

# APRIL

## Energy Awareness in Communities

This month focuses on understanding how energy is used and wasted in everyday life. Students explore energy consumption through simple audits and hands-on models. They build awareness of energy usage patterns in their surroundings.



### QUEST 1: HOME ENERGY USAGE INDICATOR

#### Materials Needed:

- Arduino Uno
- LEDs (Red, Yellow, Green – 5mm)
- Resistors ( $220\Omega \times 3$ )
- Breadboard + jumper wires
- USB cable + laptop
- Energy audit worksheet (provided)

### LEVEL 1 – BASIC ELECTRONICS

## STEP-BY-STEP INSTRUCTIONS:

#### PART 1: ENERGY AUDIT (10-15 MINUTES)

##### Step 1: Select Locations

Choose 3 different rooms/areas (e.g., classroom, office, home room, lab).

##### Step 2: Observe and Count

In each room, count the number of:

Lights (bulbs/tubes)

Fans

Other appliances (AC, projector, computer, chargers, etc.)

#### **Step 4: Calculate Total Score (per room)**

Example:

2 lights (2) + 2 fans (4) + 1 AC (3) = 9 points

#### **Step 5: Classify Usage Level**

0–5 points → Low (Green)

6–10 points → Medium (Yellow)

11+ points → High (Red)

Note down:

Room name

Total score

Usage level (Low/Medium/High)

## **PART 2: CIRCUIT SETUP**

### **Components Needed**

- Arduino Uno
- Breadboard
- 3 LEDs (Red, Yellow, Green)
- 3 resistors (220Ω)
- Jumper wires
- USB cable + laptop

### **Step 6: Place LEDs on Breadboard**

- Insert 3 LEDs in the breadboard:
- Green LED → Low
- Yellow LED → Medium
- Red LED → High

### **Step 7: Connect Resistors**

- Connect a 220Ω resistor to the long leg (positive) of each LED

### **Step 8: Connect to Arduino**

- Green LED → Pin 9
- Yellow LED → Pin 10
- Red LED → Pin 11

### **Step 9: Complete Circuit**

- Connect the short leg (negative) of each LED to GND on Arduino

## PART 3: PROGRAMMING

### Step 10: Upload Code

Upload code to switch LEDs on or off based on the value of variable usageLevel, with usageLevel values being 1 = Low, 2 = Medium, 3 = High

## PART 4: TESTING

### Step 11: Input Your Results

- Replace usageLevel with:
  - 1 → Low
  - 2 → Medium
  - 3 → High

### Step 12: Observe Output

- Check which LED lights up
- Repeat for each room by changing the value

## PART 5: REFLECTION

### Step 13: Think & Discuss

- Which rooms showed high usage?
- What caused higher consumption?
- What is one simple change that can reduce energy usage? (e.g., turning off unused lights, reducing AC usage, using natural light)

VIDEO LINK 1: [LED SEQUENTIAL CONTROL- BEGINNER PROJECT](#)

## QUEST 2: MINI WIND ENERGY DEMONSTRATION TURBINE

### Materials Needed:

- Cardboard / recycled plastic bottles
- Thin wooden dowels or pencils × 4
- Small DC motor (5V BO motor from kit)
- LED (any colour)
- Tape, scissors, ruler



## PART 1: UNDERSTANDING THE CONCEPT

### Wind turbines work by:

- Wind pushing blades → blades rotate
- Rotation spins a motor/generator
- Generator converts motion into electricity

In this activity, the BO motor acts as a generator.

