Children's innate curiosity pushes them to seek answers to real-life problems, and the proposed models built in Step-1 are designed to ignite this process. For example, how do planets actually revolve around the sun? What makes a robot move? Can the sun really power a car? ENGINO®'s STEM sets give students the chance to explore the science that fascinates them. Because asking why is what it's all about.

Key outcomes:
Understanding a problem's definition, make hypotheses and validate them, take measurements and perform analysis, draw conclusions and communicate them, develop analytical thinking.

Step 3: Learn about STEM

Asking the right questions is where science starts. But young learners also need to understand the theory so that they can start answering those questions by themselves. When students experiment at home or school with ENGINO®, they're not just learning to be creative, they're laying the foundations for a lifetime of scientific discovery. The observations and conclusions students made in Step-2 are now to be validated and compared to the actual science as presented in the theory sections. These sections, printed or digital, give students access to a vast library of information, beautifully laid out with pictures, graphics and artwork. The theoretical background and historical facts from across disciplines are elaborated and additional challenges are provided as examples.

Key outcomes:
Acquire content knowledge of various subjects as these relate to each set, find out about the history of key inventions and scientific discoveries, develop critical thinking.

Step 4: Invent your own

Having acquired knowledge and skills in previous steps, students can now unleash their creativity and imagination and create their own models to solve real-life problems. This step is not necessarily the final one along a linear path; rather it is the result of an iterative process that takes place within every step: from making simple adjustments to pre-defined models to applying elaborate modifications that will better tackle a problem. The engineering design process is superbly enhanced by having such a malleable tool as the ENGINO® building system. Every child, regardless of age and skill can become inventive as the system allows the creation of models that may start from simple builds and grow to advanced mechanical contraptions with coding and electronics.

Key outcomes:
Apply the engineering design process, develop engineering creativity and problem-solving skills, learn coding and programming, develop inventive thinking.

The original ENGINO® system, launched back in 2007, consisted of only 18 basic components. These were designed to be as modular as possible so that with just a few different parts many models could be created. At that time, when ENGINO® was still a small start-up, the available budget was very small, and every new part meant investing in another injection tool. The famous construction toy giant at that time, had a library of more than 8000 different parts, and the small ENGINO® team was up against a seemingly impossible challenge:

How to develop a building system with no more than 20 parts and be at par with a system of 8000 parts?

The ancient Greek philosopher Plato said, "necessity is the mother of invention". After 3 years of intensive research and development, our disadvantage has turned out to become our biggest advantage. It has led to the design of our patented multi-functional joints (receptors and plugs) that allow snap-fit connectivity at both sides of a rod at the same time. It was this innovation that has propelled ENGINO® to one of the top industry leaders in the category of STEM and Robotics!

Since then, our designers have embedded these same geometries to more specialized parts and developed new complimentary shapes that cover the needs of children from ages 3 to 14+. Today, the ENGINO® system continues to excel in usability, and even thought it has extended its library of components, it still has less than 200 different parts, while being perhaps the only system that is fully compatible throughout all ages.

The ENGINO® System has now evolved into 3 Sub-Systems

the **"Qboidz"**, which consists of cube-like bricks for preschool children starting at the age of 3, the **"Classic"**, which is the original ENGINO® for kids of age 6 and above, and the more advanced **"Mechanics"** with precision engineered technical parts and gearing systems for children over 9 years old.

3+ Qboidz

6+ Classic

9+ Mechanics

3+ Qboidz Building System

One of the main reasons behind the inception of "QBOIDZ" was the inability of children under the age of 6 to linearly assemble the "Classic" ENGINO® components. Extensive research with cognitive psychologists and developmental experts showed that children of the younger age of 2-5, do not have adequate skills for a two-step side-lateral connection and neither the abstract reasoning to comprehend it. An innovative solution was developed in 2016 by designing a new type of "end-receptor", a joint that would allow direct linear assembly with a single, one-step snap action. The new system became an immediate success, enabling children even from the age of 3 to achieve the ENGINO® snap-fit connection!

Together with these rods, a library of cubic blocks has been developed. Like most traditional large-scale brick systems, kids could stack one block over the other. The cubic shape also inspired the name "QBOIDZ"!

What differentiates "Qboidz" blocks from any other brick systems, is the incorporation of the original ENGINO® snap-fit geometries on the cube's body! By selectively embedding the ENGINO® bi-directional receptors and the mushroom shaped plugs on the block's sides, the possibility to connect rods onto blocks became a reality.
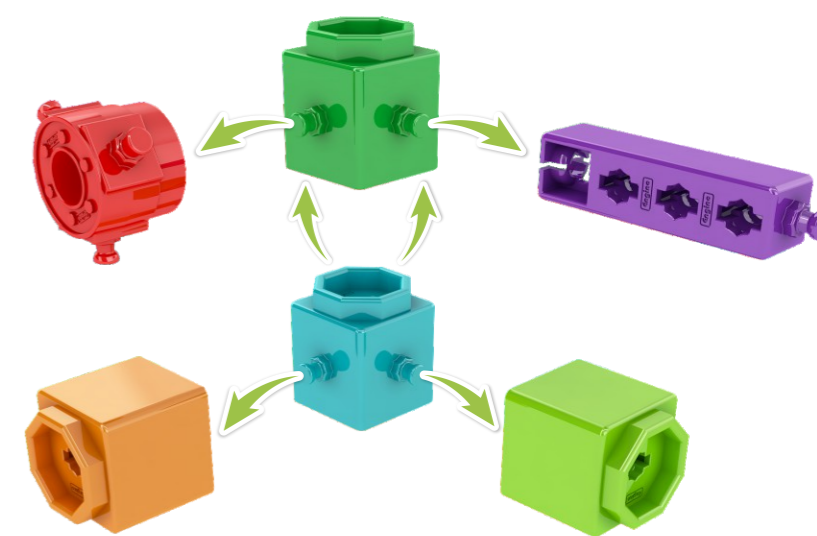

Our QBOIDZ system is perhaps the only constructional toy that grows with the child, respecting his or her needs at every stage of their development, from the age of 3 to 6. Our theory which concurs with latest neurological research- is that by playing with blocks signals are sent to the brain and activate a particular area which relates to spatial perception and three-dimensional thinking. By stacking bricks, one section of this area is activated. More and more neurons are stimulated as children play and reconfigure their blocks.

At the age of 2 to 3, stacking bricks is one of the healthiest forms of play for kids. However, as they grow older, different levels of stimuli are needed to enhance their spatial perception. Traditional bricks only allow stacking, limiting brain activation to the particular region only. However, with QBOIDZ, side-building is possible, adding complexity to the creative process. This complexity activates adjacent neurons not previously triggered and create new neuron connections called synapses.

There are critical periods during a child's development which favor specific neural connections. At this age of Junior Engineers, these brain cell synapses are permanent, much like when learning our first language. By engaging the child in a more complex constructional play, it is possible to establish such new neuro pathways which relate not only to Spatial awareness but also to Engineering Creativity and Innovative thinking. At ENGINO® research center we call these stages **Levels of Dimensional Thinking™**.

ENGINO® Building System
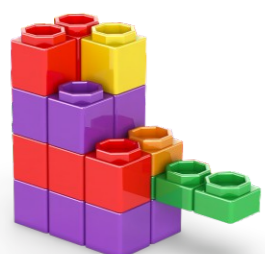
One-dimensional Thinking - Stacking blocks vertically:
Stack the patented cubic blocks (named Qboidz) vertically as with traditional brick systems.
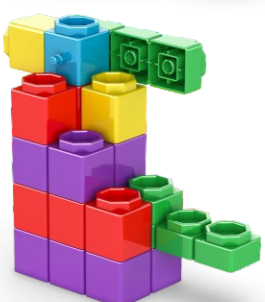
Two-dimensional Thinking - Connecting blocks to the side:
Connect the Qboidz blocks sideways to explore the 3D space, increasing building complexity while further developing hand-eye coordination, dexterity skills and spatial perception.

Three-dimensional Thinking - Combining blocks with beams:
The next step is to fine tune the skills acquired in the previous level. Qboidz blocks can connect to a range of beams designed with a plethora of male and female connecting nodes in order to allow for more detailed constructions. These beams require a higher force of assembly, challenging older preschool children.

Forth-dimensional Thinking - Compatible with Engino system:
The Qboidz parts, both blocks and beams, have embedded in their design the same geometries as the standard ENGINO® system that is suitable for older children, aged 6+. This ensures a smooth transition from one level to the next and enables full compatibility between a wide library of parts. By allowing growing children to combine these parts and work on a finer grid system, they can create more complex technical models.
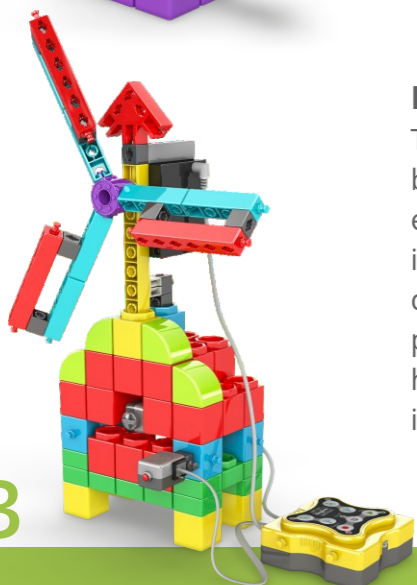
Fifth-dimensional Thinking - Coding with robotic parts:
There are three generations of construction toys. The 1st was that of building structural models. The 2nd was the inclusion of mechanical elements that added motion to the models. New technologies introduced the 3rd generation, that of robotized constructions. The compatibility of the Qboidz system with ENGINO® extends to programmable controllers and sensors! This step into technology helps students acquire 21st century skills and learn coding through interdisciplinary STEM challenges.

6+ Classic Building System

The ENGINO® classic building system is perhaps the most advanced and versatile three dimensional construction toy system in the market today. The patented design of the parts allows connectivity of up to 6 sides simultaneously, while the unique extendable components lead to builds that were previously unthinkable, unleashing children's creativity and imagination. The progressive building capability from simple to advanced is a consistent characteristic of all ENGINO® solutions, from tangible plastic parts to lesson plans and software, and it is at the core DNA of our pedagogical philosophy.
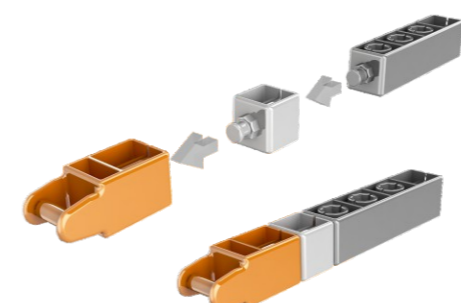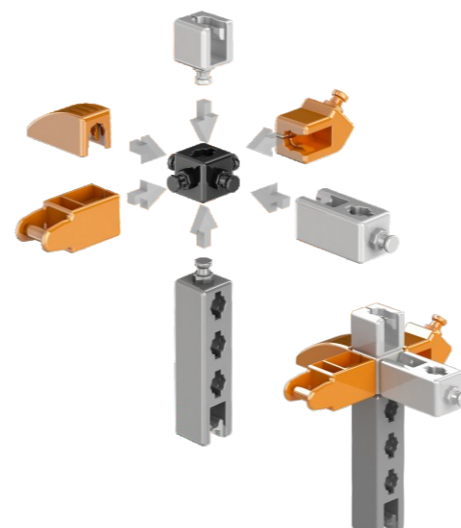
1. Building in one direction...
The ENGINO® rods can be connected in-line without the need of an intermediate connector, almost reducing to half the quantity of parts required to build models as compared to other systems. This is because the connecting plug's geometry is already embedded within each rod. The biggest advantage in requiring half the number of parts, besides simplicity, is the fact that students will need half the time to build their model, saving time to be allocated for being more creative by trying their own ideas.
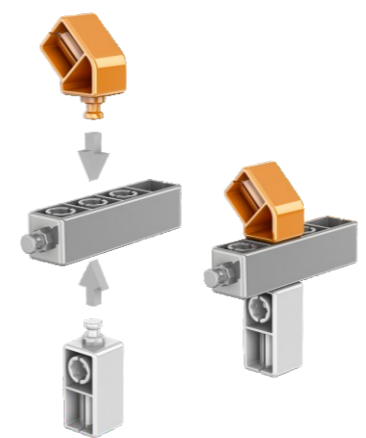
2. Building in two directions...
The same rods which can be assembled horizontally in-line can also be connected vertically sideways! The unique plug geometry can click on any of the bi-directional side-holes of the rods, meaning that students can build without needing a new component- in two directions! Even though this is a big advantage by itself, the biggest innovation is that the rods can snap-fit on both sides of the rods simultaneously, something that greatly enhances the expandability of the system and reduces even more the number of parts needed to construct a model.

3. Building in three directions...
The Classic ENGINO® system consists of "rods" and "connectors". In essence, these "connectors" share the same geometrical designs as the rods, establishing a multiplier effect that enables a further reduction in the number of parts needed to construct a model. In most cases this means 4 times less parts are required to build a model as compared to other building systems. In effect, this means that students can not only create a model 4 times faster, but they can spent 4 times less effort to modify and experiment!
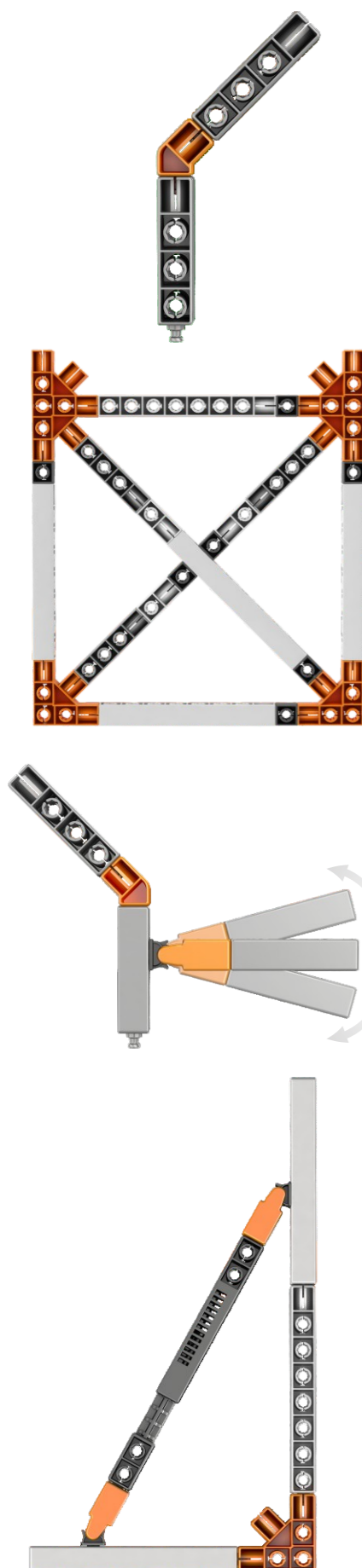
4. Building in fixed angles...

Modelling real-life machines and buildings requires also connecting components at an angle other than 90 degrees. The system includes 45-degree angular parts, which with the same ease can snap-fit on the rods and connectors to create more complex models.

5. Triangulating...

To make a frame stronger a technique called Triangulation is used, something which is clearly visible in many large bridges and wooden structures. With ENGINO®, triangulation is very easy to achieve, ideally with side-lengths of 15 units. Converting a structure from a flat two-dimensional shape to a three-dimensional one, for example adding pillars on floors when making a model of a house, is straight forward with ENGINO® . Simply snap a rod directly on the ELBOW or TEE connectors! These provide a change in the plane of building, without having any elements protruding, allowing also easy modification at any time without having to substitute these connectors with different ones.

6. Connecting in every angle...

The potential of the system is unleashed by "cloning" the innovative geometries to pivoted joints. A specially designed component acts as a pivot (called internally "swing rod") and allows any angle of the 3D space to be created, not restricted by 45 or 90 degrees!

7. Connecting everywhere...

ENGINO® rods can connect one after the other and achieve longer sizes, however these are restricted by the size of the smallest part, our unit dimension of 12.7mm. But how can a child build creatively when they want to freely triangulate a model, and the hypotenuse length is not matching the unit's multiple? This is an unsolvable problem, and no building system has so far managed to solve it. Based on Pythagoras theorem we should cut short a component to reach the required length, but this is of course not possible.
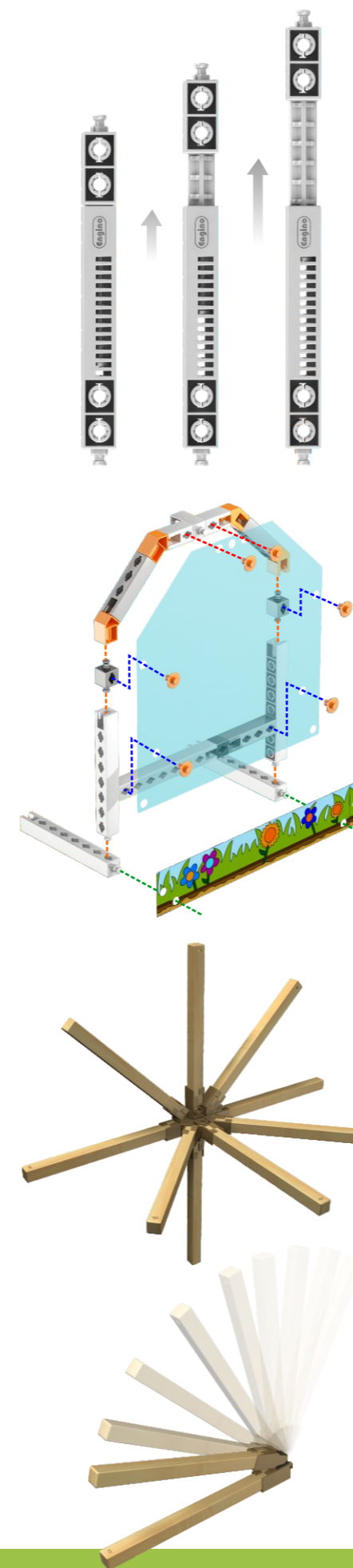
At ENGINO® we like to keep things simple for kids and assign the hard, engineering problems to our researchers. An innovative solution has been developed: our **extendable rods**. With just 2 pieces that interlock, kids can twist and extend creating any length possible! This amazing feature, when combined with the pivoted joints, can lead to the creation of any triangular shape and to constructions that were previously inconceivable! The extendable rod replaces the need of numerous other components and maximizes the building capabilities of the system.

8. Connecting DIY surfaces...

The assembled components of ENGINO® can have a flush surface with no protrusions. This has been designed on purpose for a very unique and specific reason: To allow children to cover their models with flat surface panels without obstructions. These panels can be from paper, acrylic or wooden materials, which kids can draw, paint and cut to their own ideas, making the models more realistic. This feature is the first step into the maker-space era providing a bridge between construction toys and real DIY projects. Surfaces can attach very easily on ENGINO® models by using the latest designed lock-pins, which secure the panels on the Engino rods with a simple click!

9. Driving the Maker-space revolution...

The original problem ENGINO® tried to solve, was how to build models made from wooden dowels, for -what back in 2004- was a "Design & Technology" classroom. This inspired the design of plastic modular wood connectors that could be used either as part of a toy or as consumables in DIY projects. The latest trends in education, with the Maker-space revolution, has created a new need for DIY building materials, making the ENGINO® wood connectors the ideal system to craft models with ease. These components are fully compatible with all other ENGINO® parts as they share same connecting features. This helps create hybrid models that combine plastic parts with wooden beams which can be cut at any size by students or hobby engineers. These wood connectors can also integrate with the DIY surfaces and their lock-pins, empowering open-ended projects for children and adults alike!

9+ Mechanics Building System

By 2012, ENGINO® had already started investing heavily in further Research to develop our 3rd generation of construction toys. These are called in STEM academic circles Robotized Construction Kits. Such advanced kits require high-precision mechanisms and more robust constructions that could remain assembled and functioning even after vigorous use, such as in robotic competitions.

The ENGINO® philosophy prioritizes ease of play, creativity and pedagogy, rather than technical modeling. But, as more and more electronic controllers and sensors kept being added to the ENGINO® robots, the need for a specialized system became evident by 2017. That was when a big research project started to design, prototype, test and bring into production a new technical system that would still be abiding to our pedagogical values. Our new **Mechanics System**, launched and patented early 2021, consists of a library of components that are working in conjunction with the Classic ENGINO® parts, preserving as much as possible the attributes of creativity and reconfigurability of the original system.
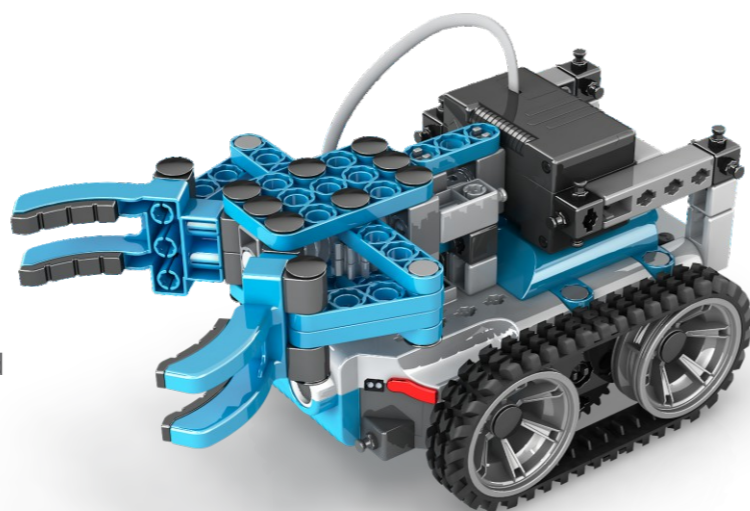
Students from the age of 9 can actively engage in advanced model's creation and dig further into the secrets of Science and Technology. As they grow older, they can use more specialized components to develop elaborate mechanisms that simulate real-life machines and robots. The Mechanics library includes around 100 different components, including new wheels and axles, beams and connectors and some impressing locking technologies, all compatible with the ENGINO® Classic parts!

