Title: Biogas Generation Using IoT Waste Segregation System

1. Introduction

This report explains in a simple way how wet waste separated by our IoT model can be used to generate biogas. The goal is to show how waste can be turned into useful energy using a quick, low-cost, and easy-to-build setup.

2. What Our IoT Model Does

Our model first separates waste into:

- Wet Waste: Food waste, fruit peels, vegetable scraps.

- Dry Waste: Plastic, paper, metal, glass, etc.

The IoT system uses:

- Moisture sensor to detect wet waste.

- IR sensor and ultrasonic sensor for sorting.

- Microcontroller (ESP32 or NodeMCU).

3. Simple and Clear Workflow Diagram (Wet Waste to Biogas)

STEP 1: Waste Collection

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STEP 2: IoT Segregation (Wet waste separated)

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STEP 3: Wet waste stored in a container

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STEP 4: Wet waste + water → Slurry preparation

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STEP 5: Slurry poured into airtight digester

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STEP 6: Anaerobic digestion (bacteria break down waste)

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STEP 7: Biogas is produced

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STEP 8: Gas is collected in a balloon/bag

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STEP 9: Bio-slurry comes out and is used as fertilizer

This simple flow helps students understand the step-by-step movement of the waste until it becomes biogas.

4. How Anaerobic Digestion Works

Inside the airtight tank:

- Bacteria eat the slurry.

- No oxygen is present.

- They release gas (mainly methane).

- This gas is called biogas.

5. IoT Monitoring Block Diagram

Sensors → ESP32/NodeMCU → Mobile Monitoring

Where:

- Sensors measure temperature, gas pressure, and slurry level.

- ESP32 sends data.

- displays data live on mobile/desktop.

6. How to Build the Biogas Model

1. Take an airtight plastic drum (20–30 L).

2. Make two holes: one for slurry input, one for gas output.

3. Attach a pipe from gas outlet to a balloon.

4. Prepare slurry by mixing wet waste with water.

5. Pour slurry inside the drum.

6. Keep drum in sunlight for warmth.

7. Balloon starts inflating in 1–2 days.

7. Output of the System

We get two outputs:

- Biogas: can be used for a small flame demonstration.

- Bio-slurry: a natural plant fertilizer.

8. Conclusion

This system is easy to understand, quick to build, and clearly shows how segregated wet waste can be turned into useful energy. It is ideal for student projects, exhibitions, and practical demonstrations.