Future Engineers

STEM education

ORGANIZATION OF EDUCATIONAL ROBOTICS, SCIENCE, TECNOLOGY & MATHEMATICS

Future Engineers

01 Lilliputian Engineers

02 Young Engineers

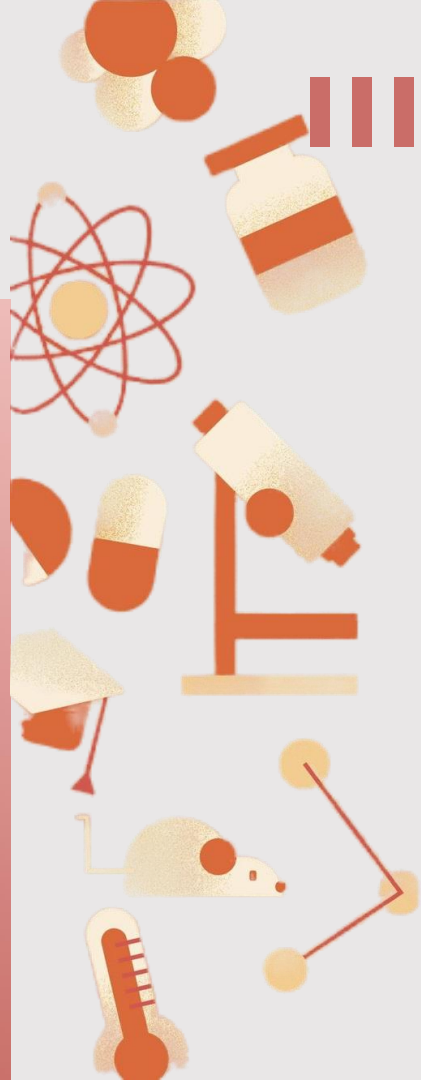
03 Power Engineers

04 Automation Engineers

05 Elementary Robotics

06 Advanced Robotics

07 Physical Computing



01

Lilliputian Engineers

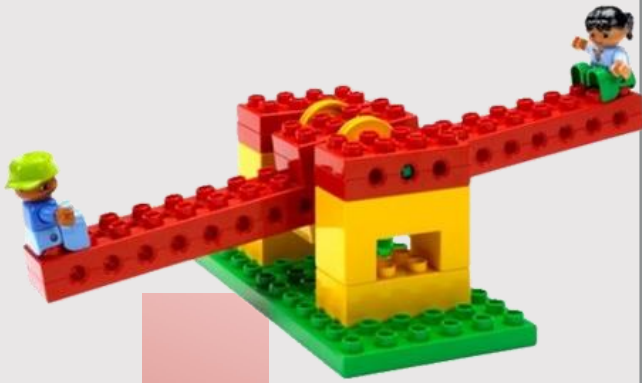
Lilliputian Engineers (Ages: 4-5)

Focus

Spark curiosity and introduce the engineering mindset

Activities

- Exploring the mechanisms from their lives
- Observing and describing how things work in the real world (car, bridges, buildings) using gears, pulleys etc
- Cultivating a sense of satisfaction with their abilities



Key conclusion

Students begin to think critically and creatively like engineers, fostering a foundation for future STEM learning.

- **Skills developed:** Teamwork, Problem-solving, Confidence

02

Young Engineers

Young Engineers (Ages: 6-7)

