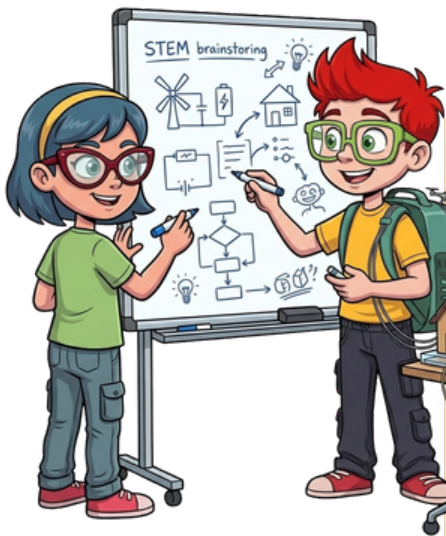


OCTOBER

Sustainable Mobility

This month focuses on how people and goods move in a more efficient and eco-friendly way. Students explore systems that improve safety and reduce energy use in transportation. They learn how smarter mobility solutions can create cleaner and safer environments.



ACTIVITY 1: MOTION-POWERED BICYCLE LIGHT GENERATOR

Materials Needed:

- Small DC motor (can act as generator)
- Dynamo or motor from kit (3–9V)
- White LED × 2
- Capacitor (1000 μ F)
- Rectifier diode (1N4007)
- Breadboard + wires
- Bicycle wheel model (cardboard + skewer axle)

LEVEL 2 – MECHANICAL + ENERGY HARVESTING

STEP-BY-STEP INSTRUCTIONS:

PART 1: BUILD THE WHEEL SYSTEM

Components Needed

- Cardboard (for wheel and frame)
- Wooden skewer (axle)
- Small DC motor (used as generator)
- Glue/tape

Step 1: Make the Wheel

- Cut a 30 cm diameter circle from cardboard
- Mark the center and insert a skewer through it (axle)
- Ensure it rotates freely

Step 2: Build the Frame

- Create a cardboard stand to hold the axle horizontally
- Fix both ends of the skewer so the wheel can spin easily

Step 3: Mount the Motor

- Place the motor so its shaft touches the rim of the wheel
- Ensure tight contact (use rubber for better grip if needed)
- When the wheel spins → motor shaft spins

PART 2: ELECTRICAL SETUP

Components Needed

- 1 diode (e.g., 1N4007)
- 1 capacitor (100 μ F–470 μ F recommended)
- LED
- Wires

Step 4: Connect the Circuit

Follow this sequence:

- Motor terminals → Diode
Ensure correct polarity (stripe side towards capacitor/LED)
- Diode → Capacitor (+ terminal)
- Capacitor (– terminal) → GND
- Capacitor (+) → LED long leg (+)
- LED short leg (–) → GND

PART 3: TESTING THE SYSTEM

Step 5: Spin the Wheel

- Rotate the wheel by hand
- Observe:
LED lights when speed is high enough
LED may stay on briefly after stopping

PART 4: MEASURE PERFORMANCE

Step 6: Calculate Minimum Speed (RPM)

1. Spin the wheel and count:
 - Number of rotations in 1 second
2. Convert to RPM:
 - $\text{RPM} = \text{rotations per second} \times 60$

Example:

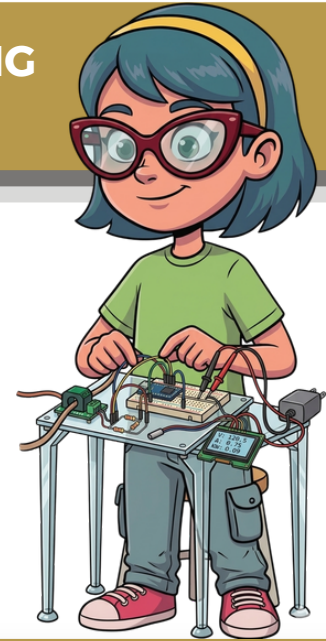
- 2 rotations per second → $2 \times 60 = 120$ RPM

Record:

- Minimum RPM required to light the LED

**CLICK FOR VIDEO TUTORIAL LINK :
[HOW DO DYNAMOS GENERATE ELECTRICITY?](#)**

ACTIVITY 2: SMART PEDESTRIAN CROSSING ALERT SYSTEM



Materials Needed:

