Chapter 1VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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Mini Project Report

on

"SMART DOOR SMS ALERT SYSTEM"

Submitted in partial fulfillment of the requirements for the
First Semester of the Bachelor of Engineering Degree, towards the completion of the

Mini Project under the **Innovation & Design Thinking Laboratory**,

Department of Basic Sciences.

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CERTIFICATE

This is to certify that the File Structures mini project entitled "Smart door guardian : Real time SMS alert security system" has been successfully carried out by Tejashree MS (P-37) and Tejaswini TM(P-38), an, bonafide students of **CMR Institute of Technology.**

The project is submitted in partial fulfillment of the requirements for the First Semester of the Bachelor of Engineering Degree, towards the completion of the Mini Project under the **Innovation & Design Thinking Laboratory, Department of Basic Sciences.**

It is further certified that all corrections and suggestions indicated during the Internal Assessment have been duly incorporated in the project report submitted to the departmental library. This File Structures mini project report has been reviewed and approved as it satisfies the academic requirements prescribed for the said degree.

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Abstract

This project presents a Smart Home Safety and Alert System designed to detect gas leakage, monitor door activity, and identify power status using Arduino-based sensors. The system uses an MQ-2 gas sensor to measure gas concentration and generates an alert when the value crosses a predefined safety threshold. A reed switch is used to detect door openings, while a relay-based sensing circuit monitors the presence of mains power. When any abnormal condition is detected-such as gas leakage, door intrusion, or power failure-the system activates a buzzer for immediate local warning and automatically sends SMS notifications to the owner through a GSM module. This ensures continuous monitoring and quick response, even when the user is away from home. The project enhances home safety by providing real-time alerts, reducing risk, and offering a simple, low-cost solution that can be implemented in households for daily protection.

Keywords:

- Gas detection
- Door monitoring
- GSM alert system
- Home safety
- Arduino
- Power failure alert

TABLE OF CONTENT

Title **Page No**

Acknowledgement ..... **i**

Abstract ..... **ii**

List of Figures ..... **iii**

Chapter 1

INTRODUCTION …… **10**

1.1 Brief History of attendance system…….. 10

1.2 Modern Biometric System…… 10

Chapter 2

ABOUT THE PROJECT …… 11

2.Problem Statement ……. 11

2.1 Description…….. 11

2.2 Challlenge Statement…….. 11

Chapter 3

DESIGN …….. **12-13**

3.1 Design Thinking Process …….. 12

3.2 Methodology ……... 12

3.3 Prototype description 12

3.3.1 Material used 13

3.3.2 System diagram

4

Chapter 4

CODE SNIPPETS AND DESCRIPTION …… **13-21**

4.1 Implementation …….. 18

Chapter 5

RESULT AND ANALYSIS ……. 22-23

5.1 Testing Procedure…… 22

5.2 Feedback collection …… 22

5.3 Observation ……. 22

5.4 Improvement based on feedback…… 23

Chapter 6

CONCLUSION …… 24

6.1 Conclusion and Future Work…… 24

REFERENCES …… 24-26

LIST OF FIGURES

Figure No.	Title	Page No.
Fig 3.3.2	System Diagram	13
Fig 7.1	Screenshot of model	27
Fig 7.2	Components picture	28

INTRODUCTION

A Smart Door SMS Alert System is a security-based system designed to monitor door activity and instantly notify the user through an SMS message. The system uses sensors to detect events such as door opening or unauthorized access and sends real-time alerts to a registered mobile number. This helps improve safety by allowing users to monitor their premises remotely, even without an internet connection. Such systems are commonly used in homes, offices, and restricted areas to enhance security and provide timely alerts.

1.1 Brief history of attendance system

Early attendance systems initially used manual registers to record entry and exit, which were slow and error-prone. With automation, electronic door sensors and GSM technology enabled automatic attendance recording and SMS alerts. This evolution led to smart door SMS alert systems that offer accurate and real-time attendance monitoring.

1.2 Modern Biometric system

Modern biometric systems in smart door SMS alert systems use fingerprint or face recognition to verify authorized users. Once authenticated, the door unlocks and an SMS alert is sent to the registered mobile number. This provides secure access control and real-time monitoring.