How the System Works

To be able to construct more robust models, the Mechanics Beams are of half-unit thickness as compared to the Classic Rods (6.2mm). They have simple cylindrical holes that allow a thick, strong axle to pass through and rotate freely with minimal friction. The unique design of these beams is to incorporate an octagonal base at every hole, which allows locking every 45 degrees when needed. Beams help create a strong structural frame and plates add robustness by providing more compact spacing.
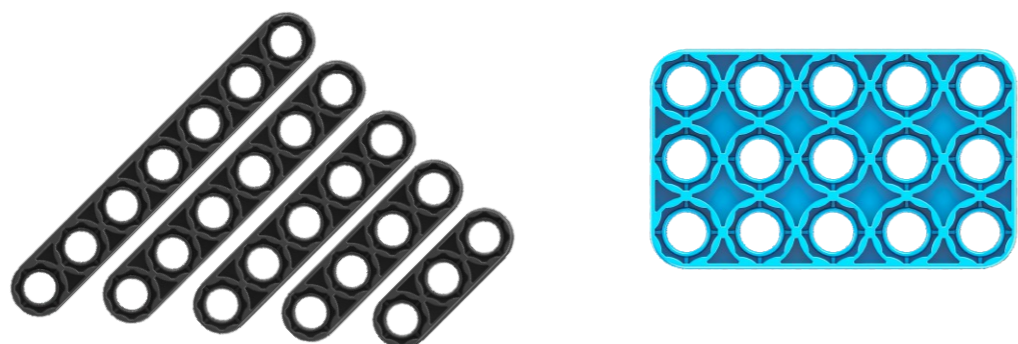
1. Connecting the Beams...
Beams can connect adjacently with each other, like bricks, by using our specially designed snap-fit axles, yet, they can be also be connected linearly at various angles using our new patented beam connectors!

90° Beam connector

45° Beam connector

180° Beam connector
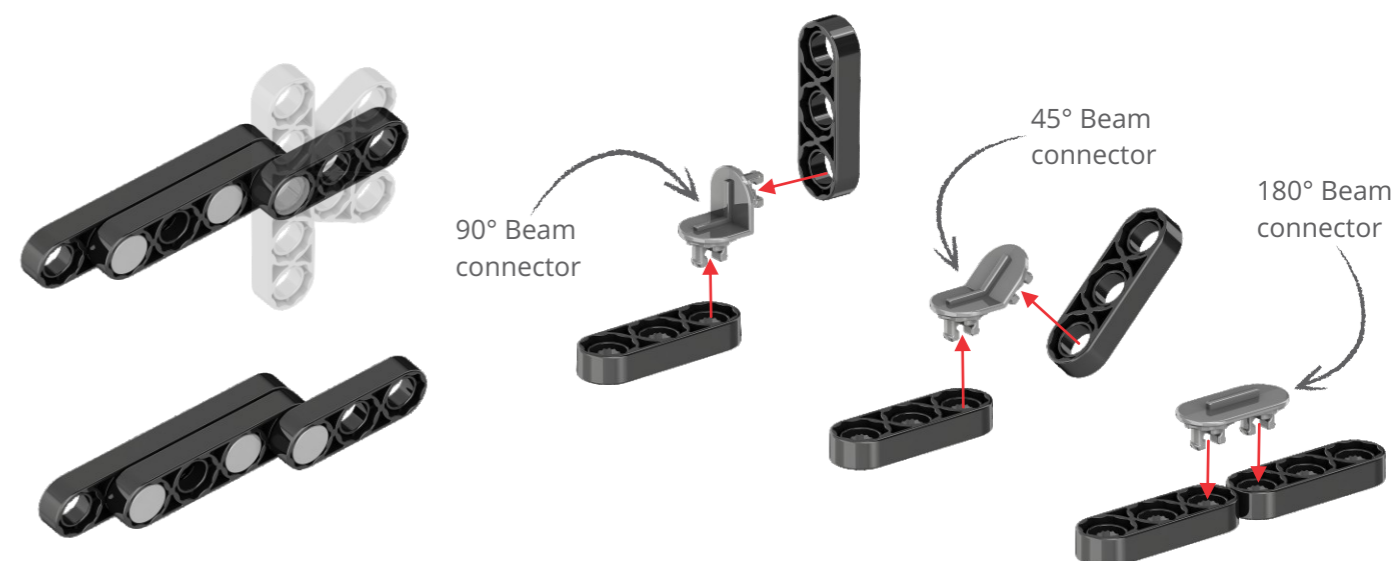
One of the biggest innovations of the ENGINO® Mechanics system is how the Beams can connect easily to the Classic System using the special axle-adaptors.

Axle adaptor from ENGINO® classic to mechanics's beams

2. Connecting the Wheels...
These axle-adaptors besides connecting Classic parts to Mechanics, they are best utilized for easily attaching our new low-friction wheels and gears to models.

One-unit long axle for connecting a free-spinning wheel or two beams

Half-unit long axle for connecting gears and beams
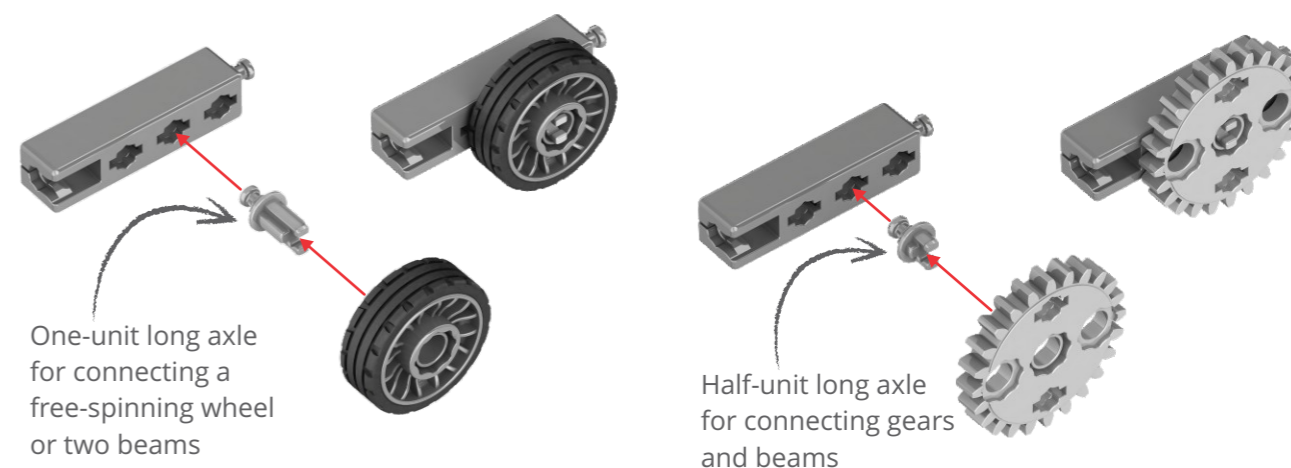
With larger models, it is possible to have the wheels breaking off due to their bigger weight. To solve this problem, a special component has been designed to be a hybrid between ENGINO® Classic rods and Mechanics' beams. This part enables a fully secure connection so that wheels or gears can remain attached to the models. There are various parts that combine these same geometries, offering a wide range of options to young builders for creating more functional mechanical and robotized models.

Lock-pin to keep wheels or other parts in-place when under stress

Various types of hybrid parts to connect Classic to Mechanics!

3. Connecting the Axles...

The new Mechanics system relies on axles to connect the various technical parts together. There are various sizes of axles, with each one servicing a specific purpose and engineering application.

When making technical models, it is important to transfer motion longer distances. For this purpose, we have developed a range of axle connectors that allow the axles to snap-in. These connectors have various sizes and will join axles linearly, extending them to the length required. There is even a special part to connect an axle vertically on Beams!
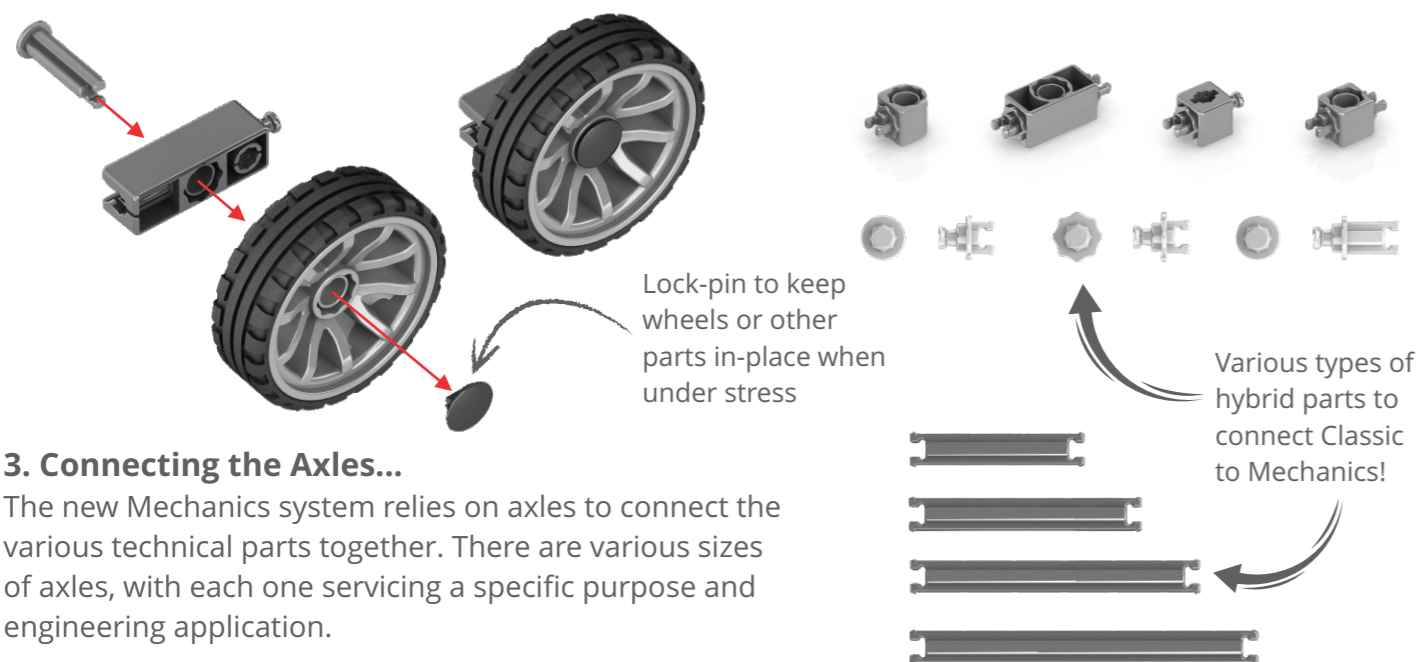
In many cases there is a need to change the direction of motion by an arbitrary angle. Transferring power at an angle is quite challenging, but engineers have actually figured it out by inventing centuries ago the Universal joint. The new Mechanics System includes even the specialized parts to model such a joint!

There is a unique design feature in all these axles, and that is the **slotted tip**. The tip has been designed with that patented shape for two purposes. The obvious one is to snap-fit when an axle is inserted in the receptive holes of beams, gears and wheels. The slot allows deflection of the tips and enable a smooth, repeatable click.

Various types of axle connectors

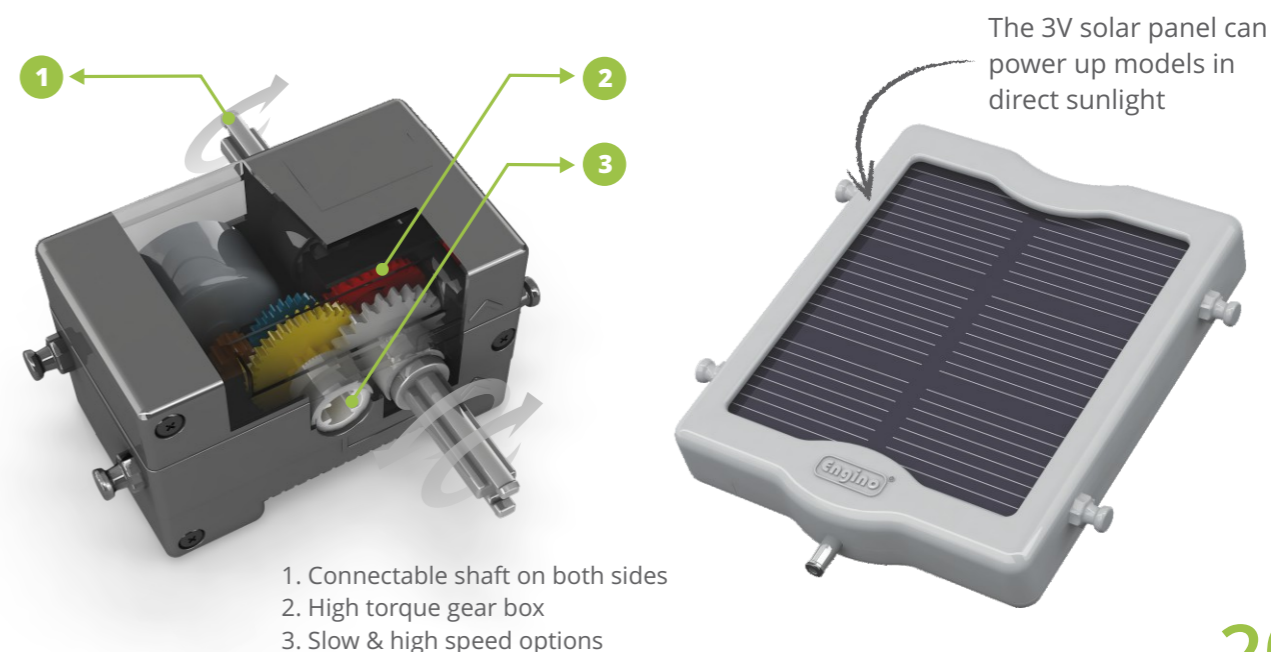A universal joint

Slotted tip for snap-fit
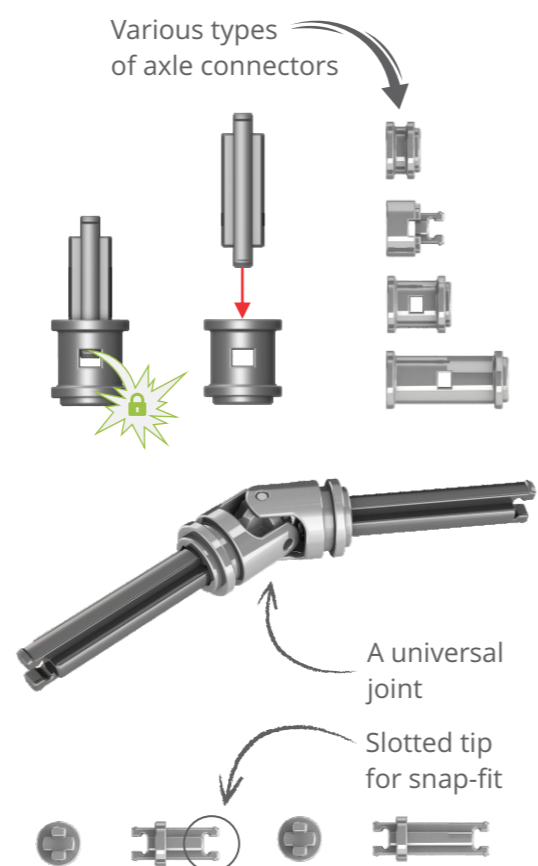
4. Locking the connections...

The second purpose of the slotted tip on the axles is what makes it a multi-purpose tool! A "lock-pin" can be inserted inside the slot and once it snaps in place, it can hold one part securely on the other, like a fastener. By attempting to pull the parts apart, the "lock-pin" wing's inside the slot restrict axle's deflection and force the parts to remain connected. But, as easily as this pin is inserted, it is as easily removed! Just pull the pin out first, either by using fingers or with the innovative extraction tool, and parts are unlocked and released.

The ENGINO® extraction tool included in most sets

OPTION 2:
Push into the hole to pop-out locked part!

OPTION 1:
Squeeze the tool to disassemble small parts!

5. Powering up the Models...

The ability to animate models using motors is the first step before introducing robotics. The new ENGINO® motors are designed with a snap fit removable axle so that it can be replaced easily when overstressed. The high-performance gearbox inside the casing achieves high torque and powers two outputs as an option, a fast one and a slower one, giving a 2-speed option to the user. There are two versions of the motor, one with built-in battery compartment and one with a robotics cable. Still, living in the new world of renewable energies, we could not have left out the possibility to power the motor only with solar energy! The solar panel of ENGINO® has a large surface to produce enough voltage when placed in direct sunlight, to power even large models such as the Ferris wheel!

The 3V solar panel can power up models in direct sunlight

1. Connectable shaft on both sides
2. High torque gear box
3. Slow & high speed options

6. Working with Gears...

The new mechanics system of ENGINO® includes a range of high-precession gears that provide a smooth motion and transmit power from a hand-driven crank or the motor to another position, changing speed and torque based on the Mechanical advantage of Simple Machines. There are 3 sizes of spur gears, a modular worm drive that can stack to itself achieving longer worms, a rack gear to convert rotational motion to linear and a set of bevel gears to change the direction of motion by 90 degrees. The central axle hub of the gears connects with a snap-fit with the various shafts of the system and is held secure in place with the use of the patented locking pin, making sure that gears will stay in place even when stressed with higher loads!

Spur gears

Rack & pinion

Bevel gears

Worm gear & screw
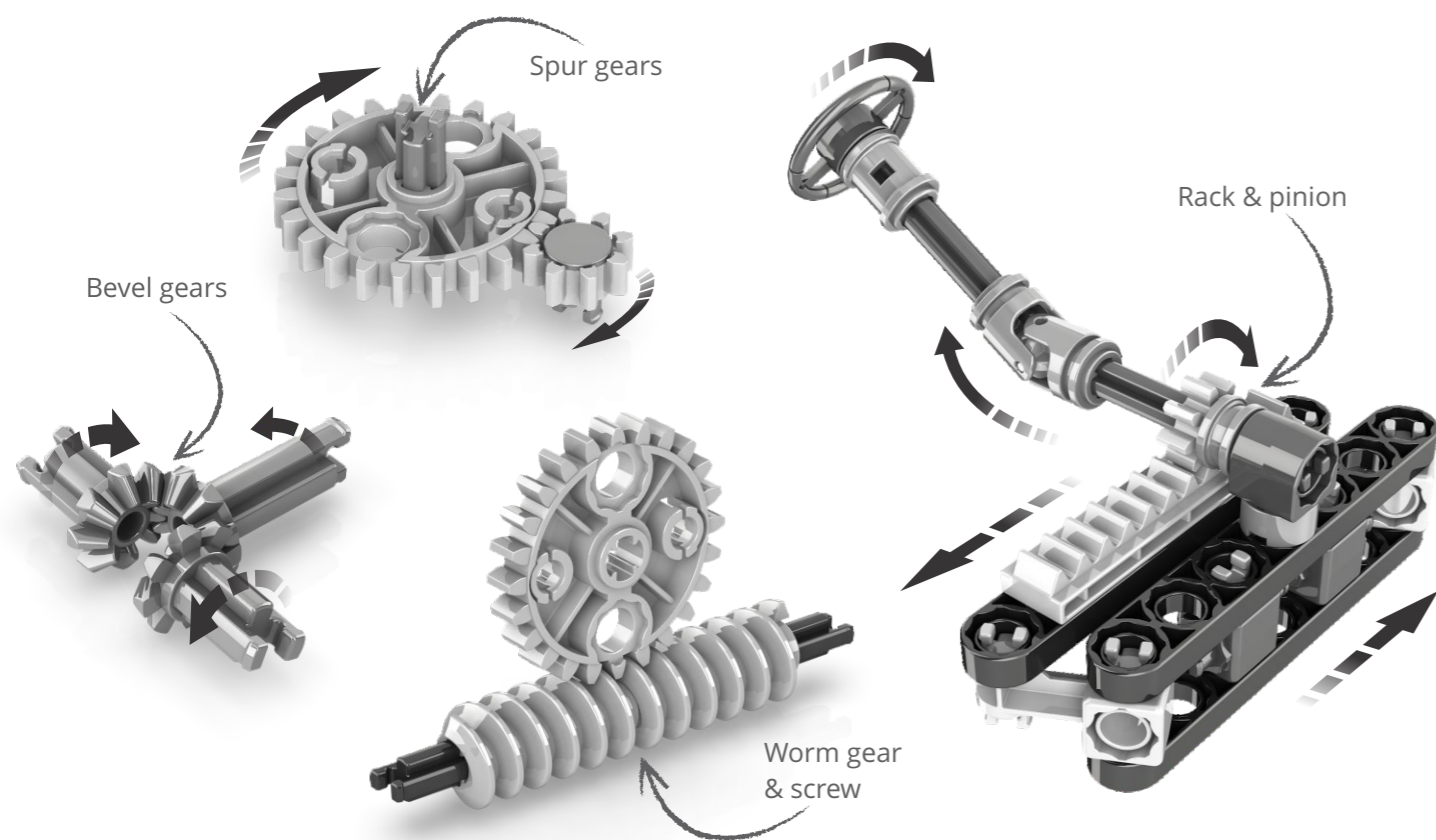
7. Working with Pulleys...

In modern-day machines, gears are more regularly used due to their compact size and efficiency. However, another Simple machine, the Pulley, has been in use since ancient times and it still has its applications! Younger students understand mechanical advantage easier when using Pulleys, and the Mechanics system by ENGINO® has 3 sizes of pulleys that can be used interchangeably to perform several experiments and machine configurations.

Different sizes of pulleys
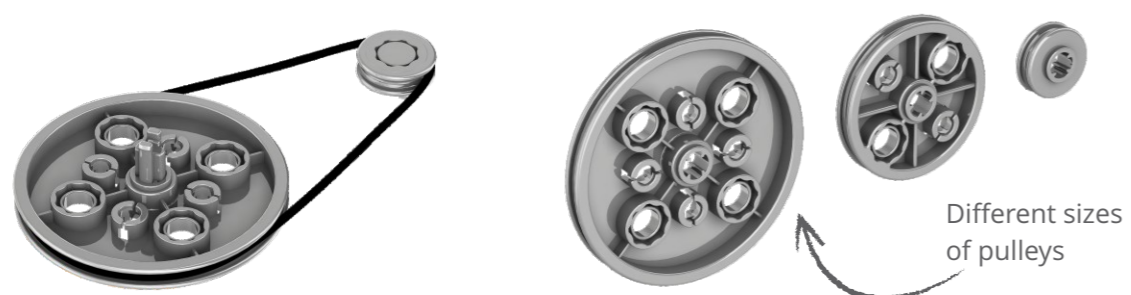
8. Working with Cams & Cranks...

To convert circular motion to reciprocal, such as the car engine, the use of cams is required. Students can learn valuable lessons through the deployment of cams in their models and understand how cams not only change the type of motion but can also act as timers. ENGINO® has two types of cams for teaching purposes, the traditional egg-shaped cam and the snail cam.

