

# INNOVATE THE FUTURE OF TRANSPORTATION

**Objective:** Students will design and build a sophisticated model of a vehicle that can move, carry a load, and navigate a simple obstacle course

## Materials Needed:

- Cardboard
- Straws
- Small dowels or rods thinner than the diameter of the straws
- Bottle caps (for wheels)
- Rubber bands
- Balloons
- Small motors and batteries
- Microcontrollers (e.g., Arduino)
- Sensors (e.g., ultrasonic sensors)
- Tape and glue
- Scissors
- Markers for decoration

## Instructions:

- 1. Introduction** (20 minutes): Discuss advanced principles of flight, space exploration, and transportation, including aerodynamics, propulsion, and navigation.
- 2. Design Phase** (30 minutes): Students will sketch their vehicle designs, considering how to incorporate motors, sensors, and microcontrollers for navigation.
- 3. Building Phase** (60 minutes): Using the provided materials, students will build their vehicle models, including motors, sensors, and microcontrollers.
- 4. Programming Phase** (40 minutes): Students will program their microcontrollers to navigate the obstacle course.
- 5. Testing Phase** (40 minutes): Students will test their vehicles to see how well they can navigate the obstacle course and carry a load.
- 6. Discussion** (30 minutes): Discuss the challenges faced during the building, programming, and testing phases. Encourage students to think about how their designs could be improved for better performance.

## Teaching Instructions:

- 1. Preparation:** Gather all materials and set up the classroom with designated areas for designing, building, and testing.
- 2. Introduction:** Start each session with a brief discussion on the principles of transportation relevant to the students' level.
- 3. Guidance:** Provide guidance and support during the design and building phases, encouraging creativity and problem-solving.
- 4. Facilitation:** Facilitate the testing phase, ensuring safety and fairness. Encourage students to observe and learn from each other's designs.
- 5. Discussion:** Lead a discussion after the testing phase to reflect on the learning experience and explore improvements.