Chapter 2

Problem Statement

Users feel unsafe because they do not get alerts when the door opens in their absence

2.1 Description

A smart door SMS alert system is designed to detect door access and immediately notify the user through an SMS message. It uses sensors and a controller to monitor entry and exit in real time. This system enhances security and allows remote monitoring without the need for internet connectivity.

2.2 Challenge Statement

Traditional door security and attendance systems lack real-time alerts and are prone to unauthorized access. There is a need for a reliable system that can instantly notify users via SMS when door activity occurs.

Chapter 3

3.1 Design Thinking Process

a. Empathize: Understand user needs such as security, real-time alerts, and remote monitoring of door access.

b. Define: Identify the problem of unauthorized access and lack of instant notification in traditional door systems.

3. Ideate: Generate solutions using door sensors, microcontrollers, and GSM modules for SMS alerts.

4. Prototype: Develop a working model that detects door activity and sends SMS notifications.

5. Test: Evaluate the system for accuracy, response time, and reliability, and improve based on feedback.

3.2 Methodology

The smart door SMS alert system monitors door activity using sensors connected to a microcontroller. When the door is opened or accessed, the controller processes the signal and triggers a GSM module. An SMS alert is then sent instantly to the registered mobile number for real-time notification.

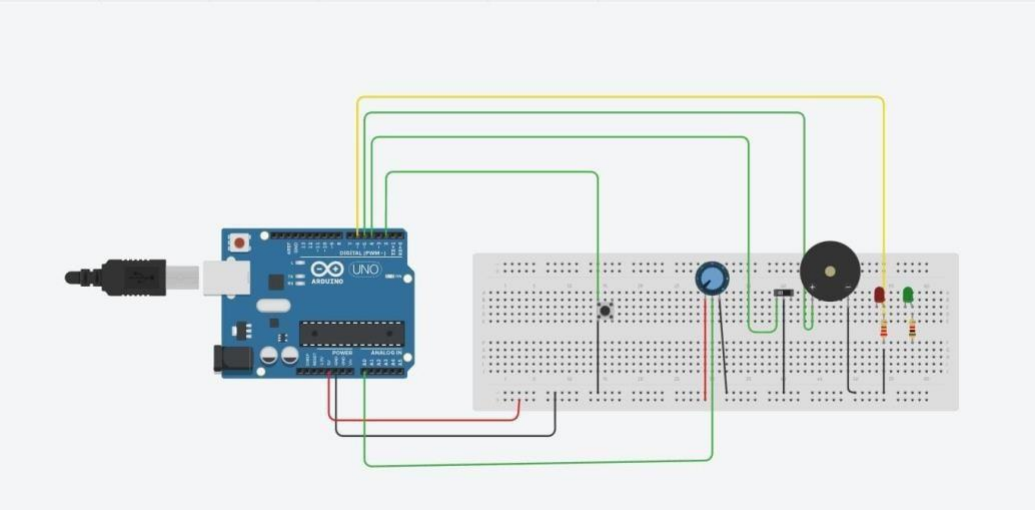
3.2 Prototype Description

The prototype of the smart door SMS alert system consists of a door sensor connected to a microcontroller and a GSM module. When the door is opened or closed, the sensor detects the change and sends a signal to the controller. The controller processes this information and triggers the GSM module to send an SMS alert to the registered mobile number, demonstrating real-time door monitoring and notification.

3.3.1 Materials Used

1. Microcontroller (e.g., Arduino)
2. Door sensor (Reed switch or magnetic sensor)
3. GSM module (e.g., SIM800L)
4. SIM card
5. Power supply (Battery or adapter)
6. Connecting wires and breadboard/PCB
7. Enclosure or casing for housing components
8. Optional: Buzzer or LED for local indication

