Remote Control of Agricultural Irrigation Motors Using GSM and Arduino

Submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering with Specialization in Cyber Security for the course Design Thinking and Innovation- SCSBDPROJ
by

Aade Hruthik Chandra (Reg. No 43614001)

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY (DEEMED TO BE UNIVERSITY)
CATEGORY - 1 UNIVERSITY BY UGC
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SCHOOL OF COMPUTING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

APRIL - 2025

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BONAFIDE CERTIFICATE

This is to certify that Design Thinking and Innovation- SCSBDPROJ is the bonafide work of **Aade Hruthik Chandra (REG.NO: 43614001), Gandham Sai Teja (REG.NO: 43614015), Kallu Harsha Vardhan (REG.NO: 43614024), Kondakrindi Anudeep Reddy (REG.NO: 43614029), Kuruba Shivakeshava (REG.NO: 43614031) and Pachipala Jayendra Koushik (REG.NO: 43614041),** who carried out the Design Product entitled **"Remote Control of Agricultural Irrigation Motors Using GSM and Arduino**" as a team under my supervision from January 2025 to April 2025.

Design Supervisor

Dr. K. VEENA, M.E., Ph.D.

Head of the Department

Dr. A. MARY POSONIA, M.E., Ph.D.,

Submitted for Design Thinking and Innovation Examination held on__

Internal Examiner **External Examiner**

DECLARATION

I **Aade Hruthik Chandra (REG.NO: 43614001),** hereby declare that the Design Product Report entitled **"Remote Control of Agricultural Irrigation Motors Using GSM and Arduino"** done by me under the guidance of **Dr. K. VEENA, M.E., Ph.D. Associate Professor** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering with Specialization in Cyber Security**.

DATE:

PLACE: Chennai **SIGNATURE OF THE CANDIDATE**

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ABSTRACT

Efficient irrigation is a cornerstone of modern agriculture, directly influencing crop productivity and water conservation. Traditional irrigation systems often rely on manual control, requiring farmers to travel to fields frequently to operate irrigation motors. This process is not only time-consuming and labor-intensive but also leads to inefficient water usage, particularly in geographically dispersed farms. To address these challenges, this project proposes a GSM-based remote irrigation motor control system utilizing Arduino microcontrollers. The system enables farmers to control irrigation motors through simple SMS commands, eliminating the need for physical presence in the field. Key components include an Arduino board, GSM module (SIM800L/SIM900), relay driver, and the irrigation pump. When an SMS is received, the system decodes the message and activates or deactivates the motor, accordingly, also sending back a confirmation message with real-time status updates.

This solution is cost-effective, energy-efficient, and easy to use, making it especially beneficial for small- and medium-scale farmers who may not have access to advanced agricultural technologies. Since the system relies on GSM communication, it doesn't require internet connectivity, making it suitable for remote and rural areas. Its compact, modular design allows for quick installation and minimal maintenance, while the SMS-based interface is user-friendly even for individuals with limited technical knowledge. The system reduces manual labor, enhances water management, and lowers operational costs, promoting sustainable agriculture. Additionally, the system's adaptability allows for future integration with smart agricultural technologies like soil moisture sensors, weather data, and automated scheduling, paving the way for fully automated and intelligent irrigation systems that can evolve with growing agricultural needs.

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CHAPTER 1

INTRODUCTION TO DESIGN THINKING

1.1 OBJECTIVE

The primary objective of this project is to design and implement a system that enables farmers to remotely control irrigation motors through GSM communication technology combined with Arduino microcontrollers. This system aims to reduce manual labor, save time, and optimize water usage, especially in areas where frequent visits to the farm for motor operation are difficult. In addition to remote access, the system offers flexibility in scheduling irrigation times and allows users to adapt quickly to changing environmental conditions, promoting sustainable water management in agriculture.

1.2 ORIGIN

The origin of this project lies in addressing the challenges faced by farmers in rural and semi-urban areas, where operating irrigation motors manually is time-consuming and often inefficient. With the increasing penetration of mobile networks and affordable microcontrollers like Arduino, integrating GSM-based remote-control technology offers a cost-effective and reliable solution to streamline irrigation processes. This project is inspired by the need to bridge the gap between traditional farming practices and modern technological advancements, allowing even small-scale farmers to improve their productivity with minimal investment.