Focus

Build on the engineering mindset and introduce simple machines

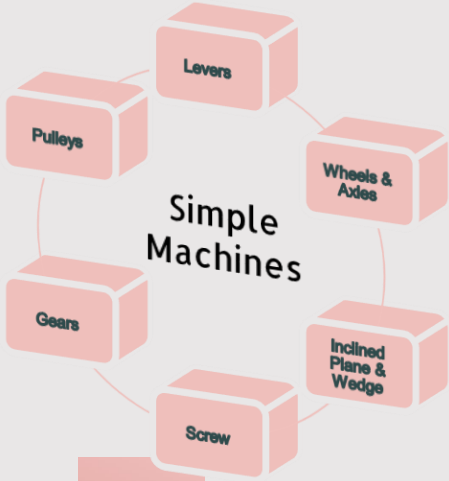
Activities

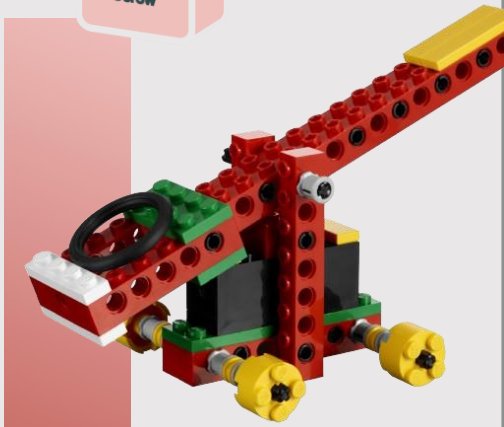
- Utilize their skills, building simple models and learning experimentally the usefulness of the mechanisms they encounter in their environment
- Explore the concept of force building projects with simple machines
- Participate in challenges that require applying simple machines to solve problems
- Use human sensory instruments to interact with their creations

Key conclusion

Students manipulate their projects manually, gain a deeper understanding of basic engineering principles and how they are applied in everyday objects

- **Skills developed:** Collaboration, Critical thinking, Fine motor skills





03

Power Engineers

Power Engineers (Ages: 8–9)

Focus

Introduce the concept of energy conversion, motors and switches

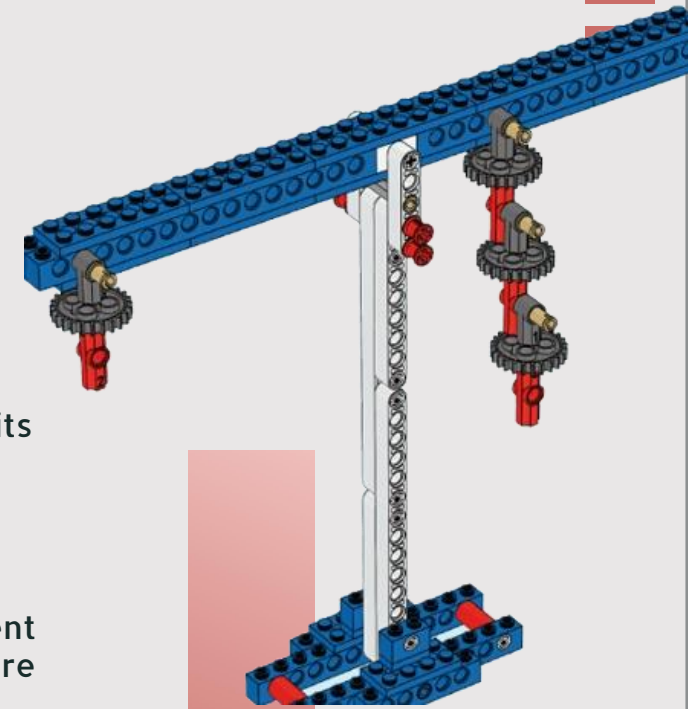
Activities

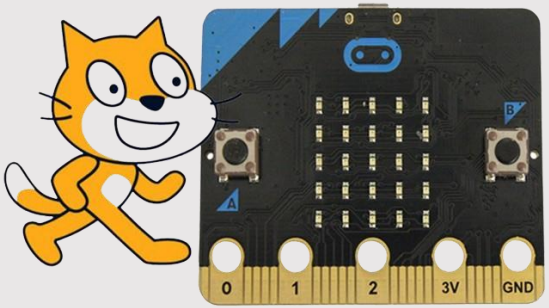
- Design and build simple motorized projects
- Explore the concept of motion, energy, mass and time
- Explore the concepts of switches and their role in controlling circuits
- Use human sensory instruments to interact with their creations

