26
Fe
Iron
55.84

# FUTURE Engineers

STEM education LLC

# Future Engineers

01 Lilliputian Engineers

02 Young Engineers

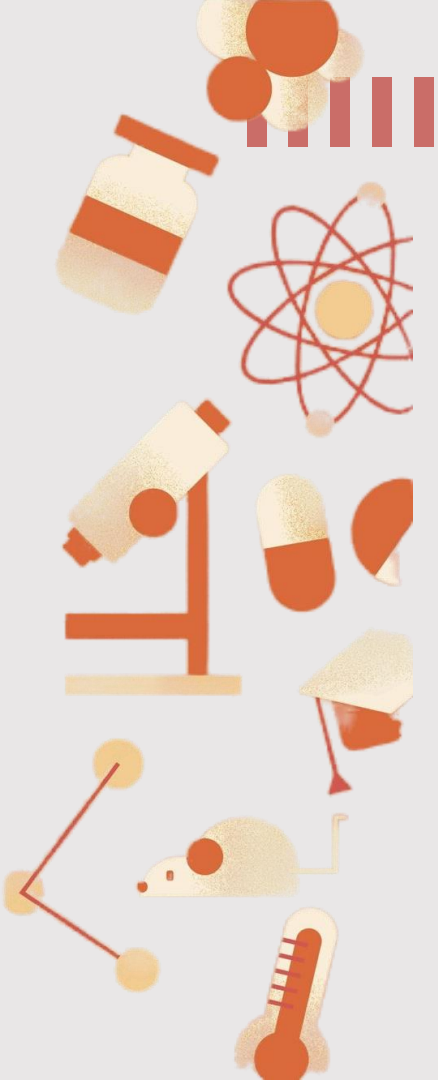
03 Power Engineers

04 Automation Engineers

05 Elementary Robotics

06 Advanced Robotics

07 Physical Computing



01

# Lilliputian Engineers

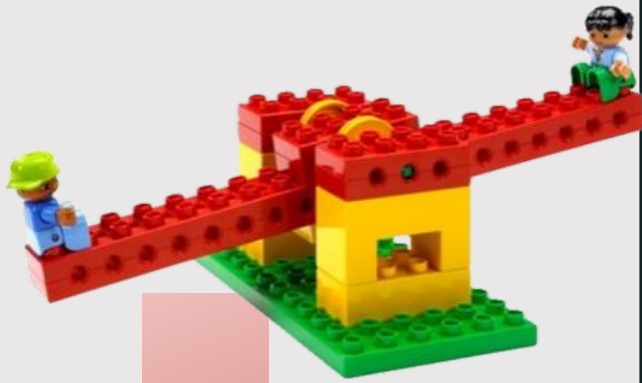
# Lilliputian Engineers (Ages: 4-5)

## 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

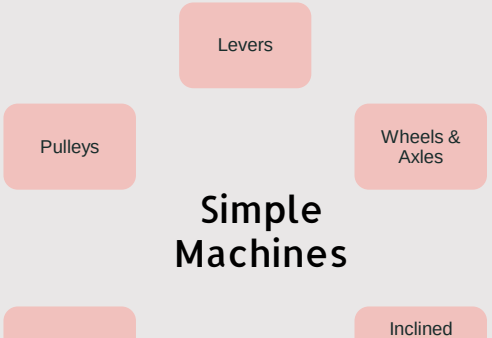
## Activities

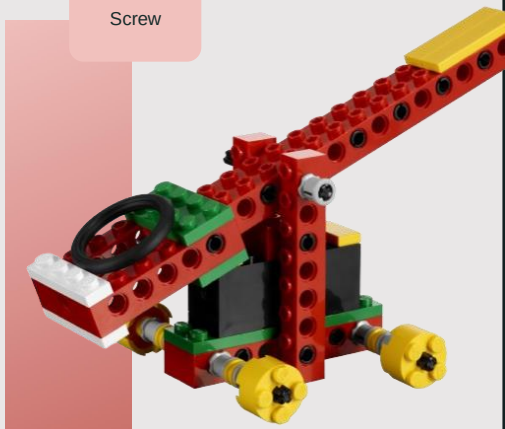
- Utilize their skills, building simple models and learning experimentally the usefulness of the mechanisms they encounter in their environment
- Explore the concept of force building projects with simple machines
- Participate in challenges that require applying simple machines to solve problems
- Use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

