



21K School

Where Every Learner
Finds Their Path

STEM LEARNING: AGE 13–18

(YOUNG ENGINEERS & TECH CREATORS PROGRAM)

Learners in this stage engage in advanced STEM exploration involving Arduino, robotics, and 3D design. They apply engineering and programming principles to design automated systems and innovative projects. This level encourages critical thinking, creativity, and readiness for real-world technological challenges.



ARDUINO & AUTOMATION PROJECTS

WHAT STUDENTS DO

Students use Arduino boards, sensors, and coding to create automation systems and real-world prototypes.

WHY WE USE IT

Arduino-based learning connects electronics, coding, and problem-solving, showing how technology powers modern systems.

NOVEMBER PROJECTS

- Arduino – Smart Streetlight (Nov 2) : Learning how light sensor works
- Automatic Dustbin (Nov 4) : How motor works and smart dustbin moves with sensor
- Sound-Activated Light (Nov 7) : Learning how sensor activates light in room.
- Rain Alarm (Nov 8) : Learning how Rain detected and alerts people
- Temperature-Based Fan (Nov 9) : How temperature controls fan on/off.
- Auto Fan (Nov 11) : How a fan switch on automatically using sensor and motor.
- Light + Temperature Combo (Nov 13) : understanding concept of light and temperature.
- Push-Button Counter (Nov 19) : Learning count using Lcd
- Motion-Activated Light (Nov 20) : Learning movement activated light
- Security System (Nov 21) : learning how a security system works
- Traffic Light System (Nov 23) : Learning how traffic system of 3 lights works
- Traffic Light with Pedestrian Cross (Nov 25) : Learning how pedestrian cross in traffic system works
- Door Lamp (Nov 27) : learning how a door lamp works in reality.
- Auto Fan (Nov 30) : learning how a fan rotates automatically.

HOW IT RELATES TO STEM

- **Science** : Energy, sensors, and control systems
- **Technology** : Coding and embedded systems
- **Engineering** : Automation and integration
- **Math** : Timing, sequencing, and logic

IMPACT ON CHILDREN

Builds logical reasoning, innovation, and practical STEM application confidence.

LEARNING OUTCOMES

- Code and connect sensors to create automated systems.
- Understand how input and output devices work together.
- Apply engineering thinking to troubleshoot circuits.
- Develop teamwork through project collaboration.



3D DESIGN & ENGINEERING PROJECTS

WHAT STUDENTS DO

Students explore 3D CAD design, creating mechanical models and real-world product enclosures.

WHY WE USE IT

3D design bridges art and engineering, helping learners visualize and prototype functional structures.

HOW IT RELATES TO STEM

- **Science** : Material science
- **Technology** : CAD and 3D modeling
- **Engineering** : Structural design
- **Math** : Geometry and scale

IMPACT ON CHILDREN

Fosters design thinking, precision, and structural understanding for engineering-oriented learning.

LEARNING OUTCOMES

- Use CAD tools to create mechanical and architectural designs.
- Understand how 3D design supports engineering solutions.
- Demonstrate creativity and structural logic in design projects.
- Connect digital design to physical problem-solving.

NOVEMBER PROJECTS

- 3D Design – Fan Housing (Nov 12)
- 3D Design – Mini Robot Frame (Nov 15)
- 3D Design – Smart Dustbin (Nov 16)
- 3D Design – Bin Lid (Nov 18)
- 3D Design – Eco Project (Nov 22)
- 3D Design – Arduino Case (Nov 26)
- 3D Design – Wind Turbine Model (Nov 28)
- 3D Design – Bridge or Tower (Nov 29)