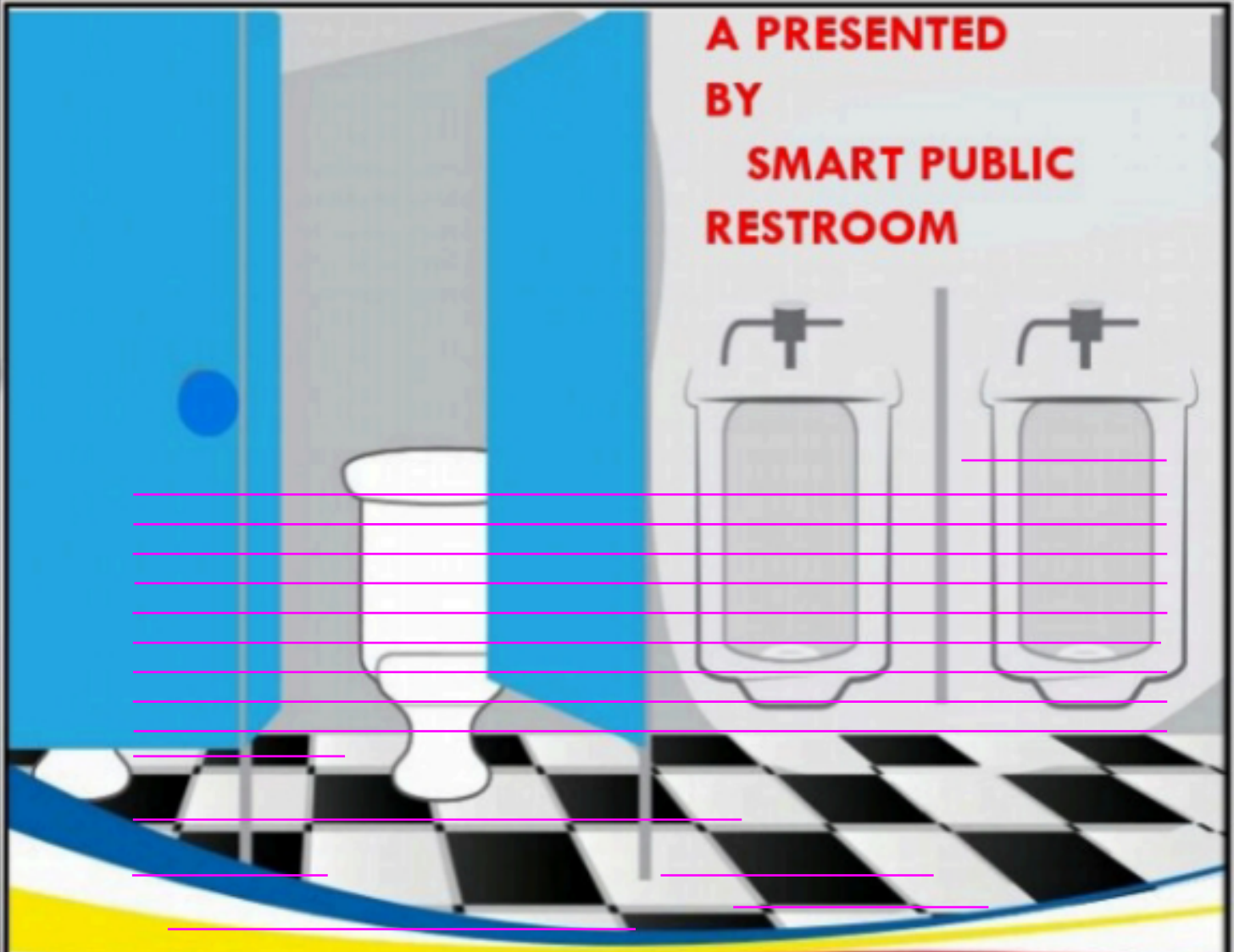
A PRESENTED BY SMART PUBLIC RESTROOM



PRESENTED BY:

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JOTHIKA M
VAIDHEGI S
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unit also sends a MQTT message about it usage data to the server part.

