



## ROBOTHTRONE 2.0 PROJECT IDEATION

### 1. Scratch Programming Challenge Theme: Interactive Stories & Games

#### Overview:

The Scratch Programming Challenge encourages students to explore creativity through visual programming. Using the Scratch platform, participants will design interactive stories, games, and animations by connecting drag-and-drop code blocks. This hands-on activity helps children learn the fundamentals of coding in a simple and fun way.

#### Example Project:

“Catch the Falling Fruit” Game: Players control a basket to catch falling fruits. Points are scored for each fruit caught, and the game ends if a fruit is missed.

#### Tools Used:

- Scratch (<https://scratch.mit.edu/>) – Visual programming platform

### 2. Smart Home Helpers Challenge

#### Theme: *Daily Task Automation & Basic Robotics Concepts*

Overview: The Smart Home Helpers Challenge introduces students to the world of automation and robotics. Participants learn how simple robots and smart devices can perform everyday tasks, making life easier and more efficient. This activity combines basic robotics concepts with hands-on learning to encourage problem-solving and innovation.

#### Example Project:

Automatic Room Light Controller: A robot or system detects motion using sensors and turns on/off lights automatically, demonstrating sensor integration and basic automation logic.

#### Tools Used:

- Microcontroller boards (Arduino, ESP32, etc.)
- Sensors (PIR motion sensor, LDR, etc.)
- Actuators (LEDs, motors, relays)

### 3. Environmental Monitoring & IoT for Sustainability

#### Overview:

This activity introduces students to the use of IoT (Internet of Things) technology for monitoring and sustaining the environment. Participants learn to use IoT sensors and



Arduino-based systems to collect data on environmental parameters such as temperature, humidity, air quality, and soil moisture. The collected data is then analysed and visualized to identify patterns, track changes, and design real-world sustainability solutions.

Through this hands-on challenge, students develop skills in data collection, analysis, and problem-solving, while understanding how technology can support smart agriculture, pollution control, energy efficiency, and environmental conservation.

#### **Tools & Platforms:**

- Arduino or ESP32 microcontrollers
- Sensors for environmental monitoring (temperature, humidity, air quality, soil moisture).

### **4. Smart Transportation**

**Theme:** *Intelligent Mobility Systems & Traffic Management*

Overview: The Smart Transportation Challenge introduces students to intelligent mobility and automated transportation systems. Participants explore how sensor integration, and traffic management solutions can improve efficiency, safety, and sustainability in urban mobility. Through hands-on projects, students learn to design automated transportation solutions that simulate real-world scenarios, such as smart traffic lights, vehicle tracking, or route optimization.

This activity encourages problem-solving, logical thinking, and innovation, while fostering an understanding of technology-driven solutions for modern transportation challenges. Limited mentor assistance is provided, promoting independent exploration and creativity.

#### **Tools & Platforms:**

- Microcontrollers (Arduino, ESP32)
- Motion sensors
- Simulation platforms for traffic or vehicle management

### **5. Industry 4.0 Solutions**

**Theme:** *Advanced Industrial Automation & Smart Manufacturing*

Overview: The Industry 4.0 Solutions Challenge introduces students to advanced industrial automation technologies. Participants explore the integration of AI and machine learning with industrial IoT systems to develop complex automation solutions. Using programming languages like Python, students design, simulate, and implement projects that mirror real-world industrial processes.

This activity promotes critical thinking, problem-solving, and technical skills, while encouraging independent project development. Learners gain hands-on experience with



smart manufacturing concepts, preparing them to understand and contribute to the next generation of automated, data-driven industrial systems.

Tools & Platforms:

- Industrial IoT devices and sensors
- Python programming environments
- Pycham

## 6. Healthcare Innovation

**Theme:** *Medical Technology Solutions & IoT Applications*

Overview: The Healthcare Innovation Challenge introduces students to cutting-edge medical technology solutions. Participants explore advanced medical device design, remote health monitoring systems, and IoT applications in healthcare. By collecting and analyzing healthcare data, students learn to develop solutions that improve patient care, efficiency, and safety.

This activity fosters technical skills, problem-solving, and analytical thinking, while emphasizing professional-level documentation and real-world application. Learners gain hands-on experience in designing smart medical systems, preparing them to contribute to the future of healthcare technology.

Tools & Platforms:

- IoT-enabled medical sensors and devices
- Simulation platforms for health monitoring