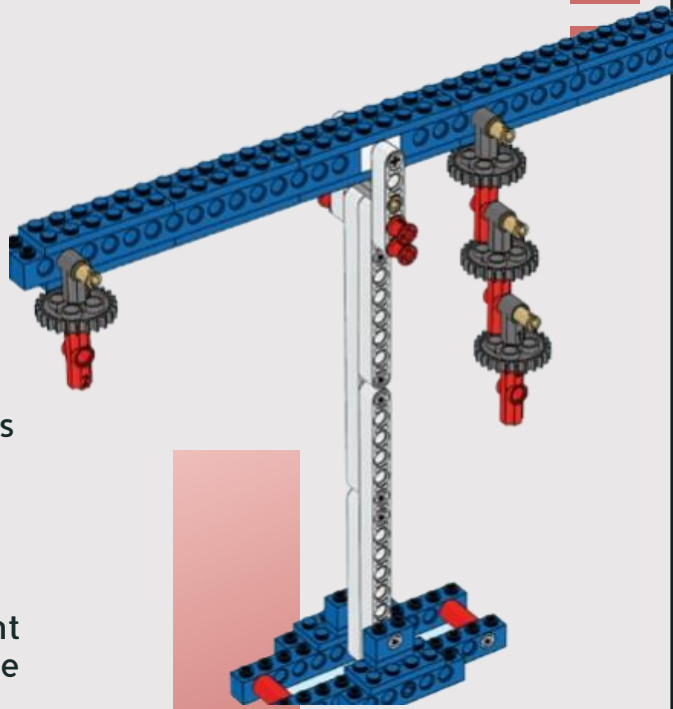
## Activities

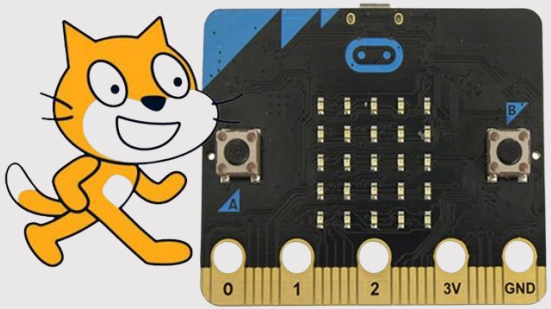
- Design and build simple motorized projects
- Explore the concept of motion, energy, mass and time
- Explore the concepts of switches and their role in controlling circuits
- Use human sensory instruments to interact with their creations