In server part, it receives the usage data from AFP unit. The usage data will be stored into a database for a future use.

A. D. Kadge, A. K. Varute, P. G. Patil, P. R. Belukhi(2016) has proposed "Automatic Sewage Disposal System for Train", Indian railways have 114,500 km of total track over a route of 65000 km and 7500 stations. While travelling by the train everyone expect healthy and hygienic surrounding. Feel uncomfortable due to the waste on the platform and the allied foul smell.[2]

Creates bad impression on foreign tourist .sanitation problem cause due to system in which train toilets dispose human waste openly on to tracks. In this system, they are using two mechanisms. They are sewage disposal mechanisms and track changing mechanisms.

In the sewage disposal mechanisms, the ultrasonic sensor and position sensor is used. The ultrasonic sensor can detects the depth of the sewage tank and the position sensor detects the proper place to dispose the sewage. After the proper detection of particular place, the solenoid valve on. Then the sewage disposal is done.

PandyaChintan, YadavJatin, KareliyaSanket 2015 has proposed "Automatic working bio-toilet tank for railway coaches", Bio toilet tank is human waste disposal mechanism in area with no infrastructure facilities. That is easy to operate alternative to the tradition waste disposal system. In that project are two doors in tank, the one input door and second exit door.[3]

The input door is on top of the tank and exit door is assembling inside the tank. The doors are open and close by using pneumatic cylinder. RPM controller is used to measure the speed of the train and transfer those details to proximity sensor, which can sends control over the train, Pneumatic cylinder is control by using RPM controller, Proximity sensor, and Compressed air tank. So, whole system is controlled with train speed. If the train speeds exceed 30 km/h then exit door will open and total waste depositor drop in tracks and input door is close. Input door is open when train is under 30 km/h speed.

ImanMorsia, Mohamed Mansour, Mohamed Mostafa 2013 has proposed "Wireless Gas Detector System Using Microcontrollers, PLC and SCADA System for Monitoring Environmental Pollution", Gas identification represents a big challenge for improving detection and pattern recognition of each gas by using inexpensive gas sensor. This paper presents a gas detector system which is built to monitor, and measure gas pollutant emissions in the air and also used to detect different gases. The pollutants are ethane (C2H6) and methane (CH4) which are located beside the fertilizer factories in Alexandria Egypt and some other gases as hydrogen (H2), propane (C3H8) and iso-butane (C4H10).The gas sensors [4].

The system is controlled and monitored by using programmable logic controller PLC Step 7-200 from Siemens and Supervisory Control and Data Acquisition SCADA systems respectively. The principal component analysis PCA method is applied for clustering and distinguishing among different gases. Thomas Schlebusch, Steffen Leonhardt 2011 has proposed "Intelligent Toilet System for Health Screening", Home monitoring is a promising technology to deal with the increasing amount of chronically ill patients while ensuring quality of medical care. [5]

Most systems available today depend on a high degree of interaction between the user and the device. Especially for people relying on advanced levels of care, this scheme is impracticable. In this paper we are presenting an "intelligent toilet" performing an extensive health check while being as simple to use as a conventional toilet. Main focus of the system is to support the treatment of diabetes and chronic heart failure, but additional applications are possible.

Here the sensors like PT1000 sensor, Pressure sensor, and RFID reader are used here. PT1000 sensor used to measure the thigh temperature. Pressure sensor is used measure the pressure of the base portion of the toilet. Using RFID reader is used to sense the particular person result. It needs designing of the base portion of the toilet. It can sense all test results of patients through the toilet usage.

1.3 EXISTING SYSTEM

In an existing system, they concentrate more on organizing sewages from the railway system. They are trying to taking all the medical tests through the usage of toilets. They are concentrated on reducing water wastage on toilets, by the implementation of automatic flusher.[14]

Disadvantages:

They are not focussed on providing clean and hygienic toilets.

The medical test can have chance to produce fault results.