1.3 PURPOSE AND INNOVATION

The purpose of this project is to empower farmers with a simple yet innovative tool that allows them to control their irrigation systems remotely using their mobile phones. The innovation lies in the use of GSM modules for communication with the motor control unit, eliminating the need for physical presence and enabling real-time monitoring and management of water distribution. By providing real-time feedback and automated motor status updates, the system ensures better decision-making and reduces water wastage. This solution not only modernizes traditional farming practices but also supports environmentally conscious irrigation by aligning with smart agriculture principles.

1.4 CREATIVITY AND COLLABORATION

The development of this system involves a creative blend of hardware and software integration, bringing together GSM technology, Arduino programming, and electrical motor control. Collaboration between students, farmers, and technical mentors ensures that the system addresses REAL- world challenges, is user-friendly, and adaptable to various field conditions. Additionally, the collaborative design process enhances cross-disciplinary learning, fostering a culture of teamwork, innovation, and empathy toward agricultural communities.

CHAPTER 2

PROCESS OF DESIGN THINKING

2.1 EMPATHIZE

The first stage of the design thinking process focuses on understanding the real needs, struggles, and perspectives of the end-users — in this case, farmers. Through conversations, interviews, and field observations, it was found that most farmers face recurring issues when it comes to manually operating irrigation motors. These challenges are heightened in rural and remote areas where motor locations are often far from their residences or difficult to access, especially during adverse weather conditions or nighttime. Farmers expressed concerns about wasted water due to delays in motor shutdown, physical exhaustion from traveling repeatedly to the field, and the lack of reliable systems to match irrigation with changing environmental factors. Empathizing with these concerns shaped the foundation of the problem-solving approach for this project.

2.2 PROBLEM STATEMENT

The core problem identified through the empathizing phase is the lack of a practical and accessible solution for remote irrigation motor control in agriculture. Farmers are frequently forced to travel to their farms, sometimes covering long distances, merely to switch the motor on or off. This routine leads to wasted man-hours, increased fuel expenses for travel, and sometimes inefficient irrigation due to delayed operation or human error. Additionally, farmers face challenges adjusting irrigation schedules to sudden weather changes or power fluctuations. There is a need for a cost-effective, easy-to-use, and reliable system that enables farmers to remotely manage their irrigation motors without dependence on physical presence or constant travel, making farming more convenient and resource-efficient.

2.3 IDEATION

The ideation phase involved brainstorming possible solutions that addressed the problem in a simple yet effective manner. Multiple concepts were considered, including wireless radio control, internet-based solutions, and GSM communication-based systems. Given the wide penetration of mobile networks even in remote areas and the simplicity of SMS-based communication, the GSM module emerged as the most viable choice. Combined with an Arduino microcontroller and a relay module, this solution allows farmers to send an SMS command from any standard mobile phone, which is then processed to turn the irrigation motor ON or OFF remotely. Additionally, the system was designed to send back status confirmation messages, ensuring the farmer remains informed about the motor's status without visiting the field.

2.4 PROTOTYPE

Based on the selected idea, a functional prototype was developed comprising an Arduino Uno board, a GSM module (SIM800L/SIM900), a relay circuit, and a motor setup. The prototype was programmed to interpret specific SMS commands sent by the farmer and to operate the irrigation motor accordingly. Besides basic ON/OFF control, the prototype also provided confirmation messages to notify the user about the success or failure of the operation. Additional safety features, like protection against electrical overload and invalid input commands, were incorporated to enhance reliability. The compact design of the prototype ensures easy installation and maintenance on existing irrigation systems without requiring major modifications.

2.5 TESTING

Extensive testing of the prototype was conducted under varied conditions to ensure its efficiency, durability, and accuracy. The system was tested across different network coverage zones, at varying signal strengths, and with different mobile service providers. The testing process evaluated the system’s response time to SMS commands, the accuracy of motor activation and deactivation, as well as the reliability of status feedback sent to the user. Testing also included real-world simulations of power cuts, weak signals, and command errors to ensure the robustness of the system. The successful completion of the testing phase confirmed the solution’s effectiveness in reducing manual labor, minimizing water waste, and improving the productivity of irrigation operations in agriculture.