- PIR motion sensor × 2
- Active buzzer
- Red + Green LEDs × 2 each
- Arduino Uno
- Relay module (5V 2-channel)
- Jumper wires, breadboard
- Cardboard for road model

Level 2→3 – PIR + Relay + Multi-sensor

STEP-BY-STEP INSTRUCTIONS:

PART 1: BUILD THE ROAD MODEL

Components Needed

- Cardboard base
- Black/grey paper (for road surface)
- White tape/marker (for lane lines and crossing)

Step 1: Create the Road

- Draw or paste a 2-lane road on the cardboard
- Mark a pedestrian crossing (zebra crossing) in the center
- Clearly label:
Vehicle lanes
Pedestrian path

PART 2: INSTALL SENSORS

Components Needed

- 2 PIR motion sensors

Step 2: Place PIR Sensors

- Fix one PIR sensor on each side of the crossing
- Angle them slightly toward the pedestrian approach path

Step 3: Connect PIR Sensors

- PIR 1:
VCC → 5V
GND → GND
OUT → Pin 2
- PIR 2:
VCC → 5V
GND → GND
OUT → Pin 3

PART 3: TRAFFIC LIGHT & ALERT SYSTEM

Components Needed

- LEDs (at least 4):
Pedestrian Green
Pedestrian Red
Vehicle Green
Vehicle Red
- 220Ω resistors
- Buzzer
- Relay module (optional for LED strip simulation)

Step 4: Connect LEDs

- Pedestrian Green → Pin 9
- Pedestrian Red → Pin 10
- Vehicle Green → Pin 11
- Vehicle Red → Pin 12

(All LEDs → GND via resistors)

Step 5: Connect Buzzer

- Positive → Pin 8
- Negative → GND

Step 6: Connect Relay (Optional)

- IN → Arduino Pin 7
- VCC → 5V
- GND → GND

Use relay to control:

- A larger LED strip or external signal light

PART 4: UPLOAD CODE

PART 5: TESTING THE SYSTEM

Step 8: Simulate Pedestrian Movement

- Walk near one PIR sensor
- Observe:
Vehicle light turns Red
Pedestrian light turns Green
Buzzer beeps

Step 9: Check Reset

- After ~5 seconds:
System returns to normal
Vehicles get Green again

PART 6: ANALYSIS

Step 10: Evaluate Performance

- Does it trigger reliably?
- Does it avoid false triggers?
- Is timing sufficient for safe crossing?

**CLICK FOR VIDEO TUTORIAL LINK :
[PIR MOTION SENSOR WITH MICROCONTROLLER](#)**

DESIGN THINKING MISSION: IMPLEMENT

THE CHALLENGE:

Your monthly mission: Take your solution beyond the model and apply it in a real-world setting.

Now it is time to put your solution into action.

This stage is about:

Moving from demonstration → real use

Testing with real people and real conditions

Understanding how your solution performs outside controlled environments



WHAT TO SUBMIT:

Real-World Implementation Evidence:

Deploy your solution in a real setting (school, home, or community)
4-6 photos or a short video showing actual use

Implementation Context:

Explain:

Where was your solution implemented?

Who used it?

What problem situation was it applied to?

User Interaction (Minimum 3 Users):

Document interactions with at least 3 users:

How did they use the solution?

What difficulties did they face?

What did they find useful?

Impact Evidence:

Show any visible or measurable change:

Did the problem reduce or improve?

What difference did your solution make?

Challenges in Implementation:

List at least 3 real-world challenges, such as:

User behaviour

Environment

Durability

Ease of use

Step	What to Do	How to Do it	Output
1	Identify Real Location	School/home/community where solution fits	Implementation site
2	Deploy Prototype	Place system in real environment	Live setup
3	Observe Usage	Watch how people interact with it	Observation notes
4	Capture Evidence	Photos/videos of real usage	Evidence
5	Interact with Users	Talk to at least 3 users	User feedback
6	Record Impact	What changed? (time, usage, behavior)	Impact data
7	Identify Challenges	List 3 real-world issues	Challenges
8	Reflect	What worked vs lab conditions?	Reflection

Judging Criteria:



- Authenticity of Implementation (30%) – Is the solution used in a real, relevant context?
- User Interaction Depth (25%) – Are user experiences meaningfully captured?
- Impact Evidence (25%) – Is there visible or measurable improvement?
- Reflection & Iteration Thinking (20%) – Is there a clear understanding of next improvements?