2.WORKING PRINCIPLE

- In the first phase, IR sensor is used to discover the dirt present in the toilet.
- Here the set of sample images are given as input.
- After using the toilet, the sensor senses the basin of the toilet.
- Then it relates the sensed image with the input image.
- If the dirt present, it increases the alarm.
- Then the user wants to be clean the waste. Through this activity, people can get the awareness about the toilet management.
- In the second phase, Figaro sensor is used to perceive the unwanted gases present in the toilet.
- In the Figaro sensor, a particular range is to be stableearlier manner. If the range gets extended, it can send the alert message to the sweeper. Then they cleaned it by using proper fragrant.
- In the third phase, RFID reader (Radio Frequency Identification) is used to observe the sweeper's activities (absence and presence in the toilet cleaning).
- Initially, the sweeper wants to show his/her individuality tag in front of RFID reader. It can be shown before and after cleaning the toilet.
- Then the first phase gets initiated and senses for the dirt presence in the toilet.
- If the dirt gets noticed, it raises the alarm.
- Through this monitoring activity, the sweeper can realize their roles and responsibilities. Then they protect the people by disposing all the unwanted materials (dirt, unwanted gases) present in the toilet.
- In the final phase, the sonic sensor is used to detect the depth of the septic tank.
- Here, the range of septic tank is fixed prior manner.
- If the sewage reached with the range, then it directs message to an organization.
- All the message transfer can be done by the GSM (Global System for Communication).

2.1 ARCHITECTURE OF THE PROPOSED SYSTEM

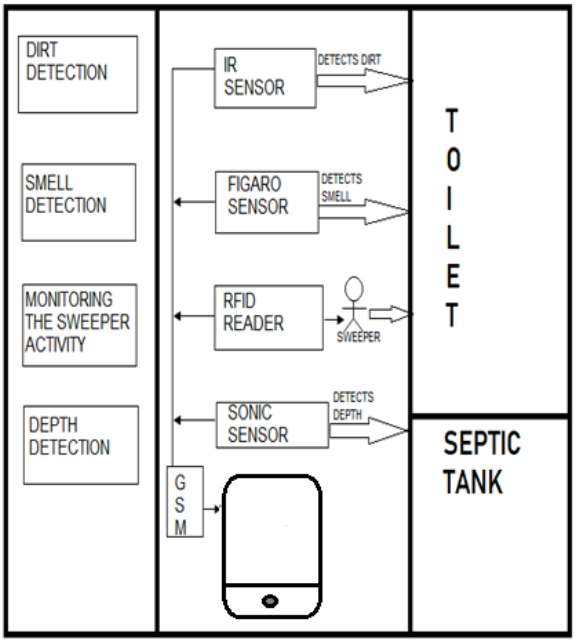

Figure 1: Architecture of the proposed system

2.2DESCRIPTION OF ARCHITECTURE

HARDWARE REQUIREMENTS:

- Microcontroller
- Power supply
- LCD display
- Buzzer
- Infrared sensor
- Sonicsensor
- Gassensor
- RFID
- GSMmodem

SOFTWARE REQUIREMENTS

- Embedded C

2.2.1 MICROCONTROLLER

A microcontroller is a small computer on a single combined circuit holding a processor core, memory and programmable input/output peripherals. Program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general-purpose applications.

Figure 2: Microcontroller

PIC 16F877 is one of the most advanced microcontroller from Microchip. This controller is commonly used for experimental and modern applications because of its low price, wide range of requests, high quality, and ease of obtainability. It is ideal for applications such as machine control applications, measurement devices, study purpose, and so on. The PIC 16F877 features all the mechanisms which present microcontrollers usually have.

2.2.2 LCD

LCD stands for Liquid Crystal Display. By using the LCD, all the outputs are displayed. LCD doesn't know about the content (data or commands) supplied to its data bus. It is the user who has to specify whether the content at its data pins are data or commands.

Figure 3: LCD Display

For this, if a command is inputted then a certainarrangement of 0s and 1s has to be applied to the Control lines so as to specify it is a command on the other hand if a data is inputted at the data lines thenan another combination of 0s and 1s has to be applied to the control lines to require it is Data.

2.2.3 BUZZER

Buzzer is also called as Beeper. It is a sound signalling mechanical device.