Snail and egg-shaped cams
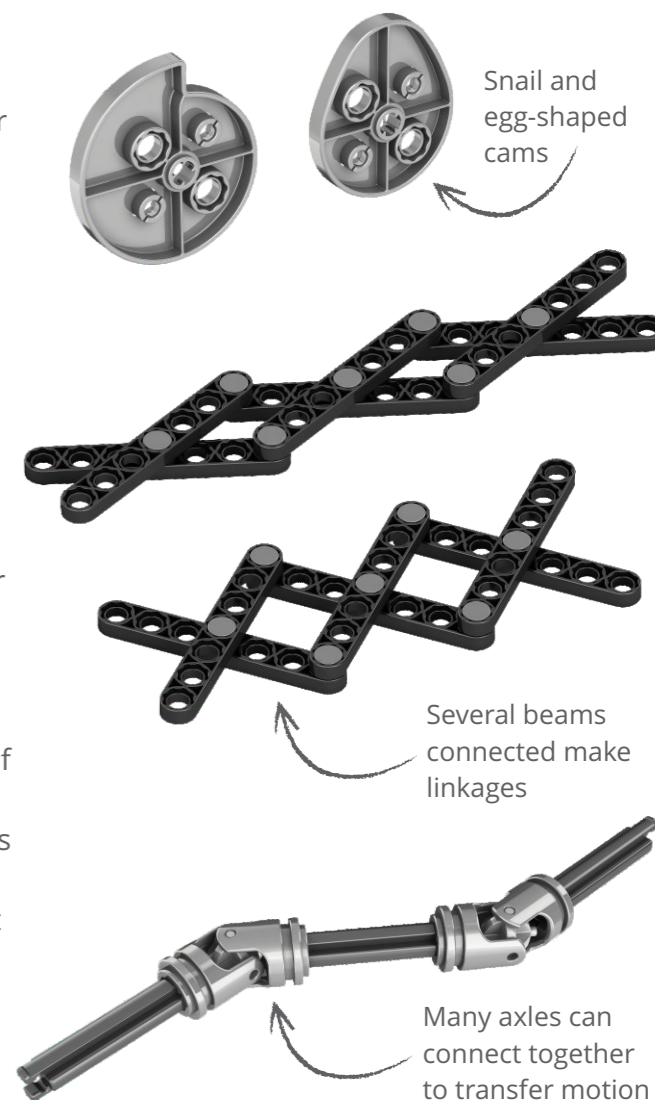
9. Working with Levers & Linkages...

The new beams of the Mechanics system has half the width of the Classic ENGINO® rods, making them more sturdy and robust, ideal to create levers and linkages and magnify motion. They can be combined with the simpler classic rods and accommodate variable complexity as per student's capabilities.

Several beams connected make linkages

10. Making shafts...

Power transition can be achieved by using single pieces of axles or shafts. But when there is a need to reach longer distances, a singe axle is not enough. The system includes axle connectors that can extend an axle to any length needed, simply by joining the axles together with snap-fit secure action. In addition to straight connectors, the ENGINO® system has Universal joints which are remarkable when attempting to change the angle of power transfer!

Many axles can connect together to transfer motion

11. Making robots turn easily...

When students make robotic models they are very often asked to program them for very common tasks such as line-following or obstacle avoidance. There are various methods to make a robotic car turn, but one of the most efficient ones which allows rotation on the same spot, is through the use of a central ball caster wheel. The metal sphere is captured in between two support wings and is allowed to rotate freely with minimal friction.

Steel ball bearing
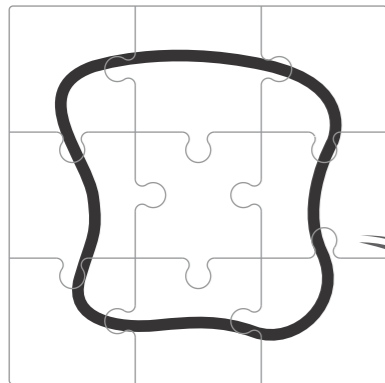
A complete ecosystem of solutions

Even though ENGINO® has several products to cover the needs of every age group, there is complete vertical and horizontal compatibility. The solutions are scientifically designed to allow for a smooth transition from one age group to the next, while also using similar tools, minimizing both the learning curve and the school's investment. The products' mapping as per age group is indicated in below representation: Qboidz is for the preschool kids, ERP MINI for early Primary, ERP PRO for late Primary and Middle School while Produino covers late Middle School and Highschool. The new GinoBot is a horizontal product, as it has been specially developed to be an expandable plug&play robotic vehicle.

GinoBot can be used from the age 7 in its basic form, and then at the age of 9+ it can be expanded with mechanical parts and peripherals. It then moves to 12+ by connecting to open electronic platforms such as Microbit, Arduino and Raspberry pi, allowing Python and C++ programming with advanced features. All these solutions share a common library of key-enabling technologies. These **vertical technologies** start with the building system itself which is compatible throughout all products. Then, there are the electronic peripherals such as sensors and motors, supported by our proprietary software such as KEIRO™, ENVIRO™ and 3D builder. ENGINO® solutions are being empowered by our curriculum-based pedagogical methodology and the new e-learning platform which digitizes the entire learning process.

Vertical Compatibility

- Engino motors, sensors & peripherals
- Engino mechanical & structural parts
- Engino software (KEIRO™, EnViRo™, 3D Builder)
- Engino e-learning platform
- Engino curriculum support & teaching methodology

Key-enabling Technologies

QBOIDZ
3-6

JUNIOR ROBOTICS
5-7

ERP MINI
7-9

ERP PRO
9-12+

PRODUINO
12-16+

GinoBot
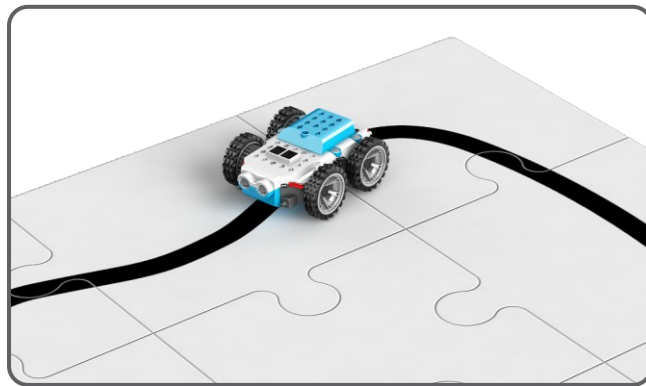**7-16+**

Horizontal Compatibility

Floor Mats

When students program their robotic models, they need to test them and optimize their code. Even though the teacher can always improvise some challenges in the classroom, it can be difficult to create realistic situations that will inspire children and motivate them to develop solutions. That is why at ENGINO® we have designed several types of large-scale floor mats which can be deployed in any classroom, depending on the complexity of the challenge and the age of the students.
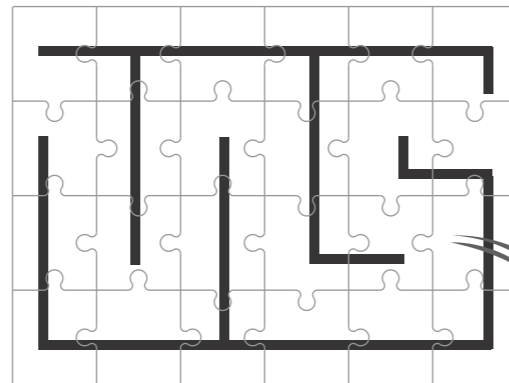
The floor mats come in the form of large corrugated plastic puzzle pieces so that they can be safely stored without taking too much space and assembled again whenever they are needed. Besides these solid puzzles which have a specific layout, such as line following and maze, we have developed an innovative **Flexi-track puzzle** for GinoBot™, that is made from thick cardboard and we can be connected as per user's needs. The set has a large number of pieces such as straight lines, corners and crossroads, and allows many combinations for increased complexity. The printed black line has slots where colored pieces can be inserted so that GinoBot™ can be programmed to follow different programs and take decisions based on these different colours which are read by the floor sensors of the vechicle. The set also includes parts to build coloured towers that can be picked up by the grabber model of GinoBot™.
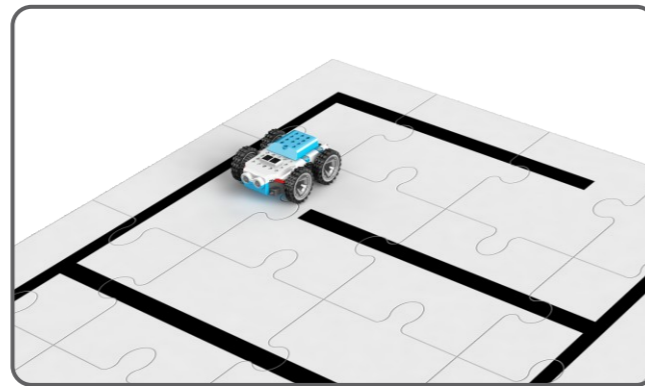
Line Follow Puzzle (100x100cm)
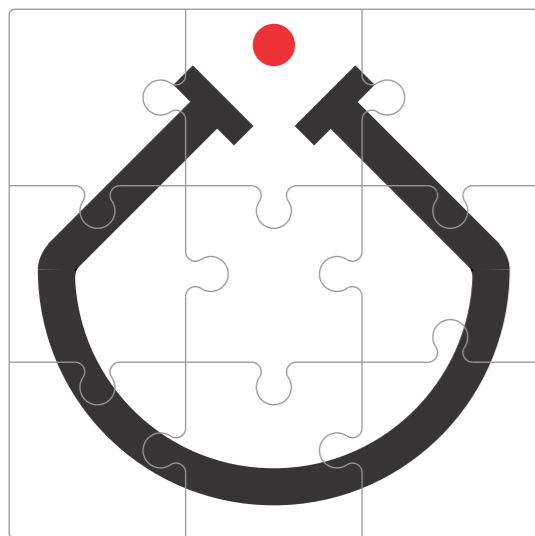
Product Code: **EP01.1**

Maze Puzzle (200x150cm)

Product Code: **EP02.1**

Grabber puzzle (100x100cm)

Product Code: **EP03.1**

Fun City puzzle (100x100cm)

Product Code: **EP04.1**

Flexi-Track Puzzle

Product Code: **EP05.1**

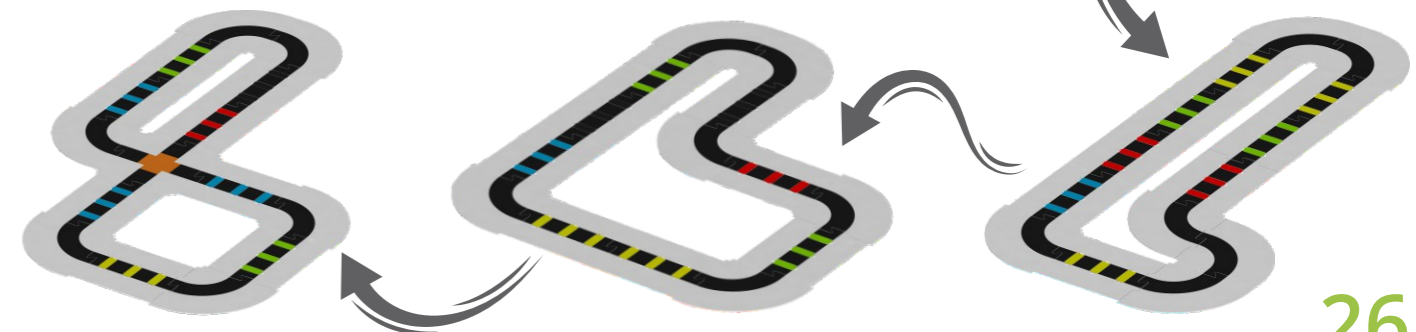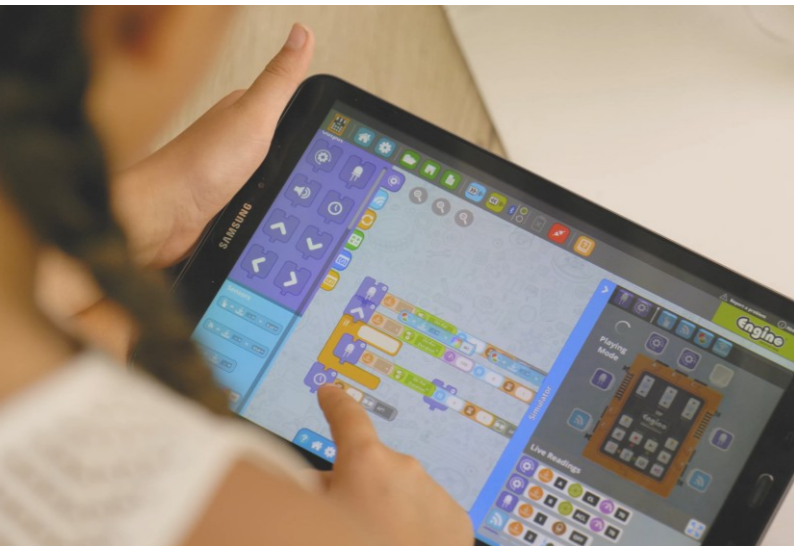## Specifications

- 8 Straight puzzle pieces, 16.5 x 22cm long each
- 6 corners puzzle pieces of 90°, 20 x 20cm
- 2 cross road puzzle pieces, 22 x 22cm
- 4 line-end puzzle pieces, 18 x 6.5cm
- 20 Qboidz parts to make 2 towers for picking and sorting

The ecosystem of ENGINO® is supported by key software technologies, specifically developed to aid the teaching of STEM. Students of today need a plethora of stimuli to better understand their world around them and develop the skills needed for our technologically driven world. By combining the physical ENGINO® system with these software applications, students develop Digital literacy, also known as virtual learning. They develop technological skills, learn authorship rules, understand how to access online information, develop computational thinking and learn social responsibility while interacting with their peers.

KEIRO™ Programming Software
Product Code: **ES01.1**

A key element of any robotics system is the programming software. ENGINO® has developed a user friendly Scratch-like software that allows multiple methods of programming depending on the user needs and capabilities. This block-based software is used for editing the program and adding complex functions both in flow diagram and in Arduino IDE environment for older students. In addition, **KEIRO™** programming platform can be also controlled from smart devices through Bluetooth connection. The software is compatible with operating systems Windows, MacOS, Linux. Applications are available in Google Play and Apple store.

Engino® Software Suite
Product Code: **ES30.1**

The ENGINO® software Suite consists of all available software developed by ENGINO® and is an ideal solution for teachers who look towards an encompassing approach on STEM. Starting with the 3D builder software, kids are empowered to create their own virtual model, practicing early CAD skills along with design thinking and 3D perception. With KEIRO™ software, students develop computational thinking and learn coding by using intuitive block-based programming, which can also advance with text programming. The ENVIRO™ simulator allows students to test their code without needing a physical device, seeing how their virtual model performs in a virtual 3D arena. They can select from a variety of challenges that are not easily actualized within usual classroom setting. With the e-learning curriculum software, all theory, experiments and quizzes become interactive and engage students with inquiry based learning.

Easy to program
• Methods to control inputs and outputs
• Fundamental principles of coding
• Parallel programming and synchronous tasks
• Basics of Programming languages like C, C++

Compatible with:

WINDOWS (7, 8.1, 10) **ANDROID** **iOS** **MacOS** **Linux**

Action Blocks   **Simulator**
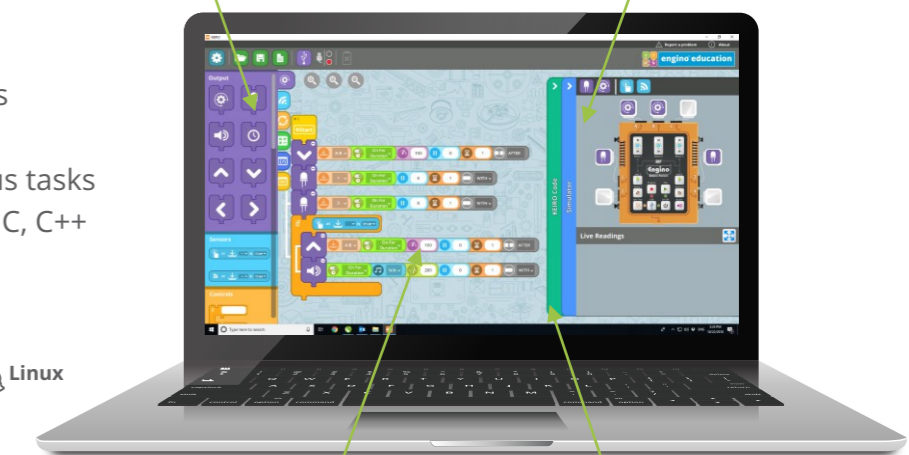
Flow Diagram   **KEIRO™ Code**

Engino® Software Suite includes:

KEIRO™	+	3D Builder	+	EnViRo™	+	Map Builder	+	Apps
Programming block-based Software		KidCAD virtual model creator Software		Programming Simulation Software		Custom map building for EnViro™		Model 3D viewer, Remote control (RC) Apps

The programming ladder

MANUAL PROGRAMMING	FLOW DIAGRAM	KEIRO™ CODE VIEWER	ARDUINO CODE	C++ and IDE Editor
Pushing physical buttons on the controller's membrane	Graphical programming with action blocks	Converting action blocks into an understandable textual form	Transition to the programming language used in Arduino	Editing a code using C++ commands and functions

3D Builder

Product Code: **ES05.1**

Students can easily build their own models and familiarize themselves with the virtual three-dimensional space. This 3D builder software contains an extended library of all the ENGINO® parts. Users can select virtual connecting points to construct a model. This is the ideal tool to teach basics of CAD software such as design, zoom, rotate, explode and implode.

Compatible with:

WINDOWS (7, 8.1, 10) **MacOS**

KidCAD™ 3D Viewer App

With this application students can view models in a virtual 3D environment. They can zoom in and out, rotate, implode and explode, even see step-by-step how to build the models. Students have access to a vast library of models, 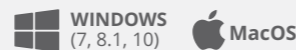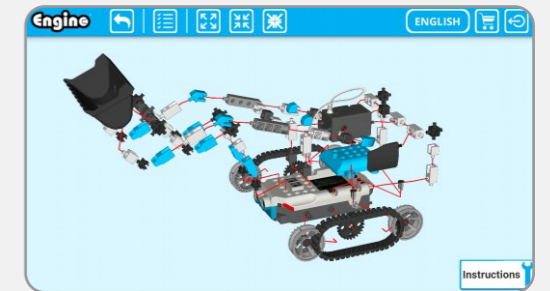even to models not included in their set, inspiring them with ideas on what can be achieved. New models are continually added to further support the curriculum and include STEM models and Robots.

Compatible with:

ANDROID **iOS**

EnViRo™ Simulation Software

Product Code: **ES10.1**

Engino Virtual Robotics, EnViRo™, is an innovative tool that enables robots to run into a simulated 3D world! Students can choose a model from the library and use it on any of the challenging environments. They can test their code and optimize, as if in a real-world environment! EnViRo™ is a plug-in to the KEIRO™ software.
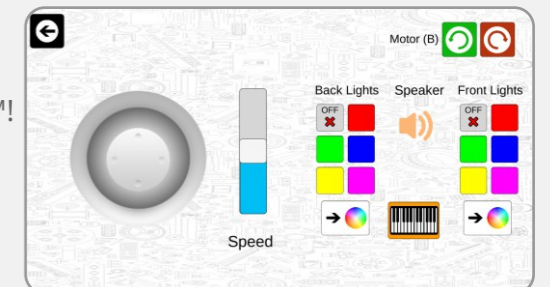
Compatible with:

WINDOWS (7, 8.1, 10) **ANDROID** **iOS** **MacOS**

GinoBot™ Robot RC App

This App is a remote control specially for GinoBot™! By connecting to the device's Bluetooth Access Point, GinoBot™ can be controlled easily with the option to even record its movements. These movements can be imported in KEIRO™ programming language and complex loop statements can be added. The App includes a library of different GinoBot™ models which students can select to control for enhanced gamification.

Compatible with:

ANDROID **iOS**

EnginoRobot BT™ App

The **EnginoRobot BT**™ application, available on Google Play or Apple Store, allows students to control the model, record and play a program just as they would do by pushing the physical buttons on the controller. All these can be achieved remotely and digitally! The application features two additional controlling methods, the **Joystick** and the **Tilter.**
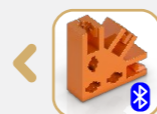
EnginoRobot BT™

Compatible with:

ANDROID **iOS**

Map Builder

Using Map Builder, students can create their own custom map by connecting various puzzle blocks and general props such as buildings, trees and more. When their custom map is ready they can use to program the ENGINO® robots inside of it!

Compatible with:

WINDOWS (7, 8.1, 10) **MacOS**

Free Software vs Software Suite

ENGINO® KEIRO software is available for free for both home and school users. For enhanced functionalities and ongoing support and updates, there is now also the option of the Software suite, which provides access to all software by ENGINO® such as ENVIRO, MAP BUILDER etc. This is the ideal solution for those that aspire to roll out a more robust STEM program in their school.

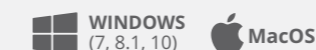|		FREE SOFTWARE*	SOFTWARE SUITE
KEIRO™	• Configurator	✓	✓
	• Block Programming	✓	✓
	• Text Code Generator	✗	✓
	• Commercial Use	✗	✗
3D Builder	• Structural Parts	✗	✓
	• Mechanical Parts	✗	✓
	• Robotic Parts	✗	✓
EnViRo™	• 3D Robotic Models	✗	4
	• Virtual Map Challenges	✗	8
	• Keiro Connection	✗	✓
Map Builder	• Line Following Puzzle Tiles	✗	✓
	• 3D Objects' Library	✗	✓
	• Gamification	✗	✗
Apps	• EnginoRobot BT™	✓	✓
	• Ginobot Robot RC	✓	✓
	• kidCAD™ Group-Building Instructions	✗	✓
	• FaceBot Simulator Challenges	4	12

* Standard use is free for private use and for Institutional use. The Software suite has a yearly cost per set that is installed in the school. Any commercial usage of ENGINO technologies will require that the Franchise license is purchased.

Learning with ENGINO®!

The ENGINO® lesson plans and activities cover all K12 levels of education, starting from Preschool all the way up to Higher education! Educators can easily guide their students to follow the Lesson Plans & ideas, to either solve real-life problems or to carry out scientific experiments and coding challenges. The ENGINO® curriculum is designed by experts to engage students with STEM and Robotics activities in a fun and exciting and way.

There are 3 options for the curriculum, the Free one, with 16 lesson plans for each age group, the Premium with 12x90 min sessions per year and comes with a printed students' books, and the Franchising with 40x90 min sessions.