## 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

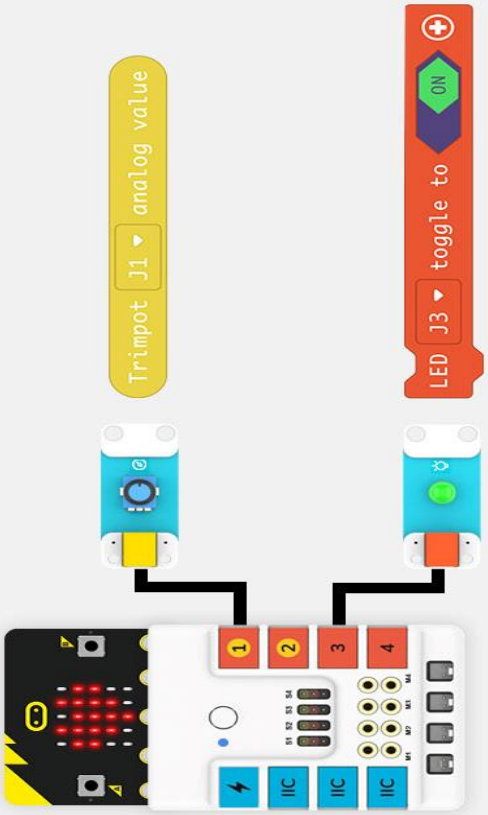
## Activities

- 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

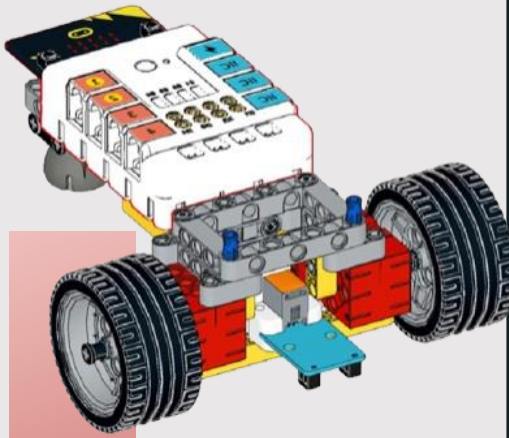
# Elementary Robotics (Ages: 10-12)

## Focus

Build and program basic fully autonomous robotic systems

## Activities

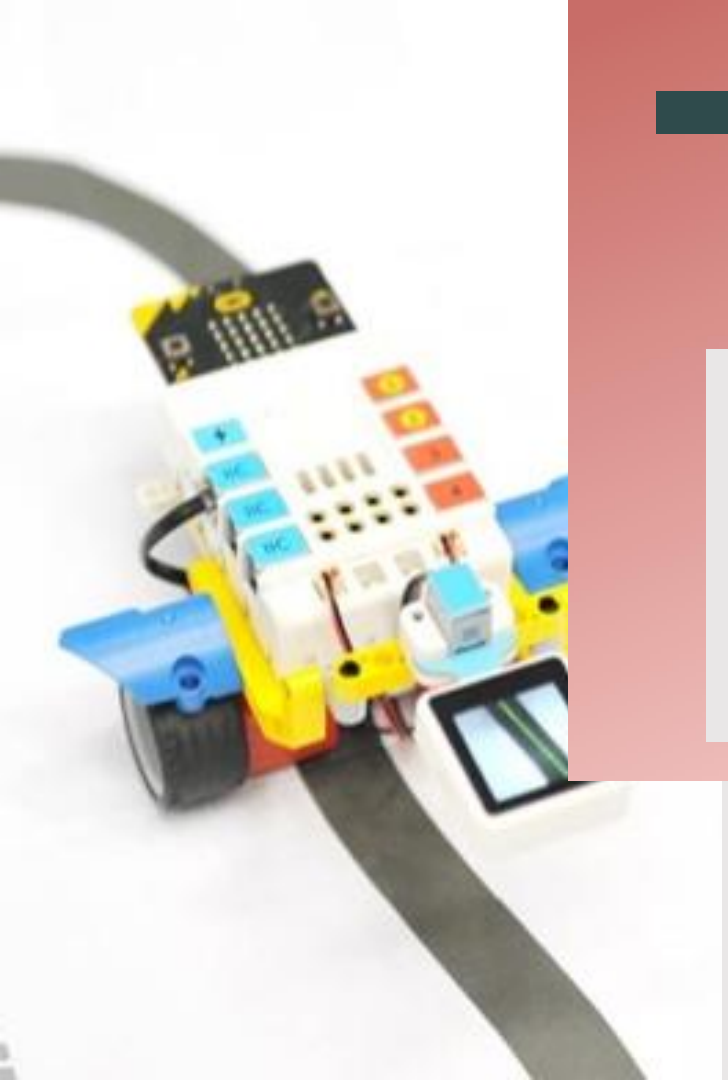
- Design and model their first fully autonomous robotic structures in the physical world
- Learn basic robot programming concepts to command and control movements
- Build simple robotic tasks using combinations of sensors and motors and take measurements of fundamental physical quantities