3.3.2 System Diagram



Chapter 4

Implementation

```
#include <SoftwareSerial.h>
// SIM900A Serial Pins
SoftwareSerial sim(10, 11);  // 10 = RX, 11 = TX
// Phone Number
const char OWNER_NUMBER[] = "+919380758395";

// Pin Definitions
const int PIN_REED     = 2;
const int PIN_MQ2      = A0;
```

```
const int PIN_RELAY_NC = 4;
```

```
const int PIN_BUZZER  = 5;
const int PIN_LED     = 6;

// Threshold
int MQ2_THRESHOLD = 400;
int MQ2_EMERGENCY = 70;

// Timers
unsigned long lastDoorSMS  = 0;
unsigned long lastSmokeSMS = 0;
unsigned long lastPowerSMS = 0;
unsigned long SMS_GAP      = 60000;

bool gsmConnected = false;

// ------------------------------------------------

void setup() {
  Serial.begin(115200);
  sim.begin(9600);

  pinMode(PIN_REED, INPUT_PULLUP);
  pinMode(PIN_RELAY_NC, INPUT_PULLUP);
  pinMode(PIN_BUZZER, OUTPUT);
  pinMode(PIN_LED, OUTPUT);

  digitalWrite(PIN_BUZZER, LOW);
  digitalWrite(PIN_LED, LOW);

  Serial.println("Booting System...");
  delay(1000);

  gsmConnected = initializeSIM();

  if (!gsmConnected)
    Serial.println("GSM NOT REACHABLE — Normal mode");
  else
    Serial.println("GSM CONNECTED — SMS enabled");

  Serial.println("System Ready!");
}


//
  ------------------------------------------------
void loop() {

  unsigned long now = millis();
  int mq = analogRead(PIN_MQ2);
  // ----------- GAS SENSOR BUZZER ALERT (mq > 70) --------------
if (mq > 70) {
```

```
digitalWrite(PIN_BUZZER, HIGH);   // Buzzer ON
```

```
} else {
  digitalWrite(PIN_BUZZER, LOW);    // Buzzer OFF
}


  bool doorOpen = digitalRead(PIN_REED);
  bool powerPresent = (digitalRead(PIN_RELAY_NC) == LOW);

  Serial.print("Gas: ");
  Serial.print(mq);
  Serial.print(" | Door: ");
  Serial.print(doorOpen ? "OPEN" : "CLOSED");
  Serial.print(" | Power: ");
  Serial.println(powerPresent ? "ON" : "OFF");

  // Smoke
  // ---------------- GAS / SMOKE ALERTS ----------------
if (mq >= MQ2_THRESHOLD && mq < MQ2_EMERGENCY) {
    // Normal gas detection
    Serial.println("⚠ GAS DETECTED!");

    if (now - lastSmokeSMS > SMS_GAP) {
      lastSmokeSMS = now;
      if (gsmConnected) sendSMS("Warning: Gas detected in the house!");
    }

}


// EMERGENCY LEVEL
if (mq >= MQ2_EMERGENCY) {
    Serial.println("🚨 EMERGENCY GAS LEVEL!");

    // Fast buzzer warning
    for (int i = 0; i < 10; i++) {
       digitalWrite(PIN_BUZZER, HIGH);
       delay(100);
       digitalWrite(PIN_BUZZER, LOW);
       delay(100);
    }


    if (now - lastSmokeSMS > SMS_GAP) {
      lastSmokeSMS = now;
      if (gsmConnected)
         sendSMS("🔥EMERGENCY! Gas level above 70! Immediate attention needed!");
    }

}
```

```
// Door
static bool lastDoorState = false;
if (doorOpen != lastDoorState) {
lastDoorState = doorOpen;
```

```
    if (doorOpen == HIGH && now - lastDoorSMS > SMS_GAP) {
      lastDoorSMS = now;
      triggerAlarm(4);

      if (gsmConnected)
        sendSMS("Door opened!");
    }

  }


  // Power
// ---------------- POWER ALERT + LED INDICATION ----------------
static bool lastPowerState = true;

// LED always follows power state
if (powerPresent) {
  digitalWrite(PIN_LED, HIGH);   // power ON → LED ON
} else {
  digitalWrite(PIN_LED, LOW);    // power OFF → LED OFF
}

if (powerPresent != lastPowerState) {
  lastPowerState = powerPresent;

  if (!powerPresent) {  // power OFF
    Serial.println("⚠ POWER FAILURE!");
    if (now - lastPowerSMS > SMS_GAP) {
    lastPowerSMS = now;
      triggerAlarm(4);
      if (gsmConnected) sendSMS("POWER FAILURE: Running on battery.");
    }

  }
  else {  // power ON
    Serial.println("✅ POWER RESTORED");
    if (now - lastPowerSMS > SMS_GAP) {
    lastPowerSMS = now;
      if (gsmConnected) sendSMS("Power restored at home.");
    }

  }
}



  delay(250);
}
```

```
//
  ------------------------------------------
bool initializeSIM() {
  unsigned long start = millis();
  Serial.println("Connecting to GSM...");
```

```
  while (millis() - start < 15000) {
    sim.println("AT");
    delay(500);

    if (sim.find("OK")) {
      sim.println("AT+CMGF=1");
      delay(500);
      return true;
    }
  }

  return false;
}

//
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
void sendSMS(String msg) {
  sim.println("AT+CMGF=1");
  delay(300);
  sim.print("AT+CMGS=\"");
  sim.print(OWNER_NUMBER);
  sim.println("\"");
  delay(300);
  sim.println(msg);
  delay(300);
  sim.write(26);
  delay(2000);
}

// - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
void triggerAlarm(int times) {
  for (int i = 0; i < times; i++) {
    digitalWrite(PIN_BUZZER, HIGH);
    digitalWrite(PIN_LED, HIGH);
    delay(300);
    digitalWrite(PIN_BUZZER, LOW);
    digitalWrite(PIN_LED, LOW);
    delay(150);
  }
}
```