FREE	PREMIUM	FRANCHISE
16 Lesson-Plans Digital version (pdf)	**36 Lesson-Plans** (12 per Year) Printed Books	**80 Lesson-Plans** (40 per Year) Printed Books
Based on "E" Products	**Based on "E" Products**	**Based on "FR" Products**
Year 1 Year 2 Year 3	Year 1 Year 2 Year 3	Year 1 Year 2
For Each Age Group	For Each Age Group	For Each Age Group
Ideal for Public Schools	**Ideal for Private Schools**	**Ideal for Private Schools and After-School Centres**
Software needed: **Free** or **Suite**	Software needed: **Suite**	Software needed: **Suite**

Teacher Training & Certification

ENGINO® has developed a comprehensive 50-hour online course for teachers that want to acquire real expertise in STEM and ROBOTICS. Teachers will learn the latest pedagogical trends in STEM and Engineering Design, how to use the ENGINO® building system and software, how to make models and create their own lesson plans and how to link with curriculum and have an interdisciplinary approach in their sessions. The interactive course requires teachers to answer questions and upload solutions, so that an expert evaluator will provide feedback and grading.

Teacher's Bundle

For the Teacher, we prepared a bundle set which includes all key ENGINO® product solutions, with maximum parts of each set, so that they can use while carrying out their teacher training but also in preparation for each lesson plan.

Subjects

- Robotics
- Levers & Linkages
- Pulley drives
- Gears & Worm drives
- Structures: Buildings & Bridges
- Wheels, Axles & Inclined planes
- Newton's Laws
- Cams & Cranks
- Solar Power

STEM & Robotics Theory

- Theoretical background
- Definitions
- Interesting facts
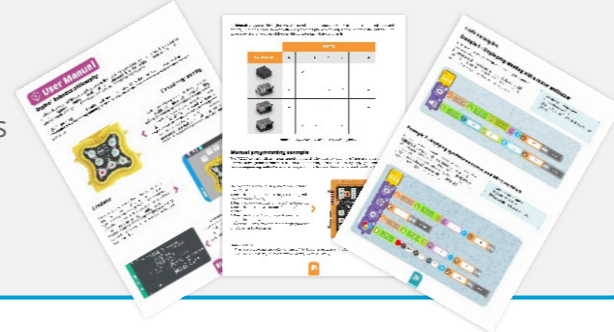- Real-life applications
- Mathematical Formulas
- Examples

Lesson Plans

- Teacher's guidelines
- Introduction
- Learning objectives
- Experimental procedure
- Exercises and activities
- Open project ideas

KEIRO™ Software Manual

- Controller and Peripherals
- Methods of Programming
- Interface and action blocks
- Connectivity options
- Code examples

Models Library

- Experimental models
- Accessible from KidCAD™ app
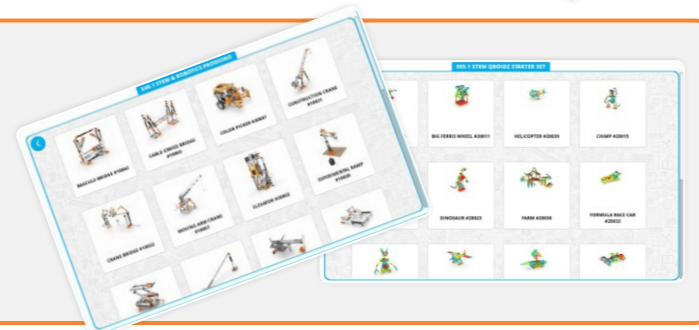
The **STEM Qboidz™ starter set** is the ideal set for preschool children to start building with ENGINO®. The QBOIDZ system combines the award-winning snap-fit connectivity of ENGINO® system with the effortless building feature of stackable blocks! The set encourages preschool children to develop their cognitive, social and motor skills through fun and creative play. This set includes enough parts to build models out of a library of 20 different ideas. The system is designed to allow for four different levels of building complexity, allowing younger children to still be creative while also challenging them as they grow older!

Product Code: **E05.1**

Suggested

for a group of **1-2 students**

Specifications

- Plastic tub (43 x 31 x 8 cm)
- 139 Plastic parts
- 1036 Connecting points
- Digital instructions for 20 models

STEM Qboidz Set E10.1 🚸 3-6

This **STEM Qboidz™ set** is developed for larger groups of preschool kids and comes with a large number of parts to allow endless creative building! There are available instructions for 90 models, even though children at this age use their own imagination. This is fueled by the proposed models of the set and the activities developed for the classroom, which cover a wide variety of themes, such as Animals, Vehicles and Sea exploration. The set aims to provide both girls and boys with the necessary, experiences, skills and knowledge to cope with the technological advancements of the future.

Product Code: **E10.1**

Specifications

• Plastic tub (43 x 31 x 15 cm)
• 195 Plastic parts
• 1043 Connecting points
• Digital instructions for 90 models

Suggested

for a group of **3-4 students**

More than **90 activities** from a variety of themes:

- Animals
- Vehicles
- Airplanes
- Technology
- Sea Exploration

Story

Adventure at the Zoo

Once upon a time, not too long ago, two little friends visited the zoo and discovered, with delight, that they could communicate with animals. Their joy was so great, they often visited the zoo to chat with their new friends, the zoo animals. The kids were very happy with their food or any problems the animals had with zoo visitors. One day, while our two friends were enjoying the zoo, an elephant, a giraffe, an ostrich, a hare and a deer came to talk with them.

As they talked about their time described some of their frustra sad, because most people se are chubby even thou biggest complaint the five o zoo visitors knew about their them sad and they thought children didn't want to lo decided to educate zoo about 2

Did you know?

The elephant's gestation period (pregnancy) is 22 months and longer than any other land animal in the world. A newborn elephant weigh up to 260kg (570 stand i

Elephant

Elephants are the largest mammals that walk the earth. They have a big proboscis (a large mobile snout, nose or trunk), the largest ears in the world and live in herds. The oldest female elephant leads the herd through all kinds of terrain searching for food, water and safety.

Building and Learning

Find the "Elephant" building instructions in pages 19-23.

Elephants eat large quantities of leaves and other vegetation. Their trunks continue to grow their whole life just like the human nose. They communicate with each other through chest rumbles and bugling and can live for 60 years or more.

Creative Activities

Follow the dots number by number to draw an elephant.

Learning numbers

Count the different shapes of Qboidz parts. Write the number in each box.

$$\bigcirc \bigcirc \bigcirc + \bigcirc \bigcirc \bigcirc = \boxed{}$$

$$\blacksquare \blacksquare \blacksquare \blacksquare \blacksquare \blacksquare + \blacksquare = \boxed{}$$

$$\blacksquare \blacksquare \blacksquare + \blacksquare \blacksquare = \boxed{}$$
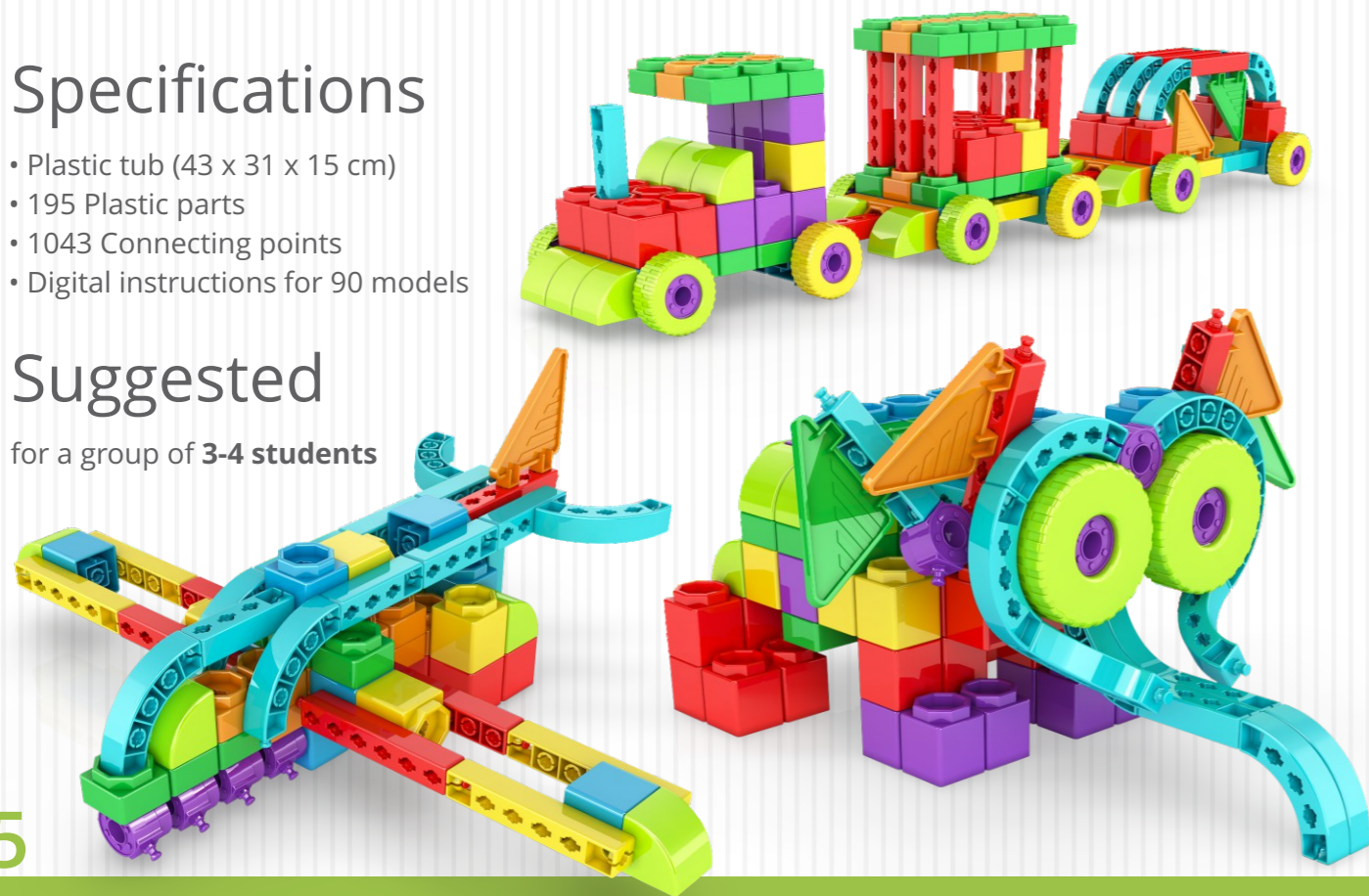
Free app to view and manipulate 3D models!

Based on STEM education principles for preschool children.

Engino kidCAD (3D Viewer) app

• rotate in 3D!
• zoom in and out!
• explode and implode!

The **Junior Robotics education set** is specially designed for Preschool & early Primary school students of ages 5-7. It combines the core subjects of STEM together with Robotics. The set comes in a convenient plastic storage tub that contains a large number of Engino - Qboidz plastic parts and robotic devices such as the ERP Mini controller, a DC motor, a LED and a touch sensor, allowing the construction of 8 robotized STEM models.

Product Code: **E15.1**

Specifications

- Plastic tub (43 x 31 x 8 cm)
- 125 Plastic parts
- 723 Connecting points
- Battery compartment for 3xAAA batteries
- Mini controller with 4 input-output ports
- Connectivity via USB and Bluetooth
- Onboard membrane buttons for manual programming
- 1 DC motor
- 1 LED red
- 1 Touch sensor

Suggested

for a group of **2-3 students**

Curriculum in digital format

Robotics Handbook
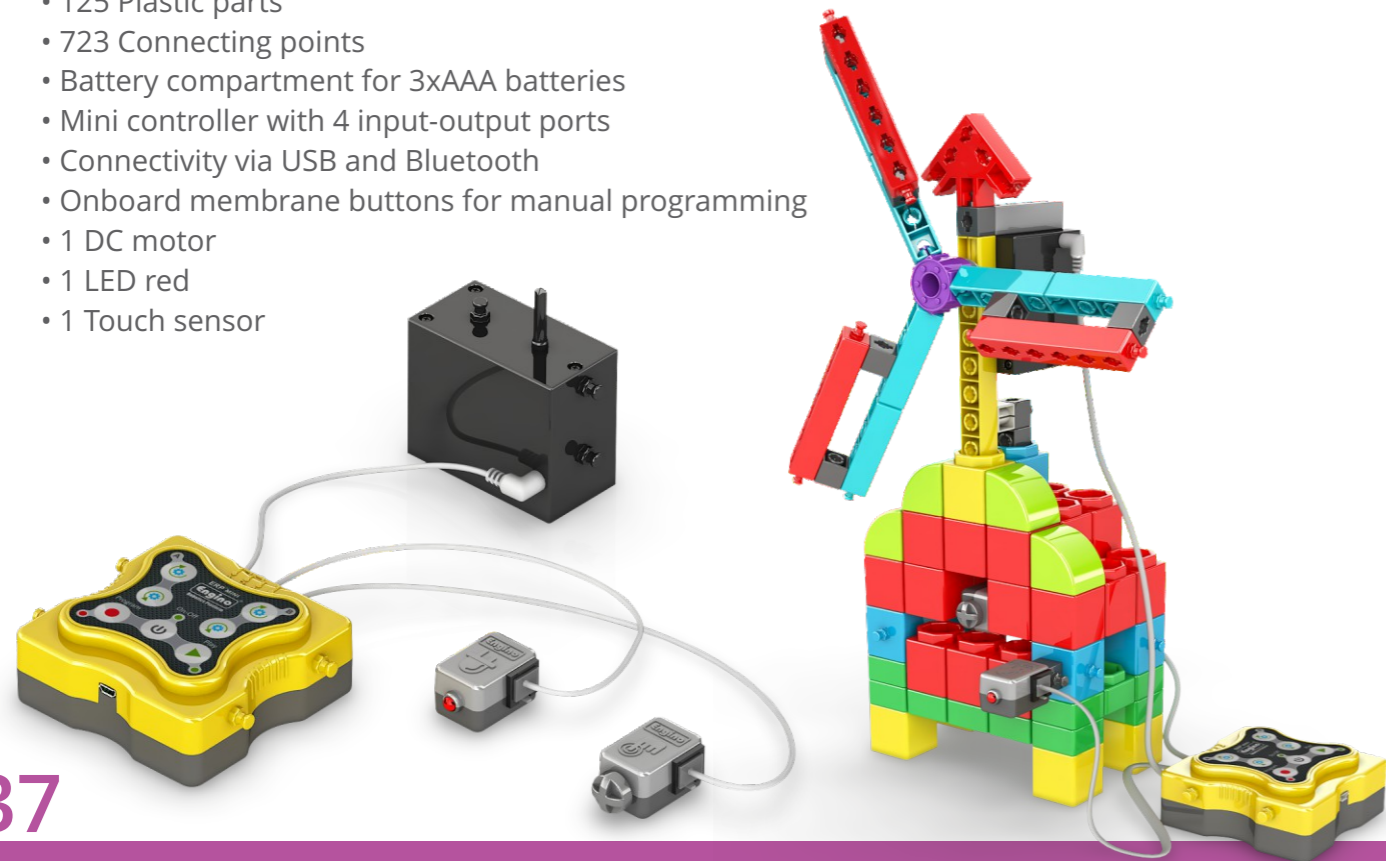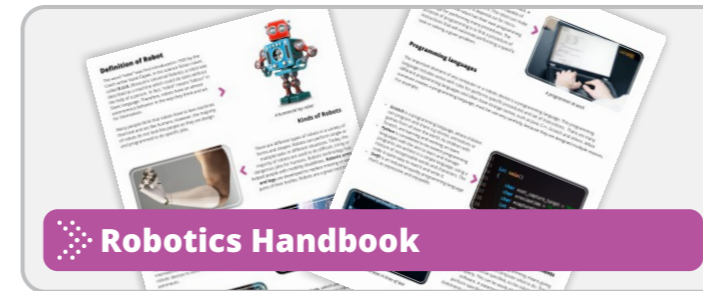
- Introduction to robotics
- Real life applications
- History of Robotics
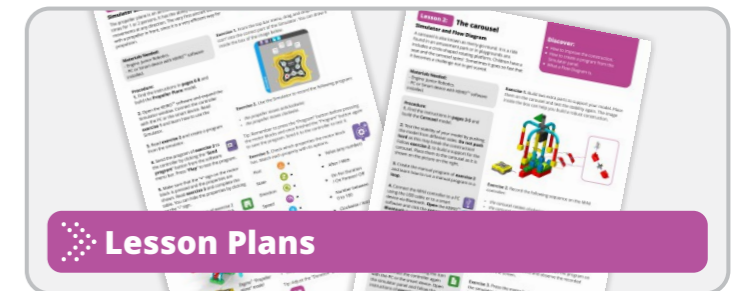
Lesson Plans

- Teacher's guidelines
- Story telling
- 6 Structured Lesson Plans

KEIRO Manual

- Controller and Peripherals
- Methods of programming
- Interface
- Coding Examples

Models Library

- 8 Experimental Models
- 3D Building Instructions

KEIRO™ Software

- Manual Programming
- Simulator
- Flow Diagram
- Outputs
- Controls
- Sensors

Compatible with:

The **Qboidz & Junior Robotics education set** is the ultimate solution for Preschool & early Primary school students of ages 5-7. It is the combination of the large tub of Qboidz (E10.1) which allows more than 90 models to be created from the younger age of 3, and the Junior Robotics set (E15.1) that steps up the complexity for the higher ages and includes the ERP MINI controller, sensors, light and motor! The merging of creativity with the ability to code and animate models, provides a unique combination for open-projects and multi-level thinking.

Product Code: **E16.1**

Curriculum in digital format

Robotics Handbook
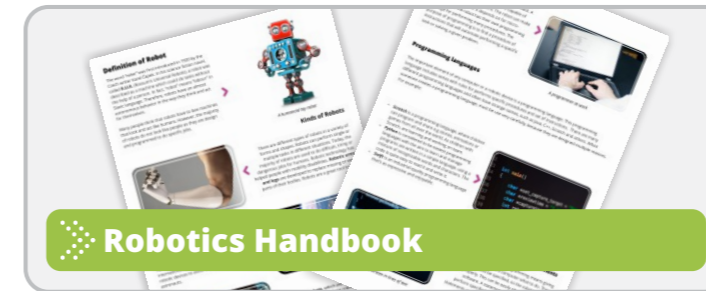
- Introduction to robotics
- Real life applications
- History of Robotics

Lesson Plans

- Teacher's guidelines
- Story telling
- 18 Structured Lesson Plans
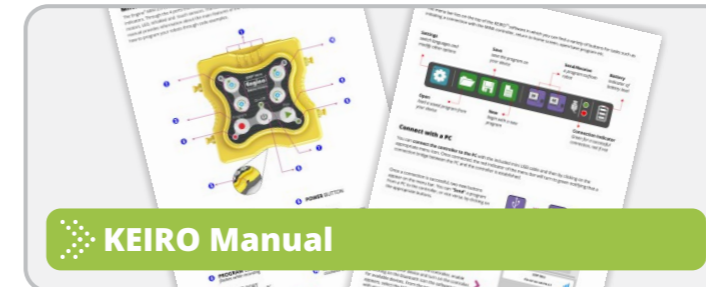
KEIRO Manual

- Controller and Peripherals
- Methods of programming
- Interface
- Coding Examples

Models Library
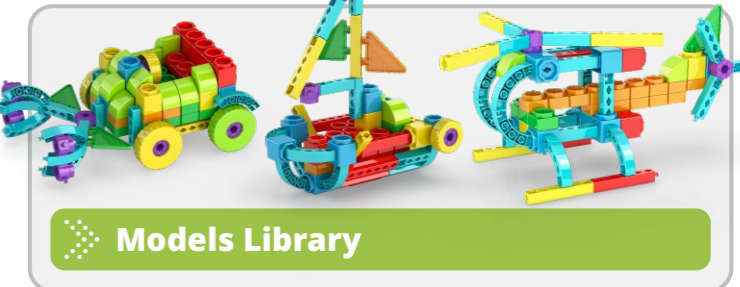
- 96 Experimental Models
- 3D Building Instructions

Specifications

- Plastic tub (43 x 31 x 15 cm)
- 268 Plastic parts
- 1743 Connecting points
- Battery compartment for 3xAAA batteries
- Mini controller with 4 input-output ports
- Connectivity via USB and Bluetooth
- Onboard membrane buttons for manual programming
- 1 DC motor
- 1 LED red
- 1 Touch sensor
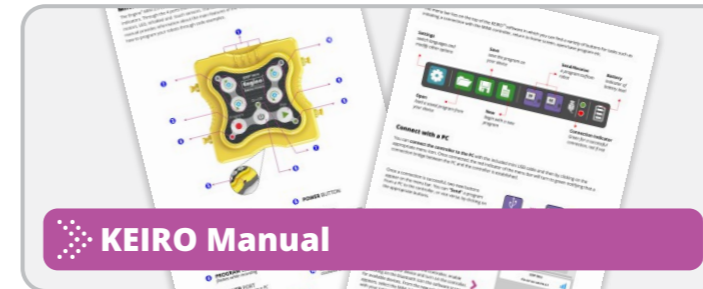
Suggested

for a group of **2-3 students**

KEIRO™ Software

- Manual Programming
- Simulator
- Flow Diagram
- Outputs
- Controls
- Sensors

Compatible with:
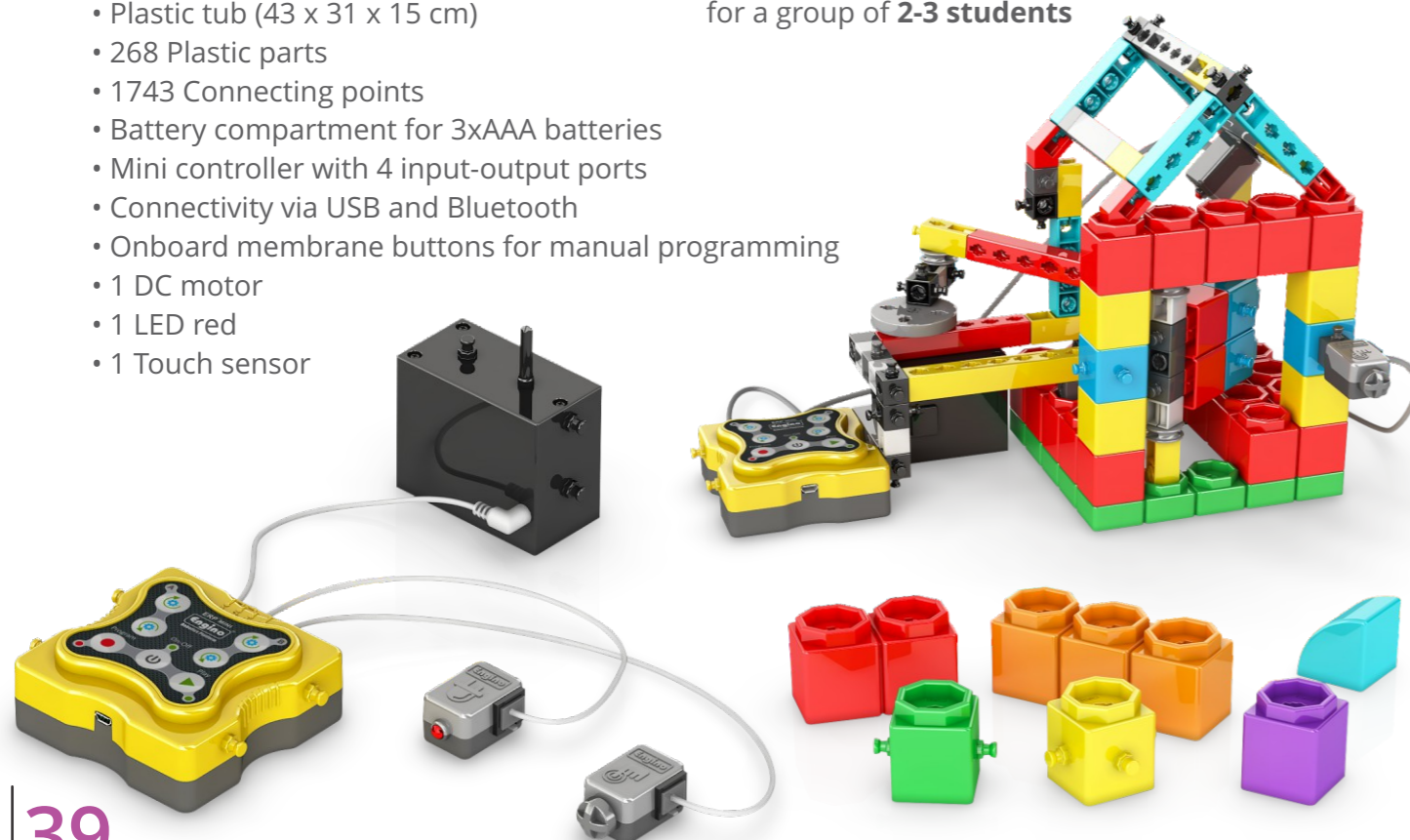
This **Junior Robotics education set** is specially designed for Preschool students of ages 5-7. It provides a unique coding concept by introducing the new FaceBot, a constructional bot-car that can have click-on different "faces". Through the "faces", kids are engaged more through story telling and real-life scenarios. This buildable robot includes 2 dual sensors (can be used as proximity or colour) along with 2 ENGINO® motors, and the iconic ERP MINI controller. This controller has onboard buttons to allow manual programming as a first step into algorithmic thinking, but is also programable with our KEIRO™ software. The set comes with tangible programming tiles which children can connect like a puzzle and physically see their code. An ingenious board game is included to challenge kids with different decision paths and help them visualize their solutions before transferring the code to the App and drive the robot. The other side of the board game has a line-following track with coloured stations that empower conditional statements! Extra parts are included in the set to create individual models besides the FaceBot.