Key conclusion

Students understand the evolution of technology since the movement is controlled manually using a switch, preparing them for more advanced concepts

- **Skills developed:** Communication, Problem-solving, Dexterity





04

Automation Engineers

Automation Engineers (Ages: 9–11)

Focus

Introduce the principles of programming and sensors for automated systems

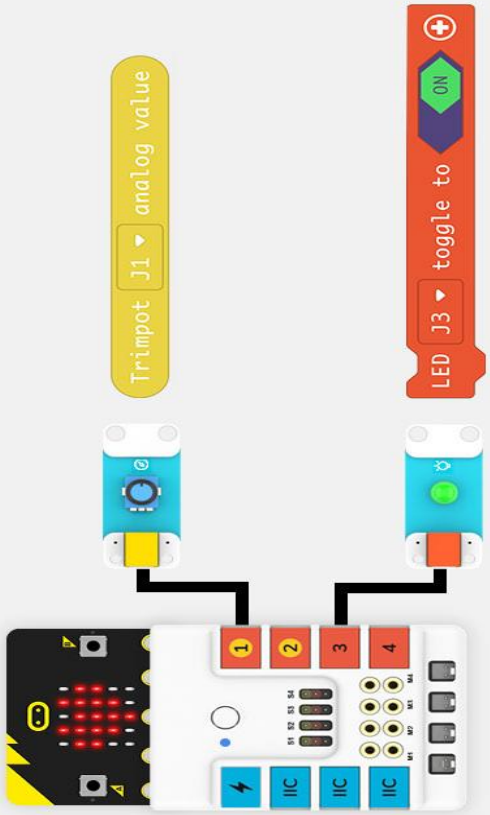
Activities

- Learn basic coding concepts using beginner-friendly programming language
- Replace human sensory instruments by electronic sensors to interact with their creations
- Utilize microcontrollers to collect data, measure basic physical quantities and study fundamental laws of physics

Key conclusion

Students integrate programming into their engineering projects, understand the evolution from manually operated mechanisms to electrically operated and automated devices, fostering critical thinking and problem-solving skills needed for automation applications

- **Skills developed:** Teamwork, Innovation, Creativity



05

Elementary Robotics

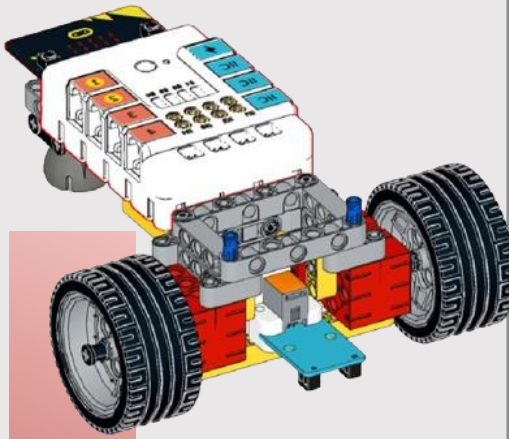
Elementary Robotics (Ages: 10-12)

