**Sensor Setup Program**

# Import necessary libraries

import RPi.GPIO as GPIO

import time

# Set the GPIO mode

GPIO.setmode(GPIO.BOARD)

# Define GPIO pins for the sensor

TRIG = 11

ECHO = 13

# Set up the GPIO pins

GPIO.setup(TRIG, GPIO.OUT)

GPIO.setup(ECHO, GPIO.IN)

# Function to measure distance

def measure\_distance():

GPIO.output(TRIG, True)

time.sleep(0.00001)

GPIO.output(TRIG, False)

start\_time = time.time()

stop\_time = time.time()

while GPIO.input(ECHO) == 0:

start\_time = time.time()

while GPIO.input(ECHO) == 1:

stop\_time = time.time()

elapsed\_time = stop\_time - start\_time

distance = (elapsed\_time \* 34300) / 2

return distance

try:

while True:

dist = measure\_distance()

print(f"Distance: {dist} cm")

time.sleep(1)

except KeyboardInterrupt:

GPIO.cleanup()

**App Code**

// Flutter code for the mobile app

// Import necessary packages

// ... (import statements)

class SmartToilet extends StatefulWidget {

@override

\_SmartToiletState createState() => \_SmartToiletState();

}

class \_SmartToiletState extends State<SmartToilet> {

String status = 'No one in front of the toilet';

Future<void> fetchToiletStatus() async {

// Make a request to your server to get the toilet status

// For example, sending a GET request to fetch the status

var response = await http.get(Uri.parse('http://

your\_server\_url/toilet/status'));

// Update the status based on the response

var data = jsonDecode(response.body);

setState(() {

status = data['presence'] ? 'Someone is in front of the toilet' : 'No one in front of the toilet';

});

}

@override

Widget build(BuildContext context) {

return Scaffold(

appBar: AppBar(

title: Text('Smart Toilet'),

),

body: Center(

child: Column(

mainAxisAlignment: MainAxisAlignment.center,

children: <Widget>[

Text(

'Toilet Status:',

style: TextStyle(fontSize: 20),

),

Text(

'$status',

style: TextStyle(fontSize: 30, fontWeight: FontWeight.bold),

),

ElevatedButton(

onPressed: fetchToiletStatus,

child: Text('Refresh'),

),

],

),

),

);

}

}

void main() {

runApp(MaterialApp(

home: SmartToilet(),

));

}

**Raspberry Pi Code**

# Import necessary libraries

import RPi.GPIO as GPIO

import time

from flask import Flask, jsonify

# Set the GPIO mode

GPIO.setmode(GPIO.BOARD)

# Define GPIO pins for the sensor

TRIG = 11

ECHO = 13

# Set up the GPIO pins

GPIO.setup(TRIG, GPIO.OUT)

GPIO.setup(ECHO, GPIO.IN)

# Initialize Flask web server

app = Flask(\_\_name\_\_)

# Function to measure distance

def measure\_distance():

GPIO.output(TRIG, True)

time.sleep(0.00001)

GPIO.output(TRIG, False)

start\_time = time.time()

stop\_time = time.time()

while GPIO.input(ECHO) == 0:

start\_time = time.time()

while GPIO.input(ECHO) == 1:

stop\_time = time.time()

elapsed\_time = stop\_time - start\_time

distance = (elapsed\_time \* 34300) / 2

return distance

# Route to get toilet status

@app.route('/toilet/status', methods=['GET'])

def get\_toilet\_status():

dist = measure\_distance()

presence = dist < 100 # Adjust the threshold as needed

status = "Someone is in front of the toilet" if presence else "No one in front of the toilet"

return jsonify({'presence': presence, 'status': status})

if \_\_name\_\_ == '\_\_main\_\_':

app.run(host='0.0.0.0', port=8080) # Run the Flask app on all available network interfaces