Chapter 5

Results and Analysis

User Testing & Feedback:

Testing Procedure:

1. Users operate the door normally (open/close).
2. Verify if the system detects the door event accurately.
3. Check whether the SMS alert is sent promptly to the registered mobile number.

Feedback Collection:

1. Users assess response time of alerts.
2. Evaluate ease of installation and usage.
3. Check reliability and accuracy of detection.
4. Suggestions for additional features like multiple users or app integration.

Observations:

1. System successfully sends instant SMS alerts.
2. Users find it convenient for remote monitoring.
3. Minor delays in SMS delivery may occur depending on network strength.

Improvements Based on Feedback:

1. Integrate app notifications along with SMS.
2. Support multiple phone numbers for alerts.
3. Enhance sensor sensitivity and reduce false triggers.

Chapter 6

Conclusion & Future Work

Conclusion:

The Smart Door SMS Alert System provides a reliable and real-time solution for monitoring door access. By combining sensors, a microcontroller, and a GSM module, it ensures instant notifications, enhancing security and convenience for users. The system is simple, effective, and suitable for homes, offices, and restricted areas.

Future Work:

Integrate mobile app notifications along with SMS alerts.
Add support for multiple users and multiple doors.
Incorporate advanced biometric authentication like face or fingerprint recognition.
Enable cloud-based monitoring and data logging for analysis.
Include additional security features such as alarms or remote locking mechanisms.

References

Research Papers

1. Leekongxue, S., Li, L., & Page, T. (2020) – Smart Door Monitoring and Locking System using SIM900 GSM Shield and Arduino UNO, IJERT, 09(04).

2. Effa, T. D., Ding, X., & Tirunh, E. M. (2013) – SMS Supported Password Door Security

Control System, IJERT, 02(04).

3. Faroqi, A., et al. (2018) – Automatic Door Control System Using SMS Gateway Based on Arduino Uno and Ultrasonic Sensor, IJET, 7(3.4).

Text books

1. Internet of Things & Its Applications (PDF) – free lecture notes with textbook references (includes IoT tech like GSM/embedded systems).

- Download: Internet of Things & Its Applications (PDF) – IoT fundamentals & GSM/embedded systems concepts

2. Internet of Things – Architecture & Design Principles (Rajkamal) (PDF) – textbook covering IoT system design principles useful for smart home/security applications (including SMS/GSM nodes).

- Download: Internet of Things – Architecture and Design Principles (PDF)

3. Embedded Systems & IoT – Complete Notes (PDF) – embedded systems fundamentals (microcontrollers like Arduino that you'd use in a GSM-SMS door system).