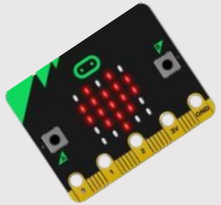


## Key conclusion

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

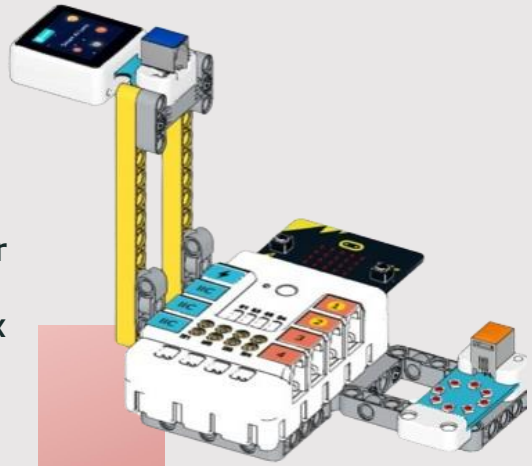
# Advanced Robotics (Ages: 11–13)

## Focus

Design, build and program advanced robotic systems with AI integration

## Activities

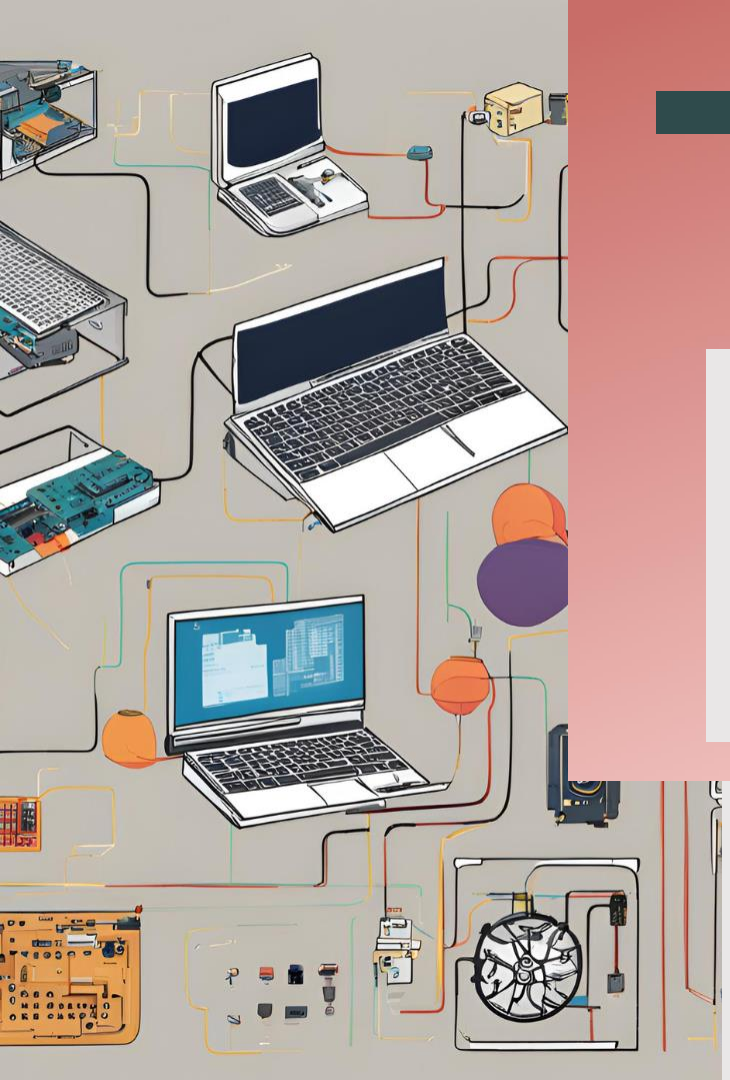
- Explore advanced programming concepts for complex robotics applications
- Integrate advanced sensors and Artificial Intelligence (AI) concepts into their projects
- Learn in real-life conditions how computer vision works implement complex robotic mechanisms by applying it.