Product Code: **E17.1**
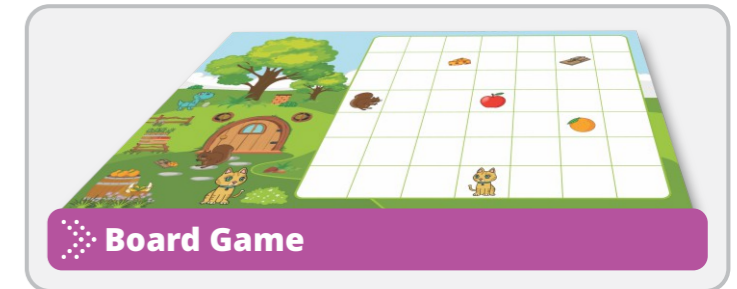
Specifications

- Plastic tub (43 x 31 x 8 cm)
- 187 Plastic parts
- 1153 Connecting points
- Battery compartment for 3xAAA batteries
- Mini controller with 4 input-output ports
- Connectivity via USB and Bluetooth
- Onboard membrane buttons
  for manual programming
- 2 DC motor
- 2 Dual sensors (Proximity and Colour)
- 35 Tangible blocks of different commands
- Line following mat with coloured stations
- Board game with coding challenges
- 4 Interchangeable faces

Suggested

for a group of **2-3 students**

Curriculum in digital format

Lesson Plans
- Teacher's guidelines
- Story telling
- Structured Lesson Plans

Line Following Mat
- Coloured stations for IF statements
- Preprogrammed code for line-following
- Can also be used by other constructions

Coding App
- Special app for virtual programming
- Simple flow commands
- Remote control and tilt functionalities
- Coding examples

Board Game
- Foldable board game for easy storage
- Prompts and game pieces included
- Unlimited challenges and coding simulations

Additional Features:

KEIRO™ Software
- Manual Programming
- Simulator
- Flow Diagram
- Outputs
- Controls
- Sensors

Compatible with:

Building Models
Extra Qboidz parts to create individual models.
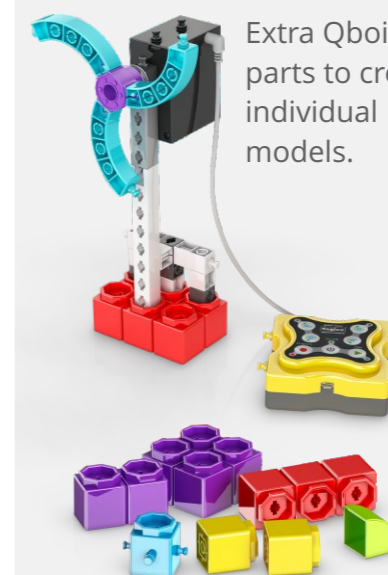
Physical Coding
Puzzle-like tangible blocks to simulate a program. Same flow can then be rebuilt on the app to drive the robot.
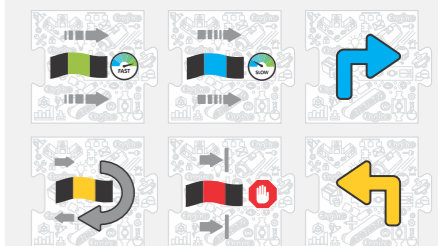
FaceBot - Tangible STEM Qboidz & Robotics Set

The **Qboidz & Junior Robotics education set** is the ultimate solution for Preschool & early Primary school students of ages 5-7. It is the combination of the Qboidz E05.1 which allows more than 20 models to be created from the younger age of 3, and the Junior Robotics set (E17.1) that steps up the complexity for the higher ages and includes the ERP MINI controller, sensors, light and motors with the Amazing FaceBot! The merging of creativity with the ability to code and animate models, provides a unique combination for open-projects and multi-level thinking.

Product Code: **E18.1**

Curriculum in digital format

Lesson Plans
- Teacher's guidelines
- Story telling
- Structured Lesson Plans

Line Following Mat
- Coloured stations for IF statements
- Preprogrammed code for line-following
- Can also be used by other constructions

Coding App
- Special app for virtual programming
- Simple flow commands
- Remote control and tilt functionalities
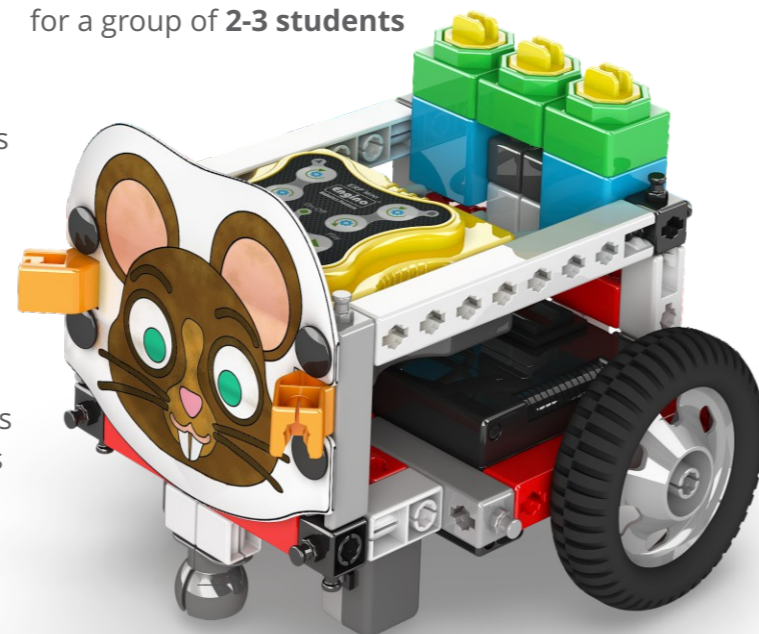- Coding examples

Board Game
- Foldable board game for easy storage
- Prompts and game pieces included
- Unlimited challenges and coding simulations

Specifications
- Plastic tub (43 x 31 x 15 cm)
- 278 Plastic parts
- 1842 Connecting points
- Battery compartment for 3xAAA batteries
- Mini controller with 4 input-output ports
- Connectivity via USB and Bluetooth
- Onboard membrane buttons for manual programming
- 35 Tangible blocks of different commands
- Line following mat with coloured stations
- Board game with coding challenges
- 4 Interchangeable faces
- 2 Dual sensors
  (Proximity and Colour)
- 2 DC motor
- 1 LED red
- 1 Touch sensor

Suggested
for a group of **2-3 students**

Additional Features:

KEIRO™ Software
- Manual Programming
- Simulator
- Flow Diagram
- Outputs
- Controls
- Sensors

Compatible with:

Building Models
Extra Qboidz parts to create individual models.

Physical Coding
Puzzle-like tangible blocks to simulate a program. Same flow can then be rebuilt on the app to drive the robot.
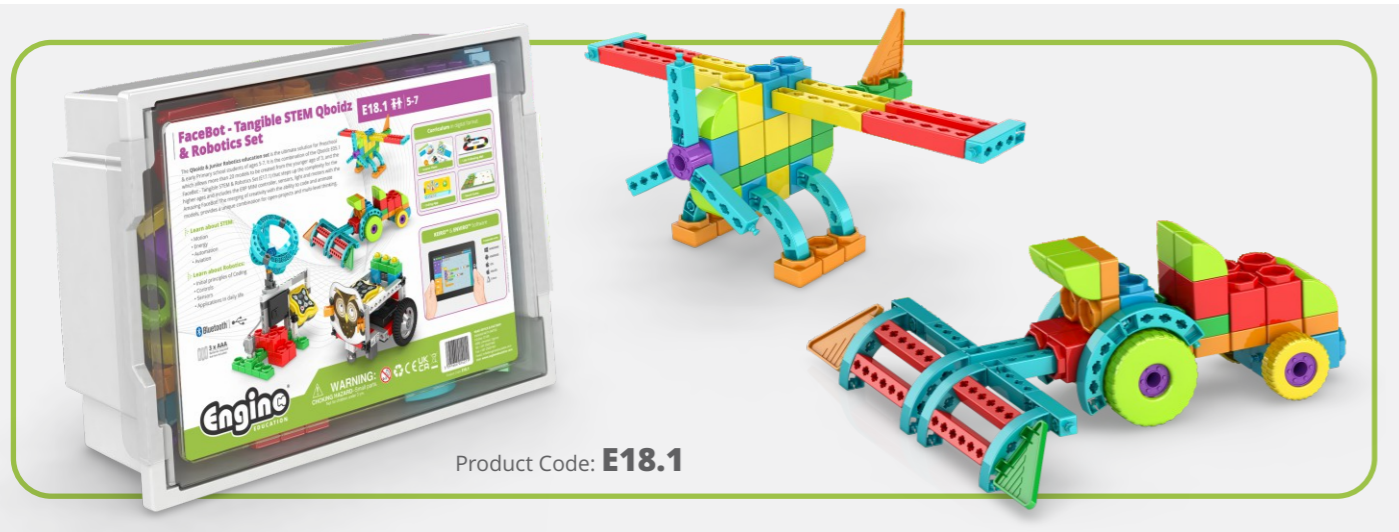
The **STEM & Robotics ERP Mini education set** is specially designed for Early Primary school students of ages 7-9. It combines the core subjects of STEM together with Robotics. The set comes in a convenient plastic storage tub that contains a large number of Engino - Qboidz plastic parts along with robotic devices such as controller Mini, DC motor, LED, touch sensor, IR sensor. The extra ENGINO® technical parts allow the construction of 40 complex models that come with theory and experimental activities to cover not only engineering design but also Coding, Mechanics and Science. There are two generations of robotic models doable with this set. Simpler models using the Qboidz parts which aim to introduce coding to the younger students, and complex ones with the classic ENGINO® parts for more advanced models.

Product Code: **E20.1**

Curriculum in digital format

STEM & Robotics Handbook

• STEM and Robotics Theoretical background
• Real life applications
• Definitions
• Interesting facts

Lesson Plans

• Teacher's guidelines
• 18 Structured Lesson Plans
• Open project ideas

KEIRO Software Manual

• Controller and Peripherals
• Methods of programming
• Interface
• Coding Examples

Models Library
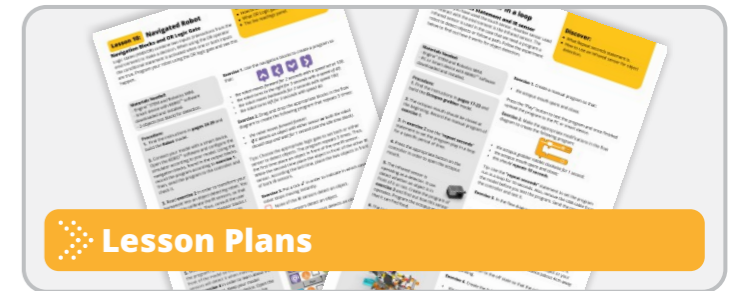
• 44 Experimental Models
• 3D Building Instructions
• Animations

Specifications

• Plastic tub (43 x 31 x 15 cm) with internal dividers
• 312 Plastic parts
• 1596 Connecting points
• Battery compartment for 3xAAA batteries
• Mini controller with 4 input-output ports
• Connectivity via USB and Bluetooth
• Onboard membrane buttons for manual programming
• 2 IR sensors & 1 Touch sensor
• 2 DC motors
• 1 LED red

Suggested

for a group of **2-3 students**
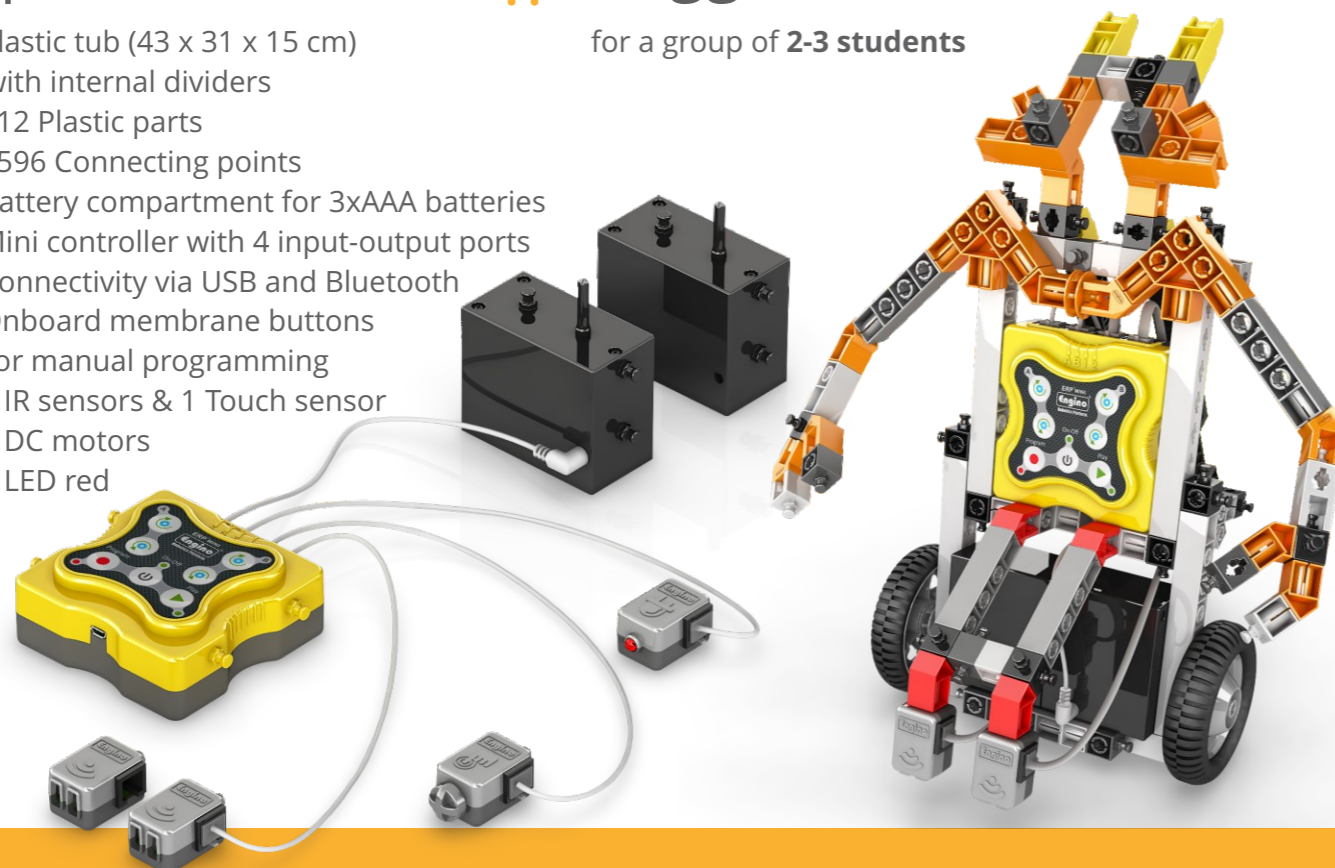
KEIRO™ Software

• Manual Programming
• Simulator
• Flow Diagram
• Outputs
• Controls
• Sensors
• Functions
• Live Readings

Compatible with:

The **STEM & Robotics ERP Pro education set** is specially designed for late Primary and Secondary school students of ages 9-12+. It combines the core subjects of STEM together with Robotics and includes high-level projects that lead to a deeper understanding of the underlying theory while also developing 21st century skills. The set comes in a convenient plastic storage tub that contains a large number of ENGINO® structural and technical parts, together with advanced robotic devices such as ERP Pro controller, DC motors, LEDs, touch sensor and IR sensors. The set allows the construction of up to 60 STEM models and 10 Robotic models with activities.

Product Code: **E30.1**

Product Code: **E35.1**

Specifications

	E30.1	E35.1 Advanced Edition
• Plastic tub (43 x 31 x 15 cm) with internal dividers	✓	✓
• Plastic parts	369	408
• Connecting points	1678	1964
• Battery compartment for 6xAA batteries	✓	✓
• Pro controller with 7 input-output ports	✓	✓
• Connectivity via USB and Bluetooth	✓	✓
• Rechargeable battery module option	optional*	included
• Onboard membrane buttons for manual programming	✓	✓
• DC motors	x3	x2
• Servo motor with RJ connector	✘	x1
• LEDs	x5	x2
• 2 IR sensors, 1 Touch sensor & Buzzer	✓	✓
• Pedestrian crossing cardboard	✓	✘
• 1 Ultrasonic sensor & 1 Color sensor	✘	✓
• 1 Compass / Magnetometer	✘	✓
• Models for teaching STEM	30	60
• Robotized Models	10	10
• Experimental activities & lesson plans (Standard Edition)	18	34

Curriculum in digital format

STEM & Robotics Handbook

• STEM and Robotics Theoretical background
• Real life applications
• Definitions
• Mathematical Formulas
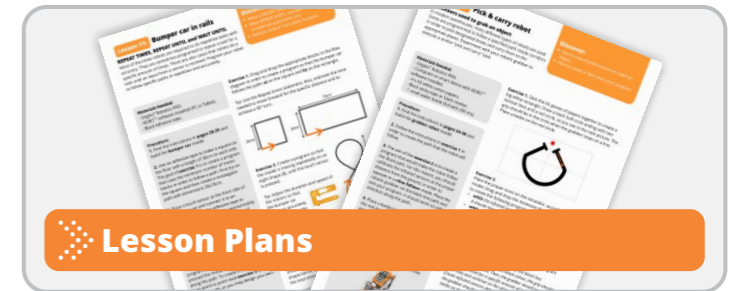
Lesson Plans

• Teacher's guidelines
• 18 (E30.1) 34 (E35.1) Structured Lesson Plans
• Open project ideas

KEIRO Software Manual

• Controller and Peripherals
• Methods of programming
• Interface
• Coding Examples

Models Library

• 32 (E30.1) 70 (E35.1) Experimental Models
• 3D Building Instructions
• Animations

KEIRO™ Software

• Manual Programming
• Simulator
• Pseudolanguage
• Flow Diagram
• Outputs
• Controls
• Sensors
• Operators
• Functions
• Variables
• Live Readings
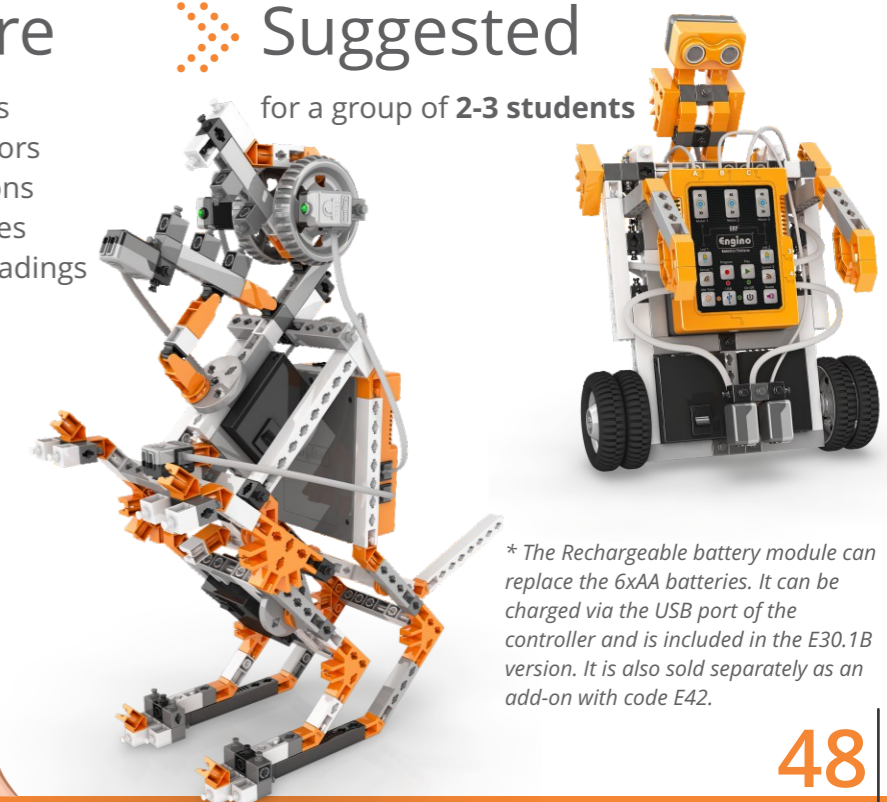
Compatible with:

Suggested

for a group of **2-3 students**

* The Rechargeable battery module can replace the 6xAA batteries. It can be charged via the USB port of the controller and is included in the E30.1B version. It is also sold separately as an add-on with code E42.