Figure 4: Buzzer

2.2.4 INFRARED SENSOR

The IR sensor is used to detect the dirt present in the toilet. Here we nourish the image models into the sensor. It can perceive the dirt by comparing the images we feed into it, after using the toilet. If it can detect the dirt, it raises the alarm, and the users may get embraced and they clean it. This system can create the responsiveness among the people.

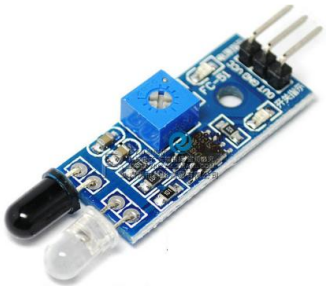

Figure 5: IR sensor

2.2.5 SMELL SENSOR

The Smell Sensor is used to detect the unwanted smell and gases in the toilet. For this purpose, we are going to use the sensor called **Figaro** sensor.

Figure 6: Smell Sensor

It cansintellect the dry gases present in the toilets such as NH_3, CO_2, CH_4, H_2S, etc. By taking those gases leads to Nausea, Drowsiness, instant loss of awareness, etc. After sensing the unwanted gases, it can blink the red light. Then the sweeper can clean it by using particular Cleaning Agents.

2.2.6 RFID READER

The RFID stands for Radio Frequency Identification. It can be used for monitoring the Sweeper. The Organization wishes to provide the identity tag for the Sweeper. The Sweeper desires to

show the tag before the cleaning process is going to start and after it is finished.

Figure 7: RFID Reader

Then the CR4 sensor can spot the presence of dirt. If it is present, it can blink the red light. If it is clean, it can blink the blue light. It assistances to understand the responsibilities of sweeper by his/her own. If Sweeper is not clean the toilets for period of time, his/her absence in cleaning the toilet also reported to the dependable organization. These all the details are stored in the database.

2.2.7 SONIC SENSOR

The Sonic Sensor is used for computing the depth. Here it is used to measure the depth of the septic tank. The Sonic Sensor is fixed into the Septic tank. Then the Septic tank get filled means, it can sends the communications to particular organization. Then they will allot persons to clean the septic tank. Then septic tank cleaners will clean the tank. After cleaning it, the sensor can detect the level, and send messages to consistent organization.

Figure 8: Sonic sensor

This ultrasonic sensor can be used for measuring distance, object sensor, motion sensors etc. High sensitive module can be used with microcontroller to integrate with motion circuits to measure the distance, position & motion sensitive products.

In a nutshell, water depth sensing is using a sensor to measure the depth of water in a tank or container. Although various sensors can be used for this application, we will talk about ultrasonic sensor application.

With ultrasonic sensors, we can find the water depth calculation by finding the distance between the transceiver and the surface of the water. The sensor will transmit a short ultrasonic pulse, and we can measure the travel time of that pulse to the liquid and back. We can then subtract that distance from the total depth of the tank to determine the water depth.

2.3BLOCK DIAGRAM:

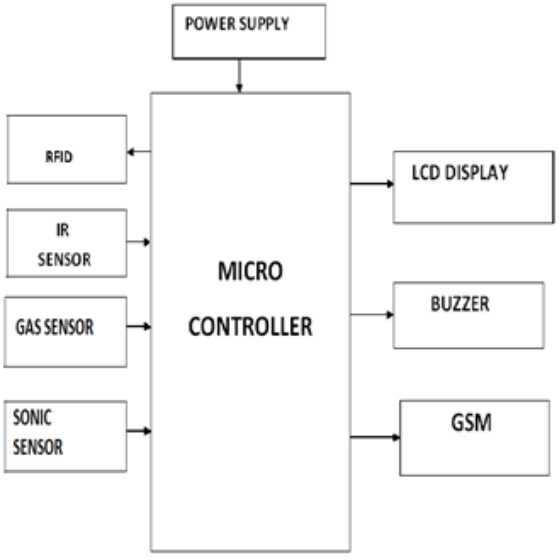

Figure 9: Block diagram of the proposed system

2.3.1GSM

GSM stands for Global System for Mobile communication. It establishes the mobile communication from one place to another place.