## Key conclusion

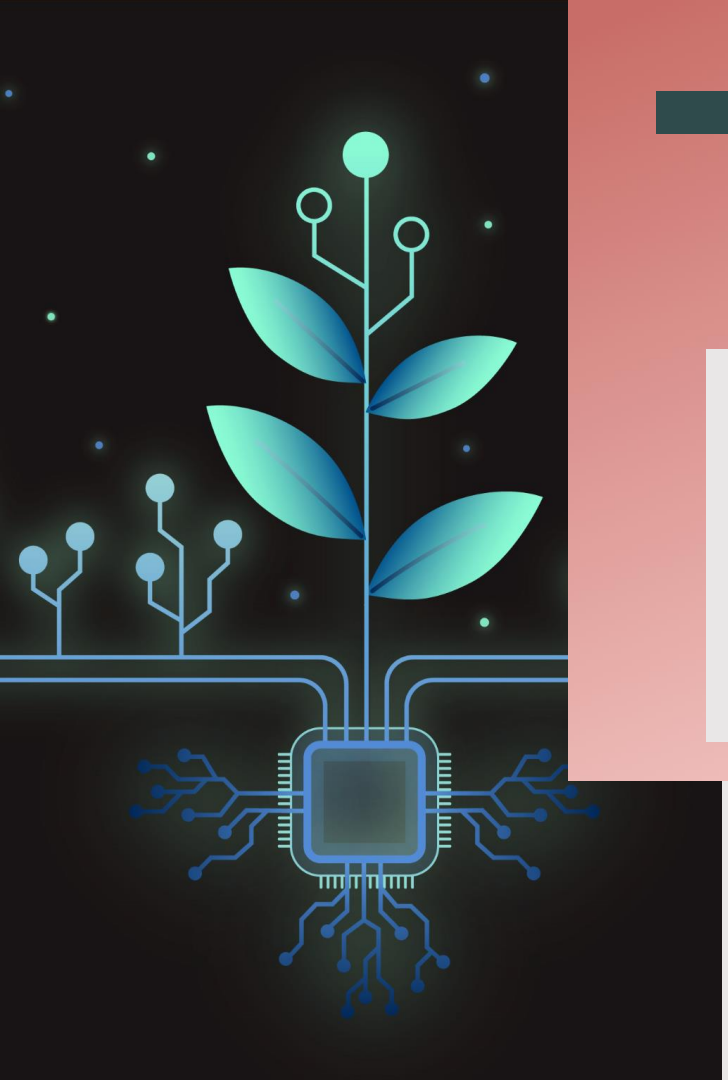
Students delve into the cutting edge of robotics, developing sophisticated robotic systems of autonomous decision-making and interaction with the environment

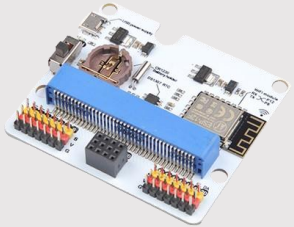
- **Skills developed:** Teamwork, Creativity, Critical thinking