The **STEM & Robotics Produino education set** is specially designed for Secondary school children of ages 12-16+ but is ideal for older students of 14+ and even vocational schools and hobby engineers. With innovative experimental activities that cover the core subjects of STEM it moves into advanced programming with textual coding. Besides its main controller, it embeds an additional Arduino processor that enables open DIY projects. The set comes in a convenient plastic storage tub that contains a large number of Engino structural and technical parts and high-level of robotic devices such as the unique Produino controller. It has 2 DC motors, a servo motor, a touch sensor, 2 IR sensors, a color sensor, an ultrasonic sensor and a gyroscope/accelerometer sensor. Besides the programmable screen, it conveniently has a built-in large breadboard so that students can make their own circuitry. It allows the construction of more than 30 STEM and Robotic models.

Product Code: **E40.1**

Curriculum in digital format
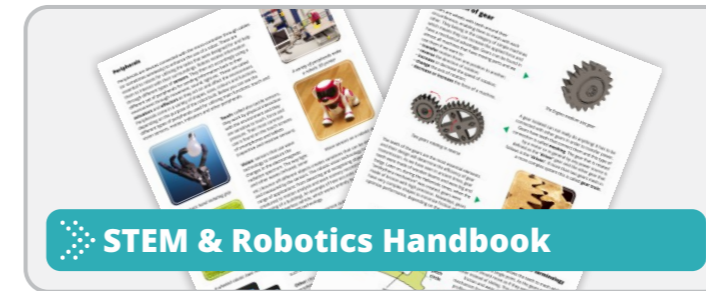
▷ STEM & Robotics Handbook

- STEM and Robotics Theoretical background
- Arduino IDE Examples
- Definitions
- Mathematical Formulas
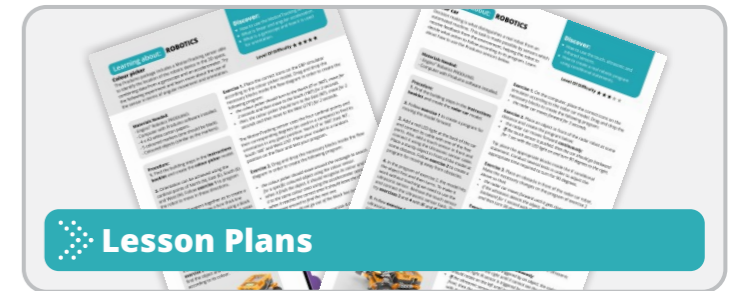
▷ Lesson Plans

- Teacher's guidelines
- 18 Structured Lesson Plans
- Open project ideas
- DIY Projects

▷ KEIRO Software Manual

- Controller and Peripherals
- Methods of programming
- Coding Examples
- Interface
- Arduino Mode
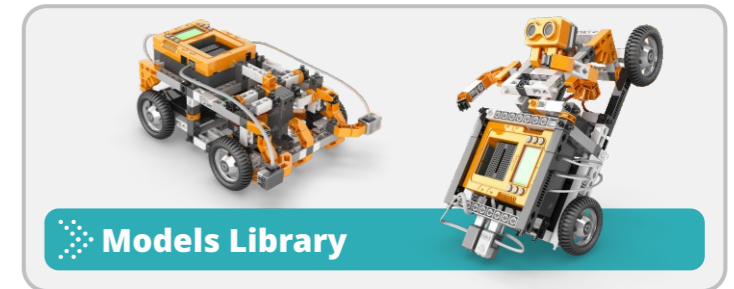
▷ Models Library

- 28 Experimental Models
- 3D Building Instructions
- Animations

Specifications

- Plastic tub (43 x 31 x 15 cm) with internal dividers
- 406 Plastic parts, 1914 Connecting points
- Battery compartment for 6xAA batteries
- Produino controller with 7 input-output ports
- Connectivity via USB & Bluetooth
- Arduino platform embedded, Display 128x64
- Rechargeable battery module option*
- Onboard breadboard for applying electronic circuits
- 1 Servo motor with RJ connector
- 1 Touch sensor & 1 Ultrasonic sensor
- 1 Compass / Magnetometer
- 1 Color sensor & 2 IR sensors
- 2 DC motors

* The Rechargeable battery module can replace the 6xAA batteries. It can be charged via the USB port of the controller and is included in the E40.1B version. It is also sold separately as an add-on with code E42.

Suggested

for a group of **2-3 students**
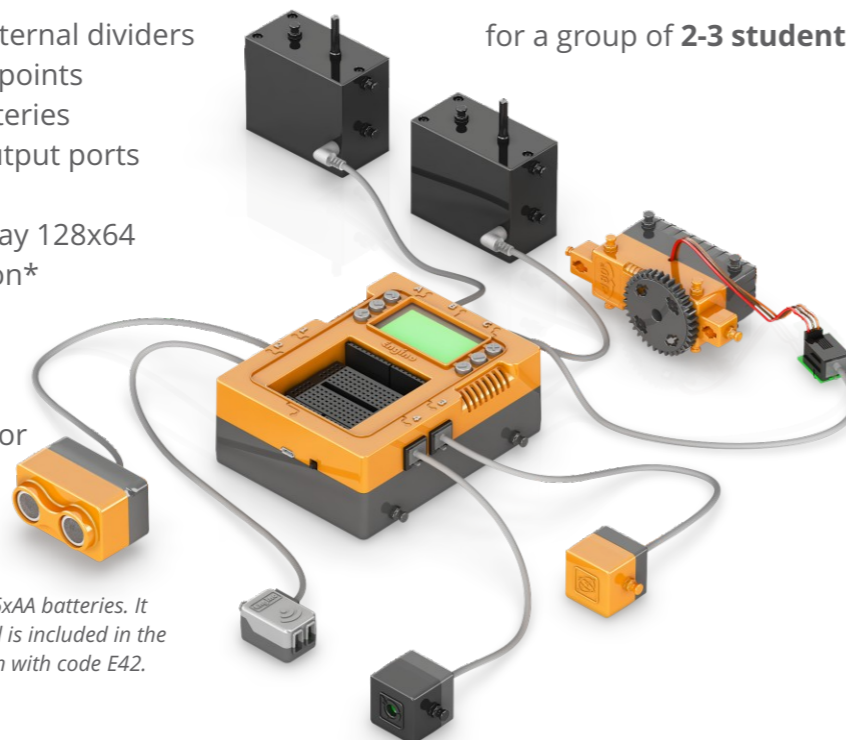
KEIRO™ Software

- Manual Programming
- Simulator
- Live Readings
- Flow Diagram
- Outputs
- Controls
- Sensors
- Operators
- Functions
- Variables
- Arduino Code
- Arduino IDE

Compatible with:
- WINDOWS
- ANDROID
- iOS
- MacOS
- Linux
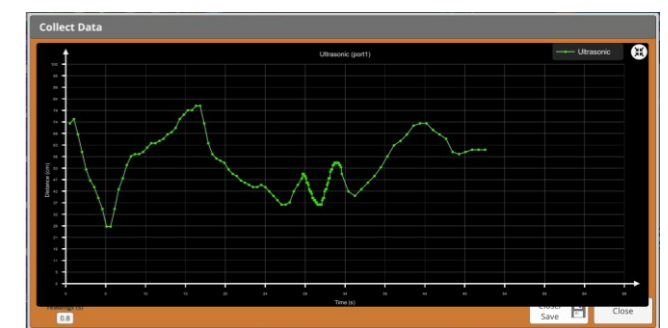
A unique feature of Produino is the ability for **Data Acquisition**. This is accomplished by recording sensor readings and exporting them into a file for further analysis. While recording these readings, individual graphs for each sensor are created. This feature is ideal for science experiments using records of the values of the sensors.

With Produino, students grow and learn about coding and robotics at an advanced level. Unlike other robotics which are limited to the included peripherals included, Produino can expand with DIY add-ons, coming from the open source library of Arduino technologies. This set consists if a library of cables, sensors and electronic components that can be connected on Produino, helping students through tinkering acquire a deeper understanding of electronics and embedded systems.

Product Code: **E41.1**
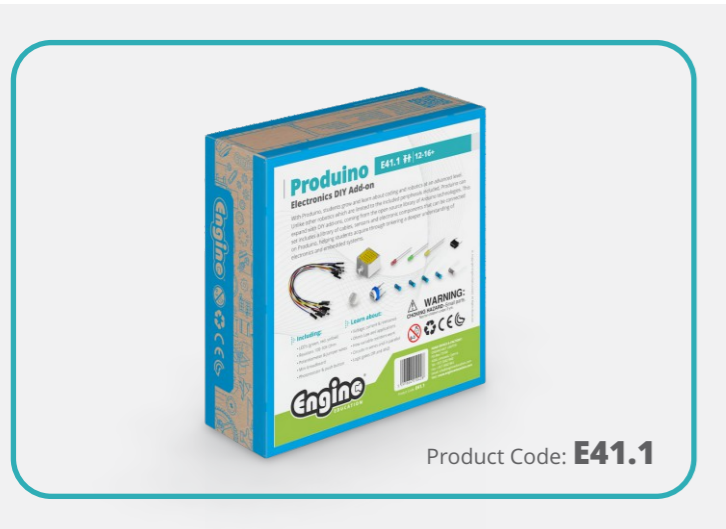
Specifications

- Carton box (17 x 17 x 6 cm)
- 5 x LED red
- 5 x LED green
- 5 x LED yellow
- 10 x Resistor 100 Ohm
- 10 x Resistor 220 Ohm
- 10 x Resistor 510 Ohm
- 10 x Resistor 1K Ohm
- 10 x Resistor 10K Ohm
- 2 x Rotating potensiometer 2K Ohm
- 8 x Push button
- Set of jumper wires 10&20 cm
- 2 x Photoresistor (LDR)
- 4 x Mini breadboard
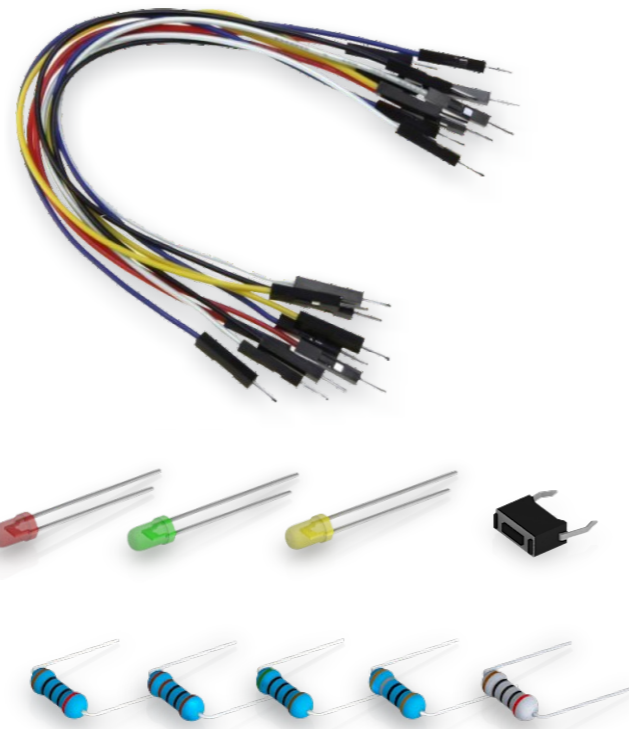
Learn about

- Voltage, current & resistance
- Ohm's Law and applications
- How variable resistors work
- Circuits in series and in parallel
- Logic gates OR and AND
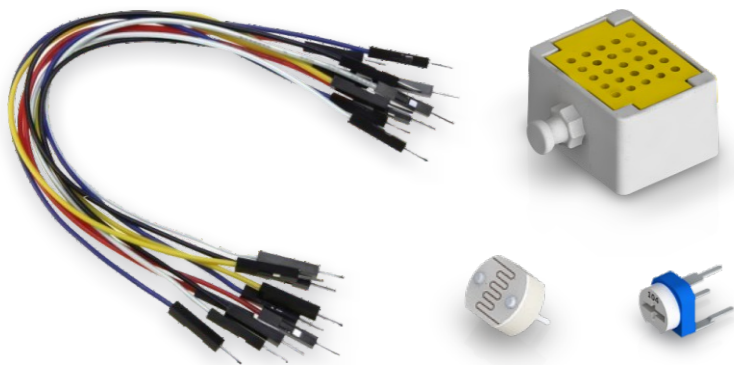
Meet the GinoBot™

GinoBot™ is a highly programmable robot ready to be used straight out of the box. Developed by a high-level research team of engineers and academics, GinoBot™ is a unique tool for teaching STEM disciplines, computational thinking and digital literacy with fun and hands-on experiencial activities.
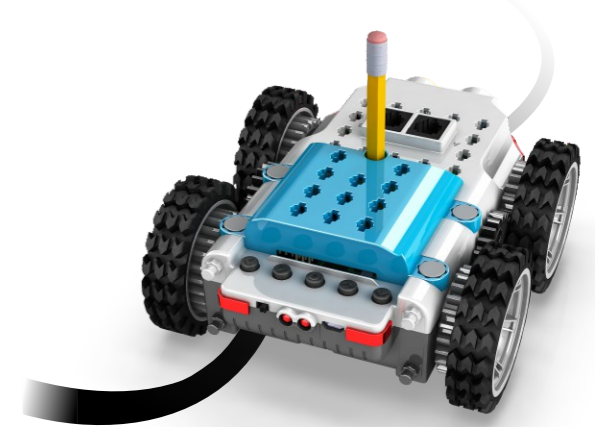
GinoBot™ is the robot that helps students explore divergent projects in a broad range of levels. It has literally unlimited expansion potential since it allows the attachment of add-on 3rd party electronics and hardware like a Raspberry Pi, Arduino, and micro:bit. Besides its internal sensors and its expandability with 3rd party electronics, the body of GinoBot™ is also compatible with the ENGINO® building system to construct larger and more sophisticated robots.

From Plug & Play robot...

The innovation of GinoBot™ lies within its core design. It is expandable and adaptable to a very broad range of features to match the classroom needs of different ages. Plug&play robots are commonly used in pre-school and early primary classrooms in order to teach algorithmic and computational thinking. GinoBot™ is an ideal plug&play robot since it allows manual programming and wireless control that allows teaching the fundamental steps of programming.
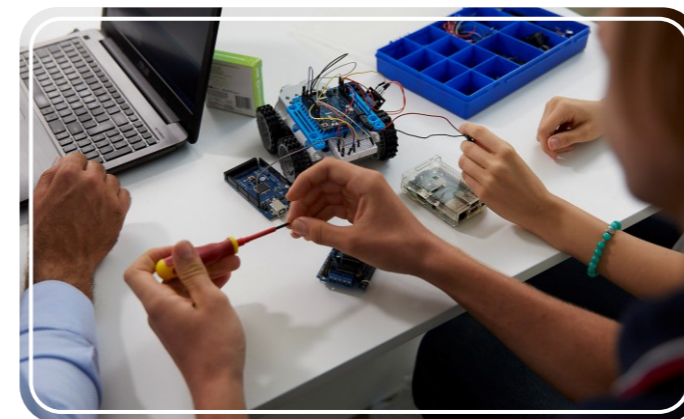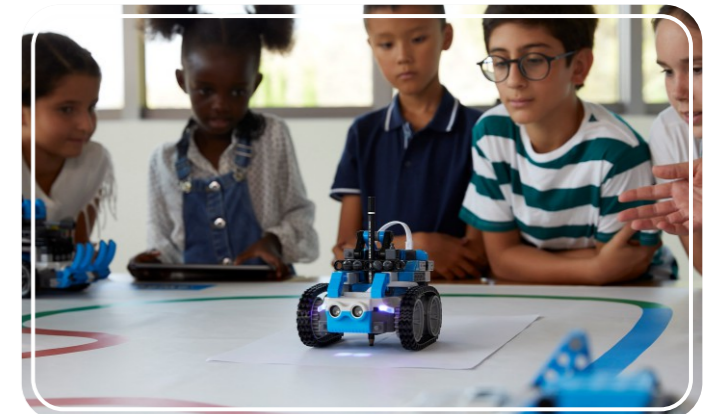
... To high-end coding and electronics

The upgradable potential of GinoBot™ is essentially unlimited due to its compatibility with microcontrollers such as Arduino, Raspberry Pi and micro:bit. Teaching real programming languages such as C/C++ and Python can easily be adopted in a classroom, while maintaining fun, entertainment and motivation to the students. The advantage of working in open projects materializes through this holistic solution that combines mechanics with software and electronics.

GinoBot™

Upgradeable with a Lithium rechargeable battery

Supports Connectivity with 3rd party electronics and microcontrollers such as Microbit, Arduino and Raspberry Pi

5 x Buttons for manual programming and playback

On-Off switch

Pencil/Pen holder to draw lines

1 x Proximity sensor to detect obstacles while moving backwards

2 x Programmable multi colour LED lights

USB Cable to download program

Removable cabin to access the PCB and connect extra hardware

2 x RJ connectors to expand with extra motors & sensors

Specially designed rims with grooves for crawler tracks

Tires can be converted to crawler tracks

Removable wheels to connect other Engino parts and gears

Gears to transfer motion from main motors to all wheels, leading to a 4-wheel drive vehicle

2 x Proximity with colour sensors on the bottom to follow lines and detect colours

Battery compartment for 3xAA batteries

2 x Proximity sensors, one at each corner to detect obstacle

2 x Programmable multi-colour LED lights

Built-in Engino geometries to connect more parts and create larger models

Removable cover to easily add an extra ultrasonic sensor

GinoBot™ comes in various editions to allow different possibilities depending on school's budget, age of students and complexity required. The **basic edition** is the lowest cost version that will still surprise teachers with the innovative features included and can always be upgraded later as students develop more coding skills. The body of GinoBot™ has numerous built-in ENGINO® connecting geometries so that students can expand their robot with structural and mechanical parts, making more advanced models. Teachers can follow STEM interdisciplinary activities and apply inquiry based learning methodologies to engage and inspire their students. The vehicle's powerful processor connects with USB, Bluetooth and wifi and can be programmed with KEIRO, but also Python and C++ once a Micro:bit or Arduino are installed. The 4-wheeled robot can have its tires converted to a cat-truck and is surrounded by three proximity sensors. It has two floor colour sensors and two encoder motors for precise motion. **(E49.1)**

GinoBot™ advanced edition is a step-up from the basic one by including the PCB adaptor plate which supports Arduino, Micro:bit or Raspberry Pi (not included), a 3-hour* lasting rechargeable battery, and the Ultrasound sensor at front. **(E50.1= E49.1+E53.1)**

GinoBot™ premium edition combines the advanced version of GinoBot™ with the Mechatronics add-on in a single fully expandable set! It includes an extensive library of mechanical and electronic elements that enable students to build at least 10 different robotic models such as a walking hexapod, a grabber, a line-drawing car and an excavator. The set comes with an extra motor which allows additional actions such as grabbing or lifting. This edition is the ultimate robotic tool kit and empowers students to gradually move beyond coding and engage in open-projects while applying engineering design methodologies. **(E51.1≈E49.1+E52.1+E53.1)**
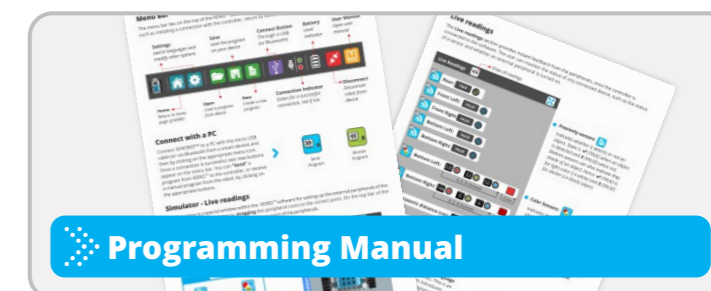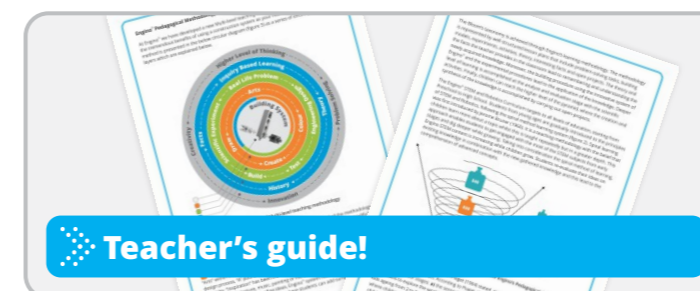
E49.1 (Basic Edition)
- Carton box (29.6 x 21.5 x 7.7 cm)
- 1 x GinoBot™ robot
- 16 Plastic parts
- 87 Connecting points

E50.1 (Advanced Edition)
- Carton box (29.6 x 21.5 x 7.7 cm)
- 1 x GinoBot™ robot
- 23 Plastic parts
- 123 Connecting points

E51.1 (Premium Edition)
- Carton box (29.3 x 29.3 x 8.3 cm)
- 1 x GinoBot™ robot
- Internal divider
- 248 Plastic parts
- 708 Connecting points

⫸ Curriculum in digital format

⫸ **Theory in robotics!**

⫸ **Coding challenges!**

⫸ **Teacher's guide!**

⫸ **Programming Manual**

⫸ Specifications

	Basic Edition	Advanced Edition	Premium Edition
• 2 x DC embedded geared motors	✓	✓	✓
• 5 x Buttons for manual programming	✓	✓	✓
• Bluetooth & WiFi	✓	✓	✓
• Pencil holder to draw shapes during movement	✓	✓	✓
• 3 x Proximity sensors (front and back for obstacle avoidance)	✓	✓	✓
• 2 x Bottom colour sensors for line follow & colour recognition	✓	✓	✓
• 4 x Programmable colour LEDs that also indicate operation.	✓	✓	✓
• 2 x RJ connectors to connect to additional motors and more advanced sensors	✓	✓	✓
• Speaker-buzzer	✓	✓	✓
• Removable cabin to insert add-on modules	✓	✓	✓
• On-Off switch	✓	✓	✓
• Micro USB connector with USB cable	✓	✓	✓
• Plastic PCB adaptor plate for Arduino, Micro:bit or Raspberry Pi with connecting parts		✓	✓
• Lithium Rechargeable battery		✓	✓
• 1 x Ultrasonic sensor at front		✓	✓
• 1x Dual axis motor with cable			✓
• 249 Structural and mechanical ENGINO® parts			✓
• Digital instructions for 10 models			✓

GinoBot Mechatronics Add-on

The greatest innovation of GinoBot™ is its expandability with ENGINO® parts and peripherals. The Mechatronics add-on includes both mechanical and electronic elements enabling students to build a plethora of models, such as a walking hexapod, a grabber, a line-drawing car and an excavator. With a vast variety of components students can engage in open-projects and apply engineering design methodologies to design, build, program and test their own solutions to real-life problems. The most important components, besides the mechanical parts, are the extra motor which allows additional actions such as grabbing or lifting.