Figure 10: GSM Module

It transfers the information from main circuit to operator. It uses Time Division Multiple Access (TDMA).

GSM is mainly used for communicating and transferring message from one person to concerned organisation. GSM module is used to establish communication between a computer and a GSM and GPRS system.

Here we are using GSM LT-2 communication module makes it possible to use GSM paths to provide monitoring and messaging functions in alarm systems. It facilitates cooperation with SATEL and third party control panel diallers or correctly configured outputs.

He GSM LT-2 module makes it possible to implement monitoring as well as text and voice messaging functions. The caller ID retransmission function creates it likely to present the incoming callers number on telecommunication stationsarmed with this functionality.

GSM alarm system built-in GSM communication module inside, work as a mobile handset. After purchased the GSM alarm system, people need to acquisition the SIM card, and select the mobile service package. GSM alarm system can program several phone numbers for alarm receiving. When any abnormal event happens, the system will response, then inform the owner via voice call and short message (SMS).

GSM will check the messaging activities for sweepers and also need to check with their cleanliness duty for their work. The sweepers need to check with particular activity of its work by their sensors.

3.1 WORKING MODEL

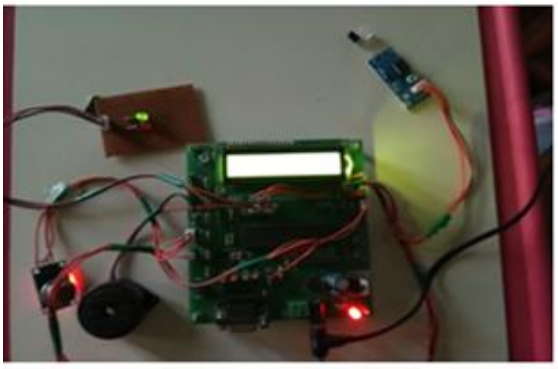

Figure 11: working model

This is the module of the proposed system. Here the sensors are connected with the microcontroller.

3.1.1 DIRT DETECTION

It shows the dirt detection in the toilets.

Figure 12: Output module, while detecting the dirt

3.1.2 SMELL AND DEPTH DETECTION

It shows the smell detection and depth detection.

Figure 13: Output module, while detecting the Gas and the distance.

3.1.3 MONITORING SWEEPER ACTIVITIES

It shows the sweeper activities.

Figure 14: Indicates the sweeper presence

ADVANTAGES

- It can creates an awareness among the people about the proper toilet management
- It can prevents the many contagious diseases like malaria, typhoid, cholera, streptococcus, asthma, etc..
- It can promotes the “Swachhbharat” scheme

4.CONCLUSION

Our proposed project will create awareness among the people about the proper sanitation. It makes use of Internet of things, which is a rapidly growing technology. Our proposed system will make everyone to strictly follow the cleanliness and proper sanitation in the toilets. It prevents the many new contagious diseases that spread due to improper sanitation of the toilets. Thus by using technologies in the smarter way, we can maintain the cleanliness which is next to the godliness. Keep Clean, Be Safe.

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Source Code (Python):

```python
import RPi.GPIO as GPIO
import time

# Set GPIO pin numbers
LED_PIN = 18
SENSOR_PIN = 23

# Set GPIO mode
GPIO.setmode(GPIO.BCM)
```

```
# Setup sensor pin as input
GPIO.setup(SENSOR_PIN, GPIO.IN)

# Function to turn on the LED
def turn_on_led():
GPIO.output(LED_PIN, GPIO.HIGH)
print("LED turned on")

# Function to turn off the LED
def turn_off_led():
GPIO.output(LED_PIN, GPIO.LOW)
print("LED turned off")

# Main loop
try:
while True:
# Check if the sensor is triggered
if GPIO.input(SENSOR_PIN):
turn_on_led()
time.sleep(5) # LED remains on for 5 seconds
turn_off_led()
else:
turn_off_led()
time.sleep(0.1) # Delay to avoid CPU usage

except KeyboardInterrupt:
GPIO.cleanup()
```