Focus

Build and program basic fully autonomous robotic systems

Activities

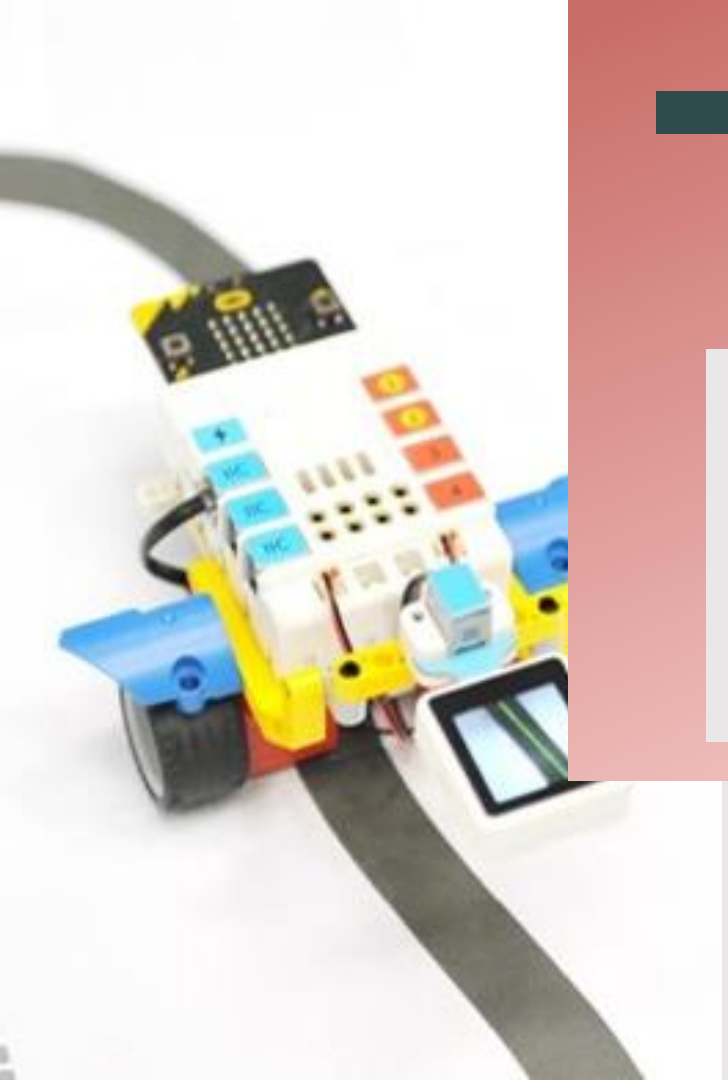
- Design and model their first fully autonomous robotic structures in the physical world
- Learn basic robot programming concepts to command and control movements
- Build simple robotic tasks using combinations of sensors and motors and take measurements of fundamental physical quantities

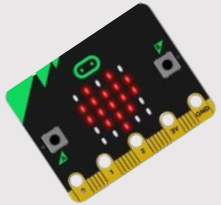


Key conclusion

Students gain hands-on experience with robot construction and programming, laying the groundwork for more complex autonomous robotic systems, equipped with basic knowledge of physics and mathematics.

- **Skills developed:** Collaboration, Innovation, Dexterity





06

Advanced Robotics

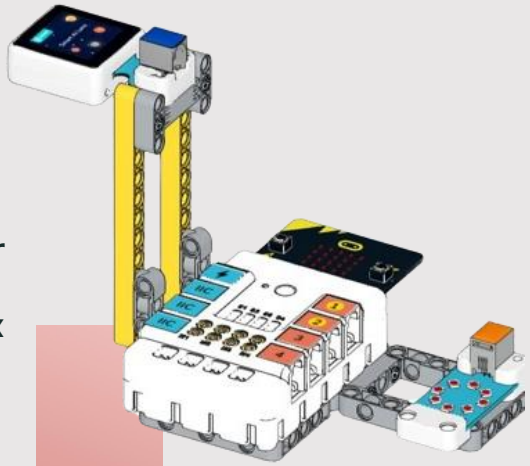
Advanced Robotics (Ages: 11–13)