❯❯ Specifications

- Carton box (29.6 x 21.5 x 7.7 cm)
- 1 x DC cabled motor with dual axle
- Worm gears and pinions
- Grabber hands
- Tractor buckets
- 65 ENGINO® Classic parts
- 183 ENGINO® Mechanics parts
- 663 Connecting points

Product Code: **E52.1**

GinoBot Upgrade (From Basic to Advance Edition)

GinoBot™ can be upgraded with various add-ons to allow increased complexity and expandability. The Basic Edition includes many sensors and features and can be converted with this set to the Advanced Edition by adding the plastic PCB adaptor plate which supports Arduino, Micro:bit or Raspberry Pi *, a 3-hour lasting rechargeable battery, and the Ultrasound module.

❯❯ Specifications

- Carton box (17 x 17 x 6 cm)
- 6 Plastic parts
- 36 Connecting points
- 1 Plastic PCB adaptor plate for Arduino, Micro:bit or Raspberry Pi*
- 1 Lithium rechargeable battery
- 1 Ultrasonic module

Product Code: **E53.1**
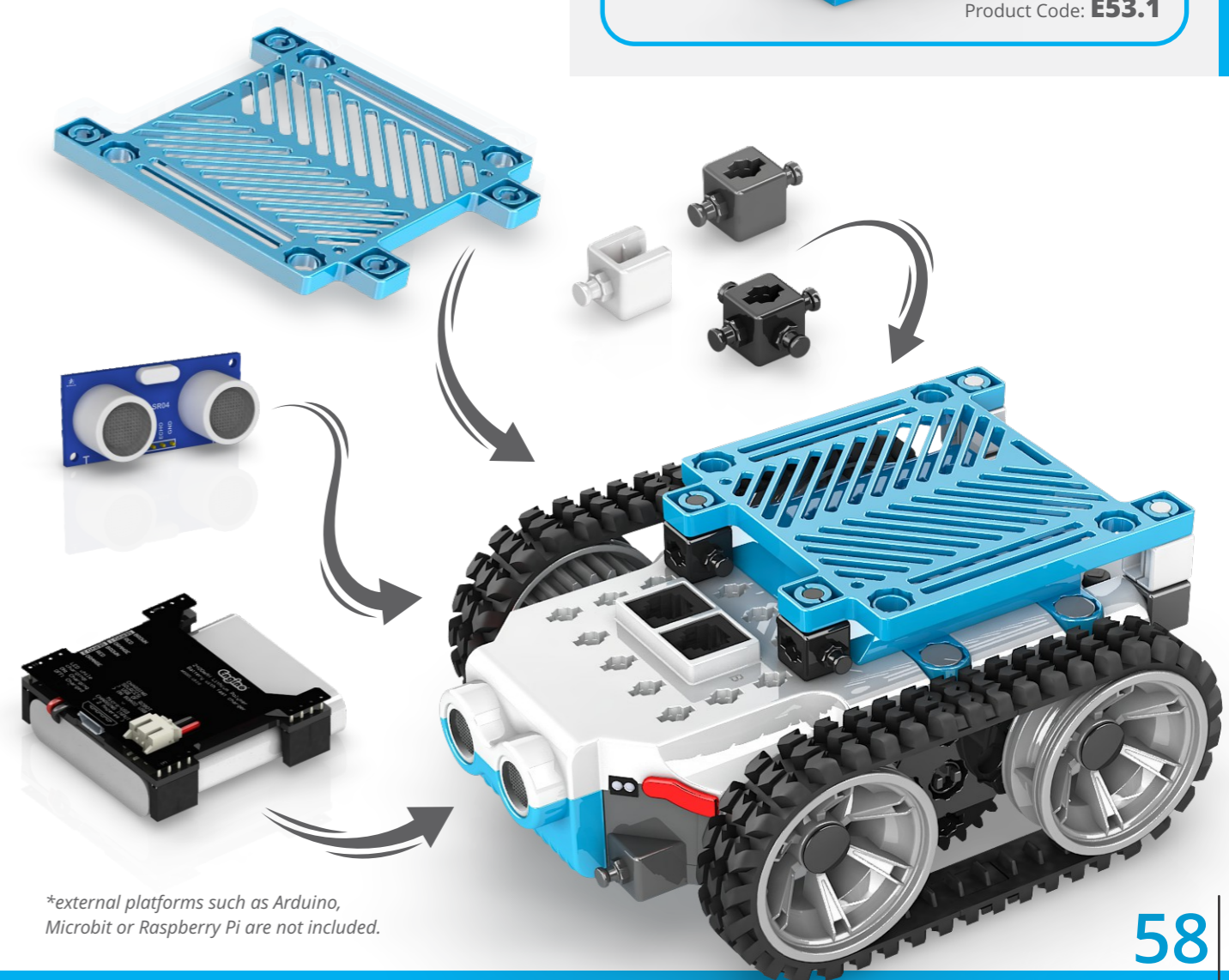
*external platforms such as Arduino, Microbit or Raspberry Pi are not included.

The **Open Projects STEM set** is the ideal classroom solution which will empower students to engage with real-life problem solving while developing critical and engineering design thinking. The set includes a huge library of parts, both structural and mechanical, so that students working in teams can brainstorm, model their ideas and develop solutions trying several iterations. The set can be used as a stand-alone product for open projects or in combination with other ENGINO® robotic solutions for more advanced problems that require coding and electronics. The set comes in a convenient plastic storage tub and has enough parts to build some of the impressive mega models of ENGINO®, such as the motorized London Eye, a 1.5m tall Eiffel tower and an amazing chain reaction machine! The extensive library of parts and interchangeability of ENGINO® system, challenges students of both late Primary and Secondary as it offers unlimited potential of creativity and increasing complexity.

Product Code: **E93.1**

Specifications

- Plastic tub (43 x 31 x 15 cm)
- 1201 Plastic parts
- 5265 Connecting points
- 1 DC motor
- 1 Metal ball for chain reaction model
- Gearing system
- Digital instructions for 14 models

Suggested

for a group of **2-3 students**

Greenhouse Set E94.1 9-12+

One of the most critical new subjects in education is sustainability and healthy living. This set by ENGINO® enables students to build their own large-sized Greenhouse of dimensions 37x35x25cm, plan their seeds in the included pots, and discover through experimentation key principles of biology such as photosynthesis. The Greenhouse is designed with opening roof flaps that utilize a gearing system leading to interdisciplinary leaning, combining Science, Structures, Mechanics and Agronomy. Students can control manually the conditions inside the Greenhouse and monitor how their plants are affected by temperature, moisture and light levels. The model can be extended and become robotized and fully autonomous, by adding either ENGINO® or DIY controllers and sensors!

PHOTOSYNTHESIS PROCESS

sunlight

oxygen

carbon dioxide

water

Product Code: **E94.1**

Curriculum in digital format

Theory and amazing facts!

Experimental activities!

Revision quiz!

Models Library
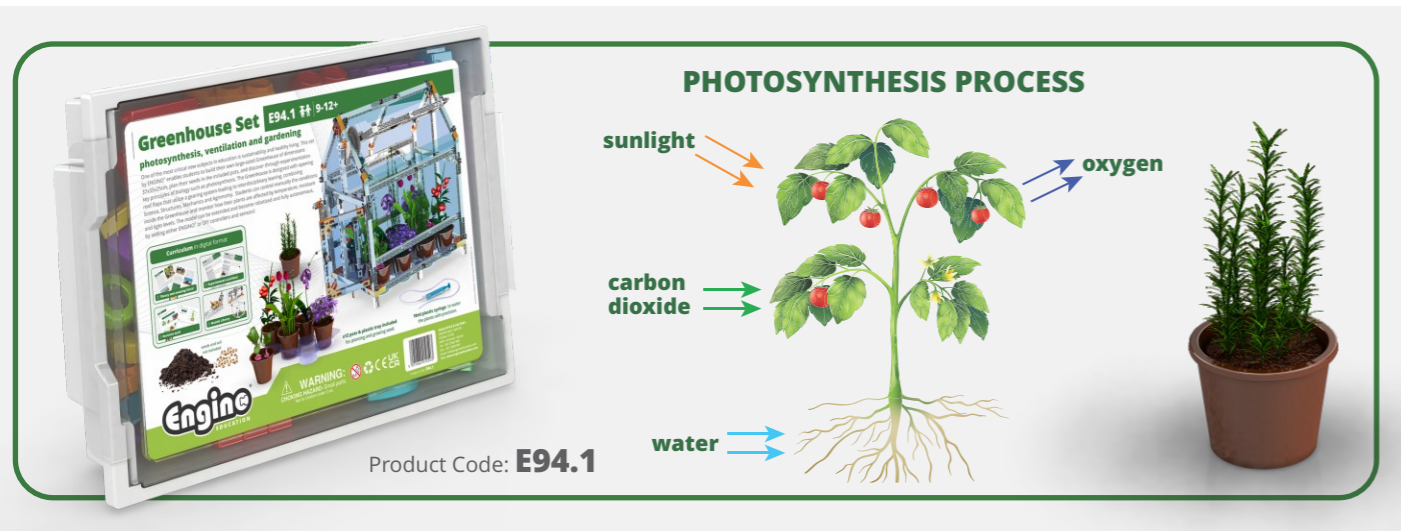
Specifications

- Plastic tub (43 x 31 x 8 cm)
- 251 Plastic parts
- 1641 Connecting points
- 12x Pots, plastic tray & acrylic surfaces
- 10ml Plastic syringe
- Gearing system
- Digital instructions for 4 models

seeds and soil not included

Suggested

for a group of **2-3 students**

+gears power

STEM Solar Power Set E95.1 👫 9-12+

Climate change and global warming urge scientists to take action and save our planet by reducing carbon emissions. The sun can provide free energy for all of our needs, however, we need to convert it to a useful form. This set includes one 3V solar panel that powers an electrical motor, along with digital instructions for 16 solar powered models such as a chopper car, a fan, a plane, a robot and a winch crane. With easy-to-follow digital building instructions and detailed explanations of the different scientific principles applied, along with innovative experimental activities, students learn by doing all about Solar Energy while acquiring 21st century skills.

Product Code: **E95.1**

Curriculum in digital format

> **Theory and amazing facts!**

> **Experimental activities!**

> **Revision quiz!**

> **Models Library**

Specifications

- Carton box (29.3 x 29.3 x 8.3 cm)
- Internal divider
- 142 Plastic parts
- 627 Connecting points
- 1 DC motor with option to operate inhouse with batteries
- 1 x 3V Solar panel with cable
- Digital instructions for 16 models

Suggested

for a group of **2-3 students**
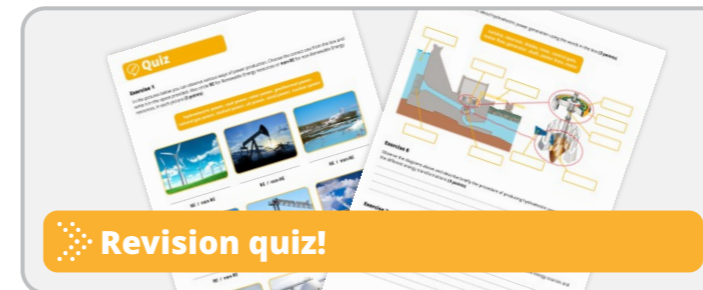
Motor Power

Solar Power

Sun Light   Solar Panel

Electron Flow

'Hole' Flow

A solar panel converts solar power to electricity

STEM Simple Machines Set E96.1 9-12+

This set covers the subject of Simple Machines in an encompassing and fascinating way. These mechanisms offer a mechanical advantage and are crucial elements of many machines and devices. They are designed to multiply or reduce force, increase or decrease speed and convert one type of motion to another. The set includes enough parts to create 60 working models that cover the subjects of levers, the wedge, the wheel and axle, the screw, the inclined plane, the pulley, as well as the more advanced gears and linkages! You can find easy-to-follow building digital instructions for all models along with detailed explanations of the different scientific principles applied. The methodology suggested combines theory with innovative experimental activities that lead to hands-on learning and engineering creativity.

Product Code: **E96 .1**

Curriculum in digital format

> **Theory and amazing facts!**

> **Experimental activities!**

> **Revision quiz!**

> **Models Library**

Specifications

- Carton box (29.3 x 29.3 x 8.3 cm)
- Internal divider
- 191 Plastic parts
- 925 Connecting points
- Digital instructions for 60 models
- Gearing system
- Pulleys system

Suggested

for a group of **2-3 students**
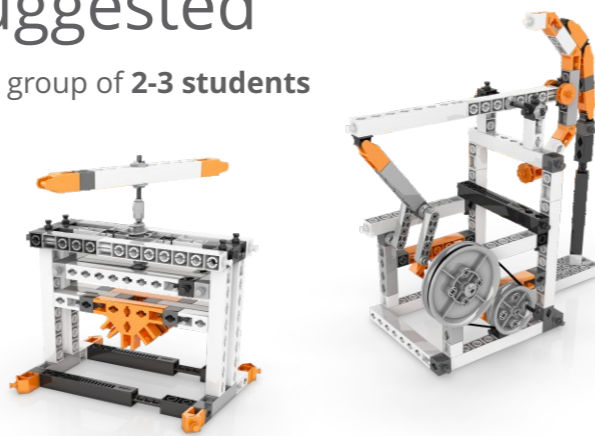
Gears

Two gears rotating in reverse

Pulleys

Follower pulley

Driver pulley

Two pulleys rotating in the same direction

Including Themes:

> **Levers & Linkages**

> **Wheels, Axles & Inclined Planes**

> **Pulley Drives**

> **Gears & Worm Drives**

> **Cams & Cranks**

STEM Mechanics Master Set E97.1 👫 9-12+

The **STEM Mechanics Master set** is the ultimate combination of the main subjects of Simple Machines and Physics, including Levels, Pulleys, Gears, Linkages, Newton's Laws, Energy conversion, Solar Power and Structures. The patented geometry of ENGINO® components allows connectivity to all directions of the 3D space, enabling users to easily create technical models. This unique set enhances creativity and imagination while also teaching a variety of STEM principles. A geared 3V motor with a large solar panel is included for animating the ENGINO® builds, converting solar energy to electricity. The set comes with a library of high-precision gears, pulleys and axles for changing speed, force and direction of motion. From this set, besides open projects, students can find digital instructions for 100 working models and amazing animated contraptions such as cars, cranes, bridges!

Product Code: **E97.1**

Curriculum in digital format

> **Theory and amazing facts!**

> **Experimental activities!**

> **Revision quiz!**

> **Models Library**

Gears

Pulleys

Solar Power

Motor Power

Specifications

- Plastic tub (43 x 31 x 15 cm)
- 283 Plastic parts
- 1037 Connecting points
- Digital instructions for 96 models
- Internal divider
- 1 DC motor
- Gearing system
- Pulleys system
- 1 x 3V Solar panel with cable

Suggested

for a group of **2-3 students**
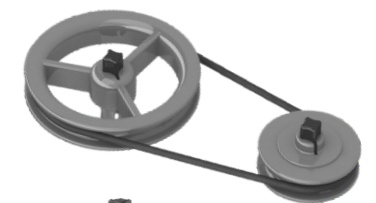
Including Themes:
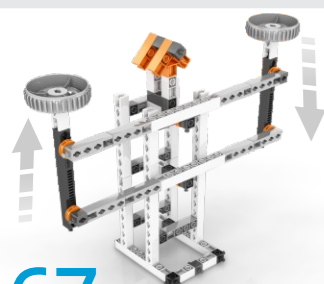
| Levers & Linkages | Wheels, Axles & Inclined Planes | Pulley Drives | Gears & Worm Drives | Cams & Cranks | Newton's Laws | Structures | Solar Power |

DIY Wood Connectors E98.1 👫 9-12+
for Makerspace

STEM has evolved over the last years to drive Maker spaces that encompass more hands-on challenges that lead to a deeper understanding of product design and manufacturing. ENGINO® has developed the ideal set of reusable consumable materials that can help students design and craft their own models. The set includes the ENGINO® wood connectors which can be combined together to create any type of 3D joint. Students can cut by themselves pieces of wooden beams of 10x10 mm and insert them into these connectors, combining them with standard ENGINO® parts for mo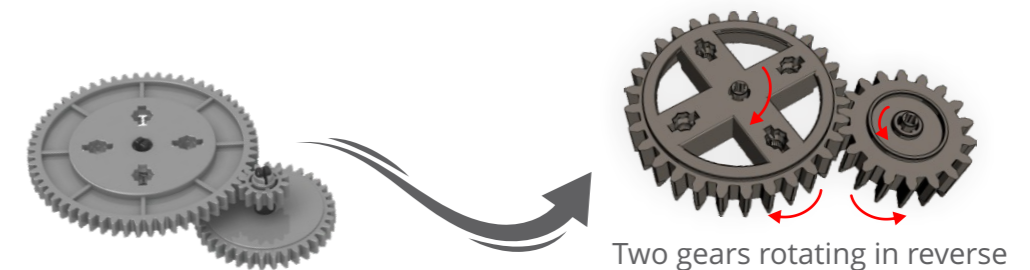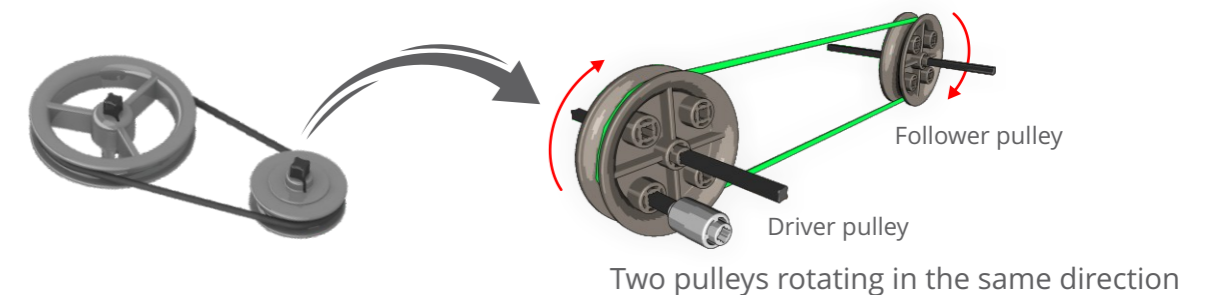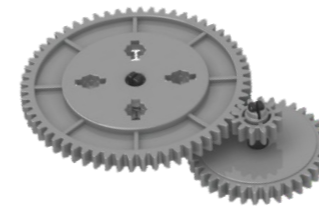re specialized functions. All plastic parts in the set are made from 100% reusable ABS so that they can be used as low-cost, environmentally friendly consumables, so that students can take their models at home. These parts made from regrinded plastic are produced in black colour. The set includes a number of lock pins which can be used to attach flat surfaces of different thicknesses and materials on the models. With the parts included in the set, an example project of a DIY Greenhouse or a house can be created.

DIY Wooden dowels* to be cut at the appropriate size

DIY Wooden panels* with holes to pass-through the secure pins

DIY window frames* made from a 3D printer

Secure pins for attaching surfaces included

Product Code: **E98.1**

DIY Acrylic or wooden panels* cut with laser cutter
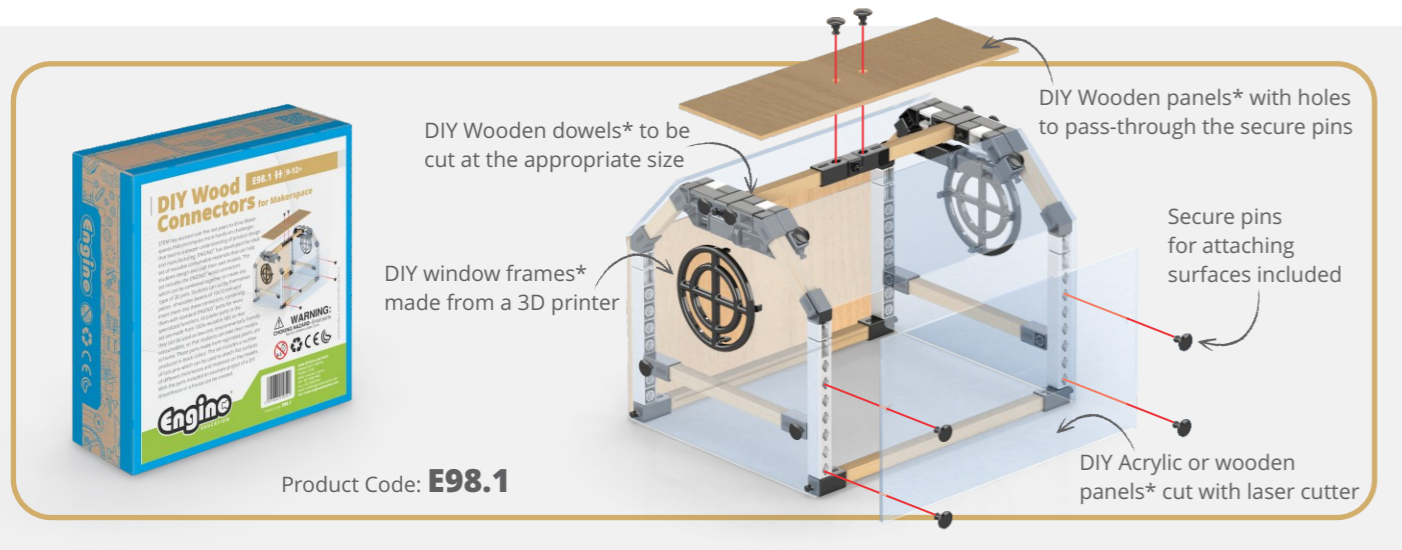
Specifications

- Carton box (17 x 17 x 6 cm)
- 86 Consumanble plastic parts
- 290 Connecting points

Patented wood connectors with snap fit design for modularity in open projects

Suggested

for a group of **2-3 students**

Several parts of ENGINO® and wood connectors included in the set for DIY projects

Wooden dowels* of 10x10 mm can be cut by students at various sizes!
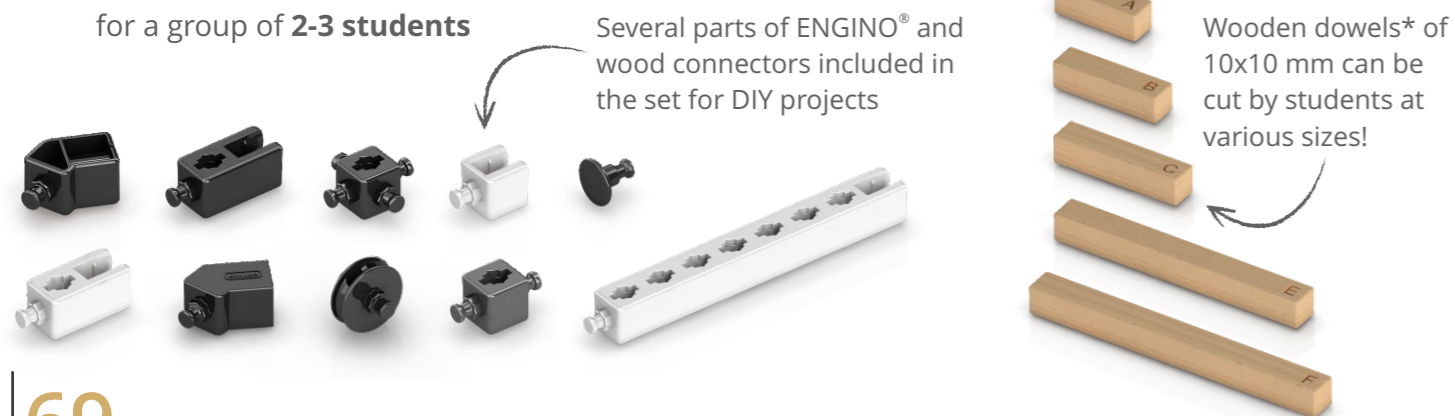
*Makerspace materials such as wooden dowels, surfaces or 3D printed parts are are not included.