- Download: Embedded Systems And Internet of Things Notes (PDF)

Online articles

- ResearchGatehttps://www.researchgate.netA Smart Door Security-Based Home Automation System: An Internet of Things

- ResearchGatehttps://www.researchgate.net(PDF) IoT based smart security and home automation system

LIST OF FIGURES

Fig 7.1 Screenshot of model

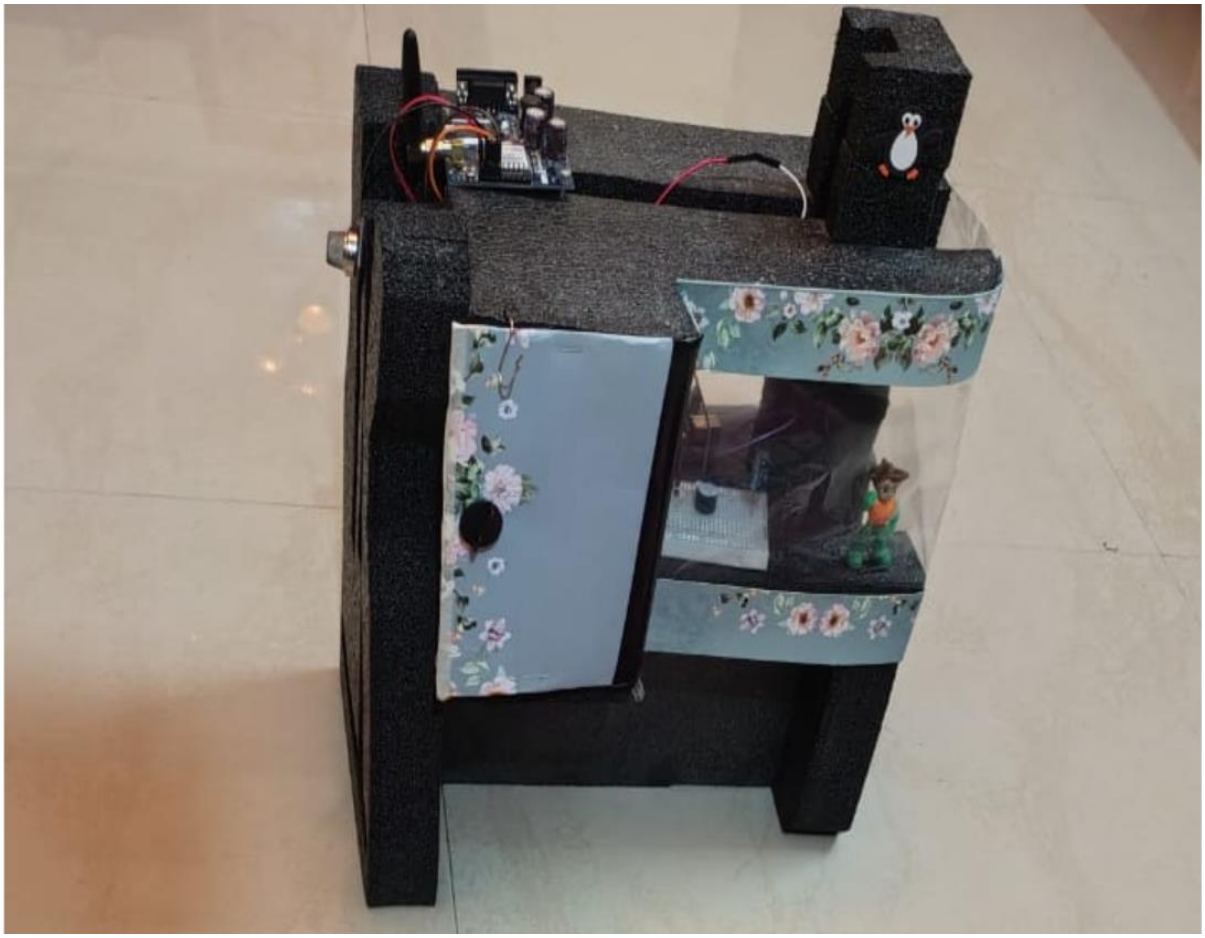


Fig 7.2 components picture