Focus

Design, build and program advanced robotic systems with AI integration

Activities

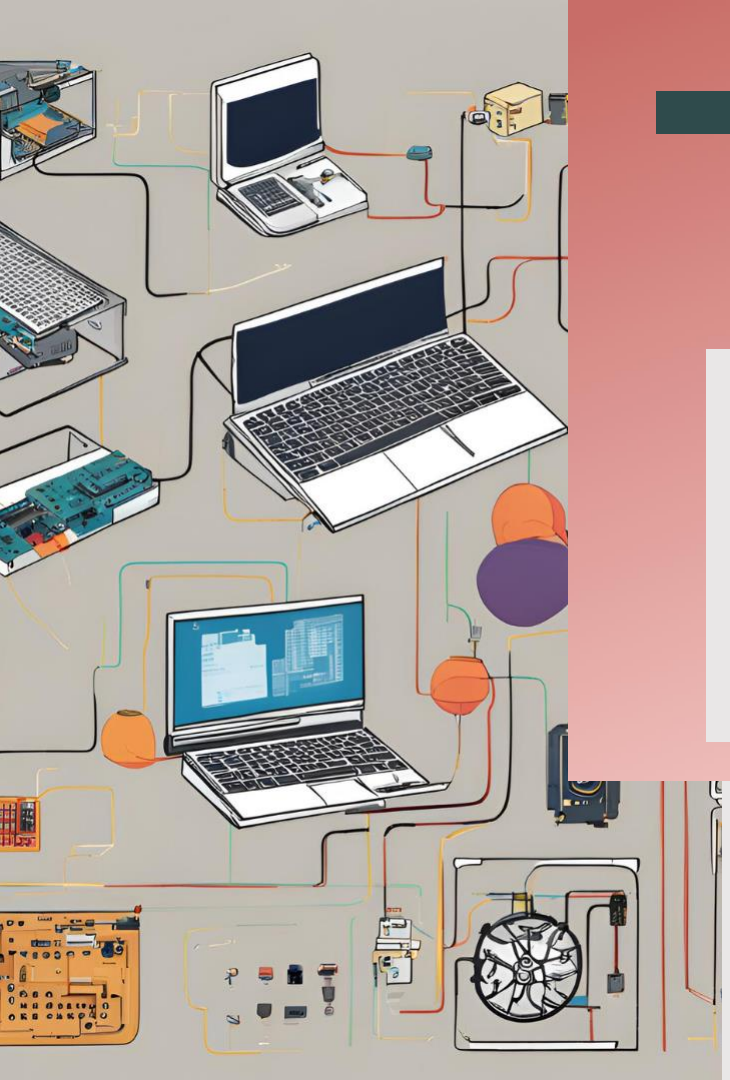
- Explore advanced programming concepts for complex robotics applications
- Integrate advanced sensors and Artificial Intelligence (AI) concepts into their projects
- Learn in real-life conditions how computer vision works implement complex robotic mechanisms by applying it.



Key conclusion

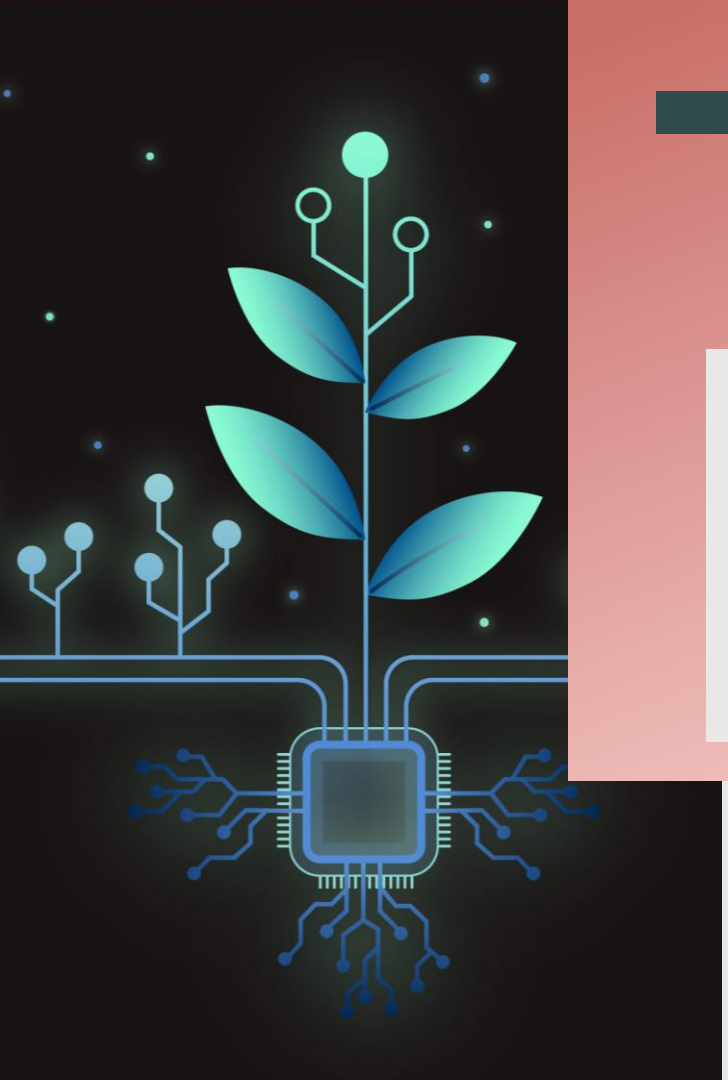
Students delve into the cutting edge of robotics, developing sophisticated robotic systems of autonomous decision-making and interaction with the environment