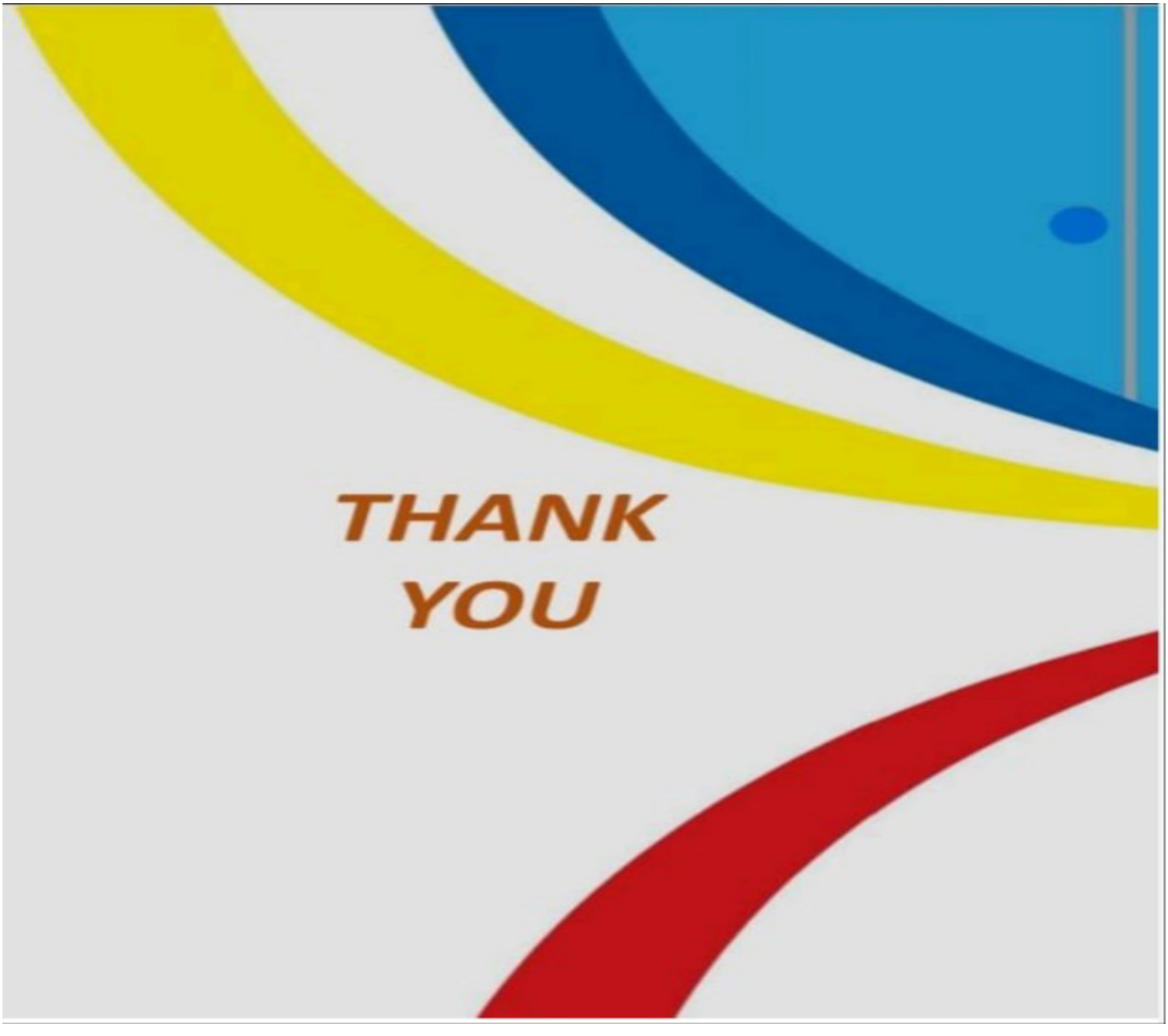
Expected Output:

```
LED turned off
LED turned on
LED turned off
LED turned on
LED turned off
...
```

usage

except KeyboardInterrupt:
GPIO.cleanup()
```

Expected Output:
```
LED turned off
LED turned on
LED turned off
LED turned on
LED turned off
...
```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