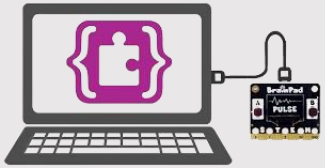


07

# 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

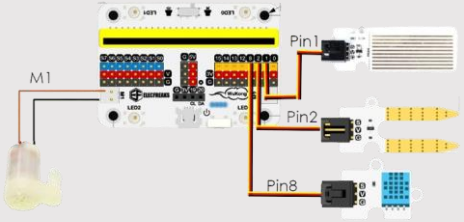
## Activities

- 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





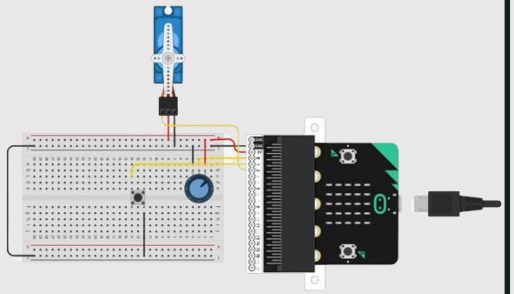
# 07.2

# Physical Computing & Python

# Physical Computing & Python (Ages: 13-14)

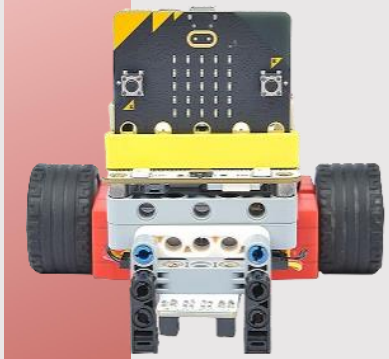
## Focus

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



## Activities

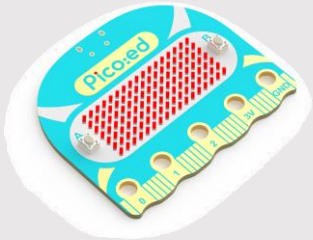
- Learn Python programming fundamentals and syntax for interacting with hardware
- Gain experience with popular programming environments
- Explore electronics and circuit building with the microcontroller Micro:bit
- Experiment with sensors and actuators (LEDs, buttons) to create interactive projects

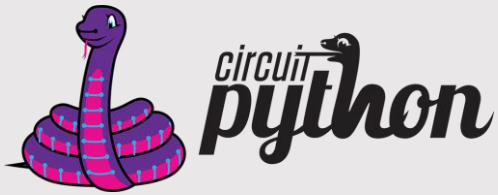


## Key conclusion

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

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



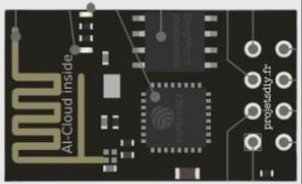

# 07.3

# 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

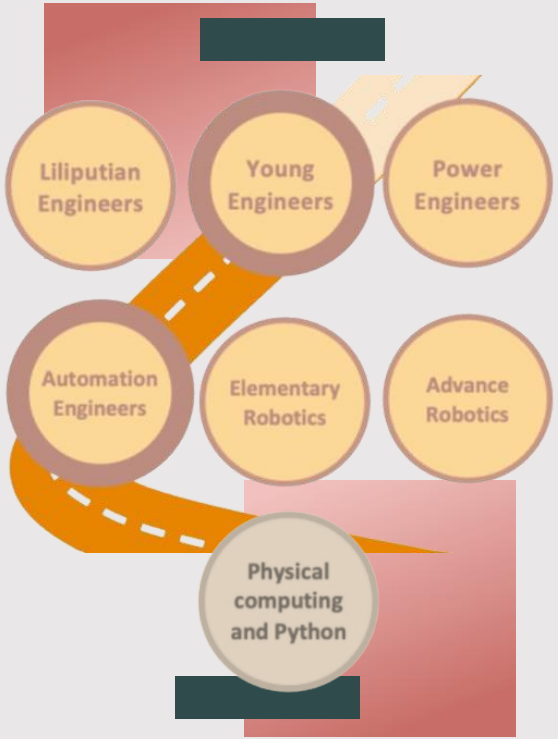
Students gain a comprehensive understanding of IoT concepts and develop the skills to create innovative IoT solutions

- **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.

# Future Engineers




01 Design 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

STEM education
ORGANIZATION OF EDUCATIONAL ROBOTICS, SCIENCE, TECHNOLOGY & MATHEMATICS