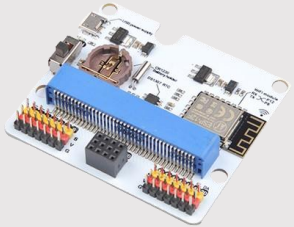
- **Skills developed:** Teamwork, Creativity, Critical thinking

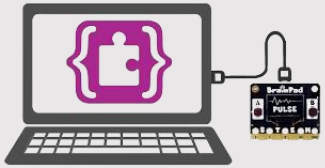


07

Physical Computing







07.1

Green Living Innovations

Green Living Innovations (Ages: 12-13)

Focus

Design and construction of automated systems for environmental monitoring and plant management using the MakeCode programming language

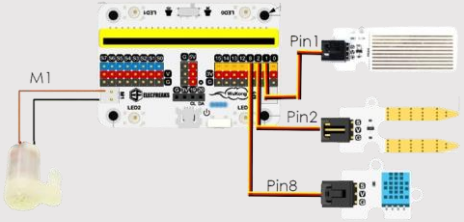
Activities

- Learn the fundamentals of block-based coding using MakeCode to control sensors and actuators in their project
- Gain a basic understanding of environmental factors (temperature, soil moisture) by taking measurements from the physical environment and using them
- Design and build greenhouse, bioclimatic house, and meteorological station applications
- Familiarization with IoT & Cloud technologies

Key conclusion

Students become familiar with the principles of programming together with IoT applications, understanding how to take and evaluate measurements of physical quantities from the environment

- **Skills developed:** Cooperation, Creativity, Problem-solving



07.2

Physical Computing & Python

Physical Computing & Python (Ages: 13-14)

Focus

Introduce the world of physical computing using Python, Micro:bit, and basic electronics

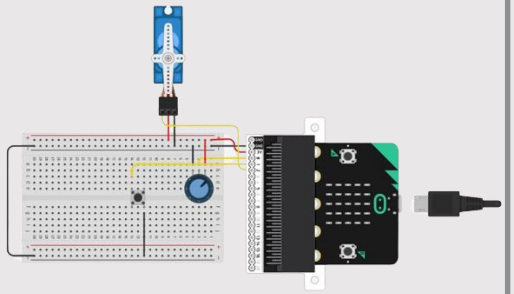
Activities

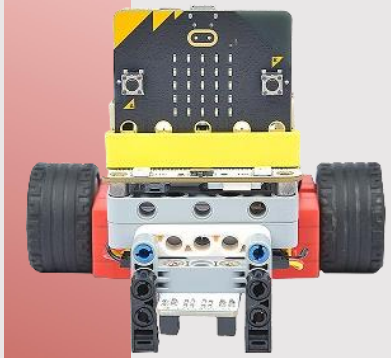
- Learn Python programming fundamentals and syntax for interacting with hardware
- Gain experience with popular programming environments
- Explore electronics and circuit building with the microcontroller Micro:bit
- Experiment with sensors and actuators (LEDs, buttons) to create interactive projects