## PART 2: BUILD THE TURBINE

### Components Needed

- Cardboard OR plastic bottle
- 1 small DC motor (BO motor)
- 1 LED
- 4 wooden sticks/pencils/dowels
- Tape or glue
- Scissors
- Wires

### Step 1: Make the Blades

- Cut 4 equal rectangular pieces (~8 cm × 3 cm)
- Slightly curve each blade (for better airflow)

### Step 2: Create the Hub

- Use a small circular cardboard piece or bottle cap as the center hub
- Make a small hole in the center to fit onto the motor shaft

### Step 3: Attach Blades

- Fix all 4 blades onto the hub
- Tilt each blade at about 45° angle
- **Ensure:**
  - All blades face the same direction
  - Spacing is equal

### Step 4: Connect to Motor

- Fix the hub onto the motor shaft tightly
- Ensure it rotates smoothly when spun

## PART 3: ELECTRICAL SETUP

### Step 5: Connect LED

- Attach two wires to the motor terminals
- Connect the wires to the LED legs:
  - One wire → longer leg (+)
  - One wire → shorter leg (-)

**(If LED doesn't glow, reverse the connections)**

## PART 4: TESTING THE TURBINE

### Step 6: Generate Wind

- Blow air using:
  - Your mouth
  - A small fan
  - Fast hand movement

### Step 7: Observe

- Do the blades spin?
- Does the LED glow?
- How fast does it need to spin?

## PART 5: EXPERIMENT & IMPROVE

### Step 8: Change Blade Angles

Try different angles:

- 30°
- 45°
- 60°

### Step 9: Compare Results

For each angle, observe:

- Speed of rotation
- Brightness of LED

## PART 6: REFLECTION

### Step 10: Think & Record

- Which blade angle produced the brightest light?
- Why did that angle work better?
- What happens if:
  - You increase blade size?
  - You increase wind speed?

VIDEO LINK 1: [HOW DO WIND TURBINES WORK?](#)

VIDEO LINK 2: [HOW TO MAKE A WIND TURBINE?](#)

## DESIGN THINKING MISSION: EMPATHISE

### THE CHALLENGE:

Your monthly mission: Identify and deeply understand a real sustainability problem in your school or local community.

This is not about solving the problem yet. This is about seeing what others ignore, observing patterns, and understanding people affected by the issue.

You must experience the problem in real life – through observation, interaction, and documentation.



### WHAT TO SUBMIT:

#### Observation Log:

Document at least 5 real observations of the problem (different times, locations, or situations)

### Photo Evidence:

Upload 4–6 photos showing the problem in real-world context (no internet images)

### User Interactions:

Document at least 5 real observations of the problem (different times, locations, or situations)

- What they experience?
- How it affects them?
- What they currently do about it

### Problem Description (Initial):

Describe the problem in your own words:

- What is happening?
- Where does it occur?
- When does it occur most?

### Reflection Note:

- Why do you think this problem matters?
- What surprised you during your observations?

Step	What to Do	How to Do it	Output
1	Select a Problem Area	Walk around school/home/community and list 2-3 sustainability issues (energy waste, water leakage, etc.)	Final chosen problem
2	Plan Observation	Decide: where (locations), when (time of day), and how many observations (min 5)	Observation plan
3	Conduct Observations	Visit locations at different times; quietly observe what is happening (no assumptions)	Raw notes

Step	What to Do	How to Do it	Output
4	Record Observations	Write each observation clearly: what happened, where, when, who involved	Observation log (5 entries)
5	Capture Photo Evidence	Take 4-6 real photos showing the issue (wide + close shots)	Photo set
6	Identify Users	Think: who is affected by this problem? (students, staff, workers, etc.)	User list
7	Conduct Interviews	Ask 2 users simple questions: What happens? How does it affect you? What do you do?	Interview notes
8	Identify Patterns	Look at all observations → what is repeating? When is problem worst?	2-3 insights
9	Write Problem Description	Answer: What, Where, When, Who affected	Problem summary
10	Reflection	Write: Why this matters? What surprised you?	Reflection note

### Judging Criteria:

- **Clarity of Observation (25%)** – Are the observations specific, detailed, and real?
- **Evidence Quality (25%)** – Are photos and interactions authentic and relevant?
- **User Understanding (20%)** – Does the team show empathy and understanding of affected people?
- **Pattern Recognition (15%)** – Are meaningful insights drawn from observations?
- **Team Collaboration (15%)** – Are roles clearly defined and contributions balanced?