CHAPTER 3

EXISTING PRODUCT

3.1 FEATURES

In recent years, several remote irrigation systems have been developed and are commercially available in the market. These systems aim to enhance agricultural productivity by automating the irrigation process. Most of the existing products use advanced technologies such as Internet of Things (IoT), cloud computing, and real-time data analytics to optimize water usage and improve farming efficiency. The common features offered by these systems include:

Remote control of irrigation motors using GSM, Wi-Fi, or IoT-based applications, allowing farmers to operate the system from mobile devices, regardless of their physical location.

Real-time monitoring and alerts that notify farmers about motor status, water flow levels, and operational feedback, helping in better decision-making and timely interventions.

Scheduled irrigation settings, which enable users to automate watering cycles according to specific crop needs and climatic conditions, thereby reducing manual dependency.

Energy-efficient motor operation, with smart protection systems that prevent dry running, manage voltage fluctuations, and help extend the lifespan of equipment.

Integration of water flow meters, soil moisture sensors, and weather prediction modules, allowing smart irrigation by adjusting water levels based on real-time environmental data.

Use of multiple communication methods, such as GSM modules for areas with good mobile connectivity, Wi-Fi for tech-enabled farms, and Bluetooth for short-range operations.

Mobile app or web dashboard integration, which provides a user-friendly interface for monitoring and controlling irrigation systems, often with graphical representations and logs.

Despite these advantages, existing systems tend to be designed for commercial-scale farming and come at a significantly higher cost. These products may also involve technical complexity that limits their accessibility for farmers with minimal technical knowledge. Additionally, they often require stable internet connections, consistent power supply, or subscription-based cloud services — all of which are not always feasible in rural or remote areas.

This presents a major barrier for small and marginal farmers who need simple, affordable, and low-maintenance systems. Hence, there is a need for a solution that bridges this gap — one that is cost-effective, easy to install, simple to operate, and functional even in low-resource settings. The proposed **GSM and Arduino-based remote irrigation motor control system** fulfills this need by offering the essential features required for remote motor operation while eliminating the dependency on expensive technologies or continuous internet connectivity.

By leveraging GSM technology, which is already widespread in most rural areas, this solution ensures greater reach and usability among farmers who may not have access to advanced technological infrastructure. Its modular design allows easy customization and scaling according to the user's specific requirements, further enhancing its value and adaptability for small-scale agricultural operations.

CHAPTER 4

SOFTWARE AND HARDWARE REQUIREMENTS

In order to design and implement the **GSM-based Agricultural Motor Control System using Arduino**, a combination of both software and hardware components is required. The software components facilitate the development and uploading of the program to the microcontroller, while the hardware components enable physical interaction with the environment, including sensor data acquisition, signal transmission, and mechanical actuation.

The integration of these components ensures the system functions effectively by enabling remote control of the motor via GSM communication. Below is a detailed list of the software and hardware requirements utilized in this project.

SOFTWARE REQUIREMENTS:

1. Arduino IDE

HARDWARE REQUIREMENTS:

1. Arduino Uno R3 with Cable
2. SIM800L GPRS GSM Module with the antenna
3. LCD1602 Parallel LCD Display Yellow Backlight
4. 65pcs Flexible Breadboard Jumper Wires
5. 5V 1 Channel Without Light Coupling Relay
6. DC6-12V MINI Aquarium water Pump R385
7. Standard 12V 2A Power Supply with 5.5mm DC Plug 2 pin input plug

CHAPTER 5

STANDARD SPECIFICATIONS

The standard specifications define the essential technical and functional requirements of the hardware and software components used in the project. These specifications are crucial for ensuring that the system operates efficiently, safely, and remains compatible with the conditions typically encountered in agricultural environments. The integration of Arduino microcontrollers with GSM-based communication was chosen specifically for its cost-effectiveness, user-friendliness, and reliability, especially in rural and semi