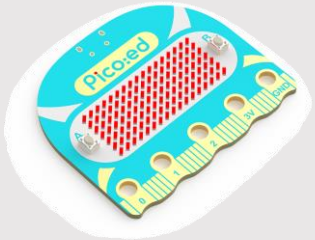
Key conclusion

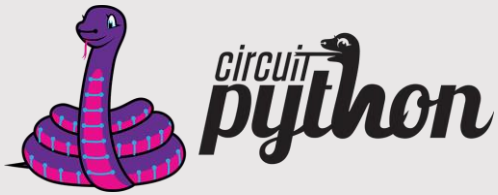
Students gain practical experience in combining programming and electronics, bridging the gap between the digital and physical world

- **Skills developed:** Communication, Innovation, Critical thinking









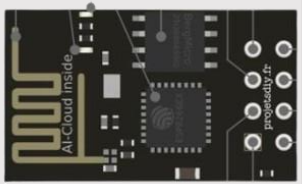
07.3

IoT & Modern Applications

IoT & Modern Applications (Ages: 13-15)

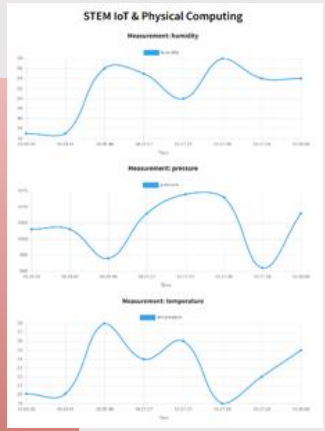
Focus

Explore the world of the Internet of Things (IoT) and its applications using Python programming language



Activities

- Learn about the fundamentals of IoT, including sensors, networks, and data communication
- Design and build IoT-based projects, such as smart home systems and environmental monitoring systems
- Data is transferred to the cloud for storage, analysis, and potential visualization using data analysis tools



Key conclusion

Students gain a comprehensive understanding of IoT concepts and develop the skills to create innovative IoT solutions

Skills developed: Teamwork, Innovation, Problem-solving

Overview

Future Engineers is a comprehensive educational initiative that takes a progressive, age-appropriate approach, gradually building on fundamental knowledge and introducing increasingly complex concepts. Starting with fostering curiosity and critical thinking, the program equips them with the foundational knowledge and practical experience needed to become future innovators who can tackle real-world challenges.

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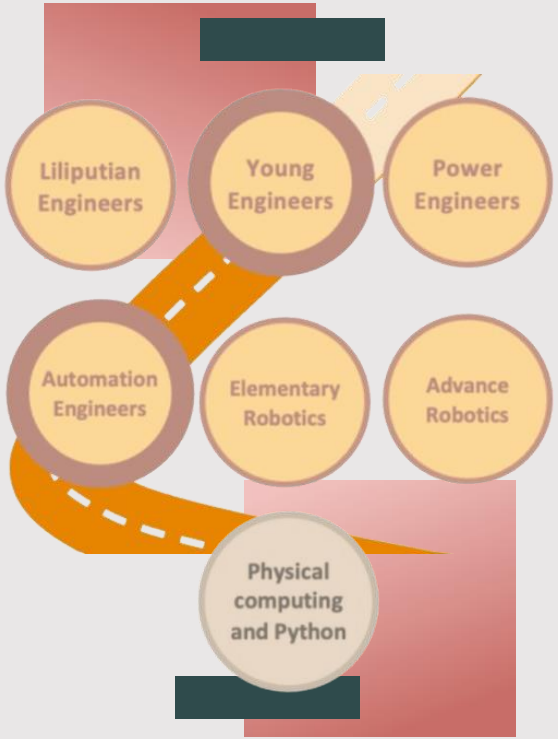

01 — Deisgn projects by observing the world

02 — Construct projects with simple machines

03 — Build and control simple motorized projects

04 — Gather enviromentral data using sensors

05 — Construct fully autonomous projects

06 — Integrate advanced sensors and AI

07 — Linking the digital and physical worlds

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