Franchising & Licensing Solutions

Toy Store

STEM Workshops

Makerspace

Scientific Playground

The Ultimate STEM experience! from Micro to Macro learning

Based on the latest trends of **STEM and ROBOTICS,** the Ultimate Children's Edutainment concept, is now available to those who share our passion for **Learning through Play**. After 18 years of continual innovation that inspired more than 30 million kids around the world to engage with creative building, coding and problem solving, ENGINO® now brings all it's proprietary technologies under one roof. Our STEM CENTRES merge organically experiential retail of toys, after-school workshops and edutainment, providing a holistic approach from micro to macro learning that encourages children from preschool to highschool, become real inventors.
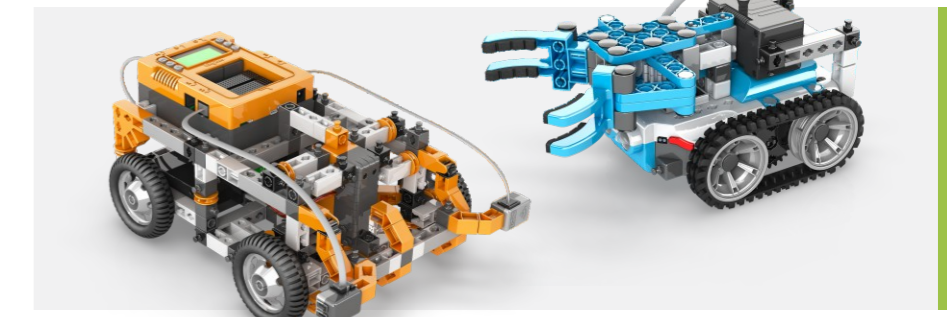
Our comprehensive ecosystem technologies are designed to work in synergy and maximize children's learning potential and skill acquisition. This exclusive program by ENGINO® is only available via two options, the first is the franchising option for those who prefer to establish their own stand-alone business under the brand's guidance and umbrella, and the second is the Licencing option for existing education centres and schools who want to implement a full-blown STEM yearly program that can incrementally and pedagogically correct cover the needs of students from 4 years old to 15+.

Franchise models:

MEGA STORE	CITY STORE	EDUCATOR	ENGINO MOBILE	LICENCING
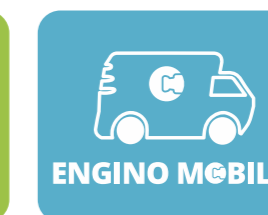
Junior Engineers Set FR16

This new special set combines several products of ENGINO® and aims to fulfil the needs of preschool kids aged 4-6, by providing all the necessary recourses to teach STEM and Robotics through weekly sessions that span over a 2-year school period. The set has so many parts that requires two plastic tubs (part A and part B) and includes additional materials such as a solar panel, a line-following mat and the impressive "Facebot" that teaches programming with both tangible tiles and software app.

Line Following Mat

Product Code: **FR16**

For age groups

4-5   5-6

Lesson Plans (75-90min per lesson)

x5 Modules (x8 Lessons per module) each year

Specifications

• 2 Plastic tubs (43 x 31 x 15 cm)
• 3 Internal plastic sorting trays
• 305 Plastic parts
• 2053 Connecting points
• Battery compartment for 3xAAA batteries
• Mini controller with 4 input-output ports
• Connectivity via USB and Bluetooth
• Onboard membrane buttons for manual programming
• Printed tiles for tangible programming
• 2 DC motors
• 2 LED's & 1 Touch sensor
• 1 solar panel & 2 Dual IR-colour sensors
• Puzzle mat for line following (1m x1m)
• Laser-cut animal faces that attach on robot
• 2 Figurine holders for story telling

Engino® trolley

Young Engineers Set FR20

Students of ages 7-9 can now obtain access to the most comprehensive product available for acquiring STEM content knowledge and skills. Several of the best-selling ENGINO® robotic sets are combined into a 2-boxes solution and provide a full-blown curriculum, exclusively developed for the ENGINO® Franchising and Licensing Program. With weekly sessions spanning over a 2-year period, the set includes also beside the ERP MINI controller, also Ginobot, a solar panel and the Flexi-Track.

Flexi-Track Puzzle

Product Code: **FR20**

For age groups

6-7   7-8   8-9

Lesson Plans (90min per lesson)

x5 Modules (x8 Lessons per module) each year

Specifications

• 2 Plastic tubs (43 x 31 x 15 cm)
• 3 Internal plastic sorting trays
• 274 Plastic parts
• 1698 Connecting points
• Battery compartment for 3xAAA batteries
• Mini controller with 4 input-output ports
• Connectivity via USB and Bluetooth
• Onboard membrane buttons for manual programming
• 2 Dual IR-colour sensors & 1 Touch sensor
• 2 DC motors
• 2 LED's
• 1 Solar panel
• 1 GinoBot Advanced Edition (E50.1)
• 1 Flexi-Track (EP05.1)
• Laser-cut animal faces that attach on robot
• 2 Figurine holders for story telling

Engino® trolley

Master Engineers Set FR30

This solution brings together the advanced ERP PRO controller with GinoBot, along with a plethora of other materials, and aims to empower students of ages 10-13 to engage into interdisciplinary activities that not only include engineering design but also Coding, mechanics and science. The set includes high-level projects which combine advanced STEM theory with higher level programming and includes lesson plans and activities that enable weekly sessions over 2 full school years.

Flexi-Track Puzzle

Product Code: **FR30**

For age groups

9-10 10-11 11-12

Lesson Plans (75-90min per lesson)

x5 Modules (x8 Lessons per module) each year

Specifications

- 2 Plastic tubs (43 x 31 x 15 cm)
- 3 Internal plastic sorting trays
- 576 Plastic parts
- 2382 Connecting points
- Battery compartment for 6xAA batteries
- Rechargeable battery
- Pro controller with 7 input-output ports
- Onboard membrane buttons for manual programming
- Connectivity via USB and Bluetooth
- 2 Dual IR-colour sensors & 1 Touch sensor
- Pedestrian crossing cardboard
- 1 GinoBot Premium Edition (E51.1)
- 3 DC motors, 5 LED's & 1 Solar panel
- 1 Flexi-Track (EP05.1)
- 2 Figurine holders for story telling

Engino® trolley

Professional Engineers Set FR40

For teaching Secondary school students aged 13-15+, we have bundled PRODUINO with GinoBot Premium Edition, to provide a comprehensive curriculum that comes with activities and challenges for 2-years of weekly structured lesson plans. Including advanced peripherals such as servo motors, ultrasonic and gyroscope sensors, students can go deep into the concepts of advanced programming while at the same time developing open DIY projects using the embedded Arduino processor.

Flexi-Track Puzzle

Product Code: **FR40**

For age groups

12-13 13-14 14-15 15+

Lesson Plans (90min per lesson)

x5 Modules (x8 Lessons per module) each year

Specifications

- 2 Plastic tubs (43 x 31 x 15 cm)
- 3 Internal plastic sorting trays
- 500 Plastic parts
- 2620 Connecting points
- Battery compartment for 6xAA batteries
- Rechargeable battery
- 1 Servo motor with RJ connector & 2 DC motors
- 1 Touch sensor & 1 Ultrasonic sensor
- 1 Gyroscope / Accelerometer sensor & 1 Solar panel
- 1 Color sensor & 2 Dual IR-colour sensors
- Connectivity via USB and Bluetooth
- Produino controller with 7 input-output ports
- Arduino platform embedded, Display 128X64
- Onboard breadboard for applying DIY circuits
- 1 GinoBot Premium Edition (E51.1) & 1 Flexi-Track (EP05.1)
- 1 Electronics DIY Addon (E41.1)

Engino® trolley
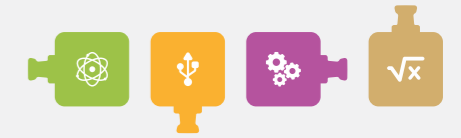
Franchise Products Specifications

	FR16 Junior Engineers Set	FR20 Young Engineers Set	FR30 Master Engineers Set	FR40 Professional Engineers Set
• x2 Plastic tubs	43x31x15cm	43x31x15cm	43x31x15cm	43x31x15cm
• x3 Internal plastic sorting trays	✓	✓	✓	✓
• Plastic parts	305	274	576	500
• Connecting points	2053	1698	2382	2620
• Mini controller with 4 input-output ports	✓	✓	✗	✗
• Pro controller with 7 input-output ports	✗	✗	✓	✗
• Produino controller with 7 input-output ports	✗	✗	✗	✓
• Ginobot advanced edition (E50.1)	✗	✓	✗	✗
• Ginobot premium edition (E51.1)	✗	✗	✓	✓
• Electronics DIY Addon (E41.1)	✗	✗	✗	✓
• Onboard membrane buttons for manual programming	✓	✓	✓	✓
• Onboard breadboard for applying circuits	✗	✗	✗	✓
• Connectivity via	Bluetooth & USB	Bluetooth & USB	Bluetooth & USB	Bluetooth & USB
• Arduino platform embedded, Display 128x64	✗	✗	✗	✓
• Printed tiles for tangible programming	✓	✗	✗	✗
• Flexi-Track (EP05.1)	✗	✓	✓	✓
• LED	x1 (Red)	x1 (Red)	x5	✗
• Solar panel	x1	x1	x1	x1
• Speaker-buzzer	✗	✗	✓	✓
• Battery compartment for	3xAAA batteries	3xAAA batteries	6xAA batteries	6xAA batteries
• Rechargeable battery	✗	✗	✓	✓
• Ultrasonic sensor	✗	✗	✗	x1
• Touch sensor	x1	x1	x1	x1
• Dual IR-colour sensors	x1	x2	x2	x2
• Color sensor	✗	✗	✗	x1
• Gyroscope/ accelerometer sensor	✗	✗	✗	x1
• Servo motor with RJ connector	✗	✗	✗	x1
• DC motors	x2	x2	x3	x2
• Printed tiles for tangible programming	✓	✗	✗	✗
• Puzzle mat for line following (1m x1m)	✓	✗	✗	✗
• 2x Figurine holders for story telling	✓	✓	✓	✓
• Laser-cut animal faces that attach on robot	✓	✓	✗	✗
• Lessons Plans per year	x5 modules	x5 modules	x5 modules	x5 modules
• Lessons per module	x8	x8	x8	x8

STEM Products Specifications

	E05.1 STEM Qboidz Starter Set	E10.1 STEM Qboidz Set	E93.1 Open Projects STEM Set	E94.1 Greenhouse Set
• Plastic tub	43x31x8cm	43x31x15cm	43x31x15cm	43x31x8cm
• Carton box	✗	✗	✗	✗
• Plastic parts	139	195	1201	251
• Connecting points	1036	1043	5265	1641
• Battery compartment for	✗	✗	2xAA batteries	✗
• DC embedded geared motors	✗	✗	x1	✗
• Gearing system	✗	✗	✓	✓
• Pulleys system	✗	✗	✗	✗
• Metal ball for chain reaction model	✗	✗	✓	✗
• Open projects	✗	✗	✓	✗
• 12x Pots, plastic tray & acrylic surfaces	✗	✗	✗	✓
• 10ml Plastic syringe	✗	✗	✗	✓
• Digital instructions	x20	x88	x14	x4
• Models for teaching STEM	x20	x88	x14	x4
• Lesson plans (Standard Edition)	x6	x12	x7	x3

	E95.1 STEM Solar Power Set	E96.1 STEM Simple Machines Set	E97.1 STEM Mechanics Master Set
• Plastic tub	✗	✗	43x31x15cm
• Carton box	29.3x29.3x8.3cm	29.3x29.3x8.3cm	✗
• Internal plastic sorting trays	x1	x1	x2
• Plastic parts	142	191	283
• Connecting points	627	925	1037
• Battery compartment for	2xAAA batteries	✗	2xAAA batteries
• DC embedded geared motors	x1	✗	x1
• 3v Solar panel with cable	x1	✗	x1
• Gearing system	✗	✓	✓
• Pulleys system	✗	✓	✓
• Digital instructions	x16	x60	x96
• Models for teaching STEM	x16	x60	x96
• Lesson plans (Standard Edition)	x3	x24	x34

Robotic Products Specifications

	E15.1 STEM Junior Robotics	E16.1 STEM Qboidz Junior Robotics	E20.1 STEM & Robotics ERP Mini	E30.1 STEM & Robotics ERP Pro	E35.1 STEM & Robotics ERP Pro Advanced Edition	E40.1 STEM & Robotics Produino	E49.1 GinoBot Basic Edition	E50.1 GinoBot Advanced Edition	E51.1 GinoBot Premium Edition
• Plastic tub with internal dividers	43x31x8cm	43x31x15cm	43x31x15cm	43x31x15cm	43x31x15cm	43x31x15cm	✗	✗	✗
• Carton box	✗	✗	✗	✗	✗	✗	29.6x21.5x7.7cm	29.6x21.5x7.7cm	29.6x29.3x8.3cm
• Plastic parts	125	268	312	369	408	406	16	23	248
• Connecting points	723	1743	1596	1678	1964	1914	87	123	248
• Mini controller with 4 input-output ports	✓	✓	✓	✗	✗	✗	✗	✗	✗
• Pro controller with 7 input-output ports	✗	✗	✗	✓	✓	✗	✗	✗	✗
• Produino controller with 7 input-output ports	✗	✗	✗	✗	✗	✓	✗	✗	✗
• GinoBot™ robot	✗	✗	✗	✗	✗	✗	✓	✓	✓
• Onboard membrane buttons for manual programming	✓	✓	✓	✓	✓	✓	✗	✗	✗
• Onboard breadboard for applying electronic circuits	✗	✗	✗	✗	✗	✓	✗	✗	✗
• Connectivity via	Bluetooth & USB	Bluetooth & USB	Bluetooth & USB	Bluetooth & USB	Bluetooth & USB	Bluetooth & USB	Bluetooth & WiFi	Bluetooth & WiFi	Bluetooth & WiFi
• Buttons for manual programming	✓	✓	✓	✓	✓	✓	x5	x5	x5
• Arduino platform embedded, Display 128x64	✗	✗	✗	✗	✗	✓	✗	✗	✗
• Pedestrian crossing cardboard	✗	✗	✗	✓	✗	✗	✗	✗	✗
• Pencil holder to draw shapes during movement	✗	✗	✗	✗	✗	✗	✓	✓	✓
• LED	x1 (Red)	x1 (Red)	x1 (Red)	x5	x2	✗	x4	x4	x4
• RJ connectors to connect additional motors & more sensors	✗	✗	✗	✗	✗	✗	x2	x2	x2
• Speaker-buzzer	✗	✗	✗	✓	✓	✓	✓	✓	✓
• Removable cabin to insert add-on modules	✗	✗	✗	✗	✗	✗	✓	✓	✓
• On-Off switch	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Micro USB connector with USB cable	✗	✗	✗	✗	✗	✗	✓	✓	✓
• Plastic PCB adaptor plate for Arduino, Micro:bit or Raspberry Pi	✗	✗	✗	✗	✗	✗	✓	✓	✓
• Battery compartment for	3xAAA batteries	3xAAA batteries	3xAAA batteries	6xAA batteries	6xAA batteries	6xAA batteries	3xAA	3xAA	3xAA
• Lithium Rechargeable battery	✗	✗	✗	optional*	✓	optional*	optional*	included	included
• Proximity sensors	✗	✗	✗	✗	✗	✗	x3	x3	x3
• Ultrasonic sensor	✗	✗	✗	✗	x1	x1	✗	x1	x1
• Touch sensor	x1	x1	x1	x1	x1	x1	✗	✗	✗
• IR sensor	✗	✗	x2	x2	x2	x2	✗	✗	✗
• Color sensor	✗	✗	✗	✗	x1	x1	x2	x2	x2
• Compass / Magnetometer	✗	✗	✗	✗	x1	x1	✗	✗	✗
• Servo motor with RJ connector	✗	✗	✗	✗	x1	x1	✗	✗	✗
• Dual axis DC 3v motor	✗	✗	✗	✗	✗	✗	✗	x1	x1
• DC embedded geared motors	x1	x1	x2	x3	x2	x2	x2	x2	x2
• Digital instructions	x8	x96	x44	x32	x70	x28	x1	x1	x10
• Models for teaching STEM	✗	x88	x24	x22	x60	x19	✗	✗	✗
• Robotized Models	x8	x8	x20	x10	x10	x9	x1	x1	x10
• Lesson plans (Standard Edition)	x6	x18	x18	x18	x34	x18	x18	x18	x22

* The Rechargeable battery module can replace the 6xAA batteries. It can be charged via the USB port of the controller and is included in the E30.1B and E40.1B version. It is also sold separately as an add-on with code E42.

Since the inception of ENGINO®, our engineering systems have powered STEM classrooms around the world, inspiring kids to become the future innovators. The need for better handling and storage of our plastic tubs, along with the requirement for easier mobility has led to the design of specialized furniture that would align and complement our ENGINO® open-teaching methodology. Having as a top priority to meet the highest levels of quality and safety, as well as providing robustness and re-usuability, these pieces of furniture are the ideal solution for a modern STEM or Makerspace classroom!

Product Code: **EF10.1**

Product Code: **EF11.1**

ENGINO® Stools

When students build ENGINO® models and program their robots, they regularly need to stand up, pick parts, move around and collaborate with their peers. This makes regular seats incovenient and necessitates the use of appropriately designed stools that can be adjusted also in height according to the age of the student. There are two types of stools, the short one (EF10) for using with normal desks and the tall one (EF11) for semi-seating on taller work benches.

Product Information:

EF10.1
Height: 570mm
Width: 390mm
Depth: 390mm

EF11.1
Height: 990mm
Width: 440mm
Depth: 440mm

ENGINO® Trolleys

Product Code: **EF20.1**

Product Information:

EF20.1
Height: 1000mm
Width: 460mm
Depth: 460mm

EF21.1
Height: 1000mm
Width: 810mm
Depth: 460mm

EF22.1
Height: 1000mm
Width: 1160mm
Depth: 460mm

The storage of our plastic tubs is no longer an issue by using one of the trolleys developed by ENGINO®. High-quality wheels allow extreme mobility from classroom to classroom. The side panels are metallic and have special holes and slots to support makerspace tools and storage bins, while the wooden top can be used as a workstation. There are 3 main types of trolleys, one, two or three-column ones, with each column fitting 4 deep trays of 15cm and 1 shallow tray of 7 cm to accommodate tablet storage or complementary materials, such as floor mats.

Product Code: **EF21.1**

Product Code: **EF22.1**

ENGINO® Trolleys Add-ons

The trolleys can be converted at any time to enable multiple usage, either by adding a makerspace back-panel to attach small plastic trays, hangers and tools, or by adding shelves to store assembled models with Engino or any other materials.

Storage Shelves

Product Information:

SS10.1
Height: 960mm
Width: 420mm
Depth: 420mm

SS11.1
Height: 960mm
Width: 750mm
Depth: 420mm

SS12.1
Height: 960mm
Width: 1100mm
Depth: 420mm

Slotted Back-Panels

Product Information:

BP10.1
Height: 650mm
Width: 420mm
Depth: 30mm

BP11.1
Height: 650mm
Width: 770mm
Depth: 30mm

BP12.1
Height: 650mm
Width: 1120mm
Depth: 30mm

ENGINO® Cabinet

Where space is limited, and more storage of tubs is needed, ENGINO® has developed tall cabinets of open access which can store 10 deep plastic tubs per column. There are 3 types: single column, double and triple.

ENGINO® TV Stand

A modern classroom requires an interactive touch screen. So, a special stand for wall mounting has been designed with 24 colorful hexagonal pockets where ENGINO® parts can be stored for students to pick and use for open project, where additional parts might be needed. *ENGINO® parts and TV not included.*

ENGINO® Adjustable Table

When a school is planning to set up a makerspace classroom, it would be ideal to cover the students' needs of all school ages. Standard-height tables have limitations as they do not allow all kids to sit comfortably and there is a big height difference between a 7 year old and a 12 year old! Our specially designed adjustable table works with high quality servo motors and can start from as low as 53cm, covering the needs of early Primary school children, and can go up to 90cm so it can be used even as a standing workbench! The ENGINO® table has also an innovative receptor slot in the middle where teachers can position the plastic trays in an inclined position, enabling ergonomic reach of parts by students. The table set comes with acrylic sheets which can be stored on the sides of the table and cover parts or all the receptor slot of the table so it can be used as a normal flat table. The ENGINO® tables come as islands of 6 or 8 seat positions, but also as a wall unit of 4 seat positions.

Product Information:

AT10.1 (wall unit 4 seats)
Height: 530-900mm
Width: 2150mm
Depth: 600mm

AT11.1 (island 6 seats)
Height: 530-900mm
Width: 1750mm
Depth: 1200mm

AT12.1 (island 8 seats)
Height: 530-900mm
Width: 2300mm
Depth: 1200mm

Product Information:

SC10.1 (1 column shelf)
Height: 1890mm
Width: 420mm
Depth: 420mm

SC11.1 (2 columns shelf)
Height: 1890mm
Width: 770mm
Depth: 420mm

SC12.1 (3 columns shelf)
Height: 1890mm
Width: 1120mm
Depth: 420mm

Product Information:

ES10.1
Height: 2070mm
Width: 1230mm
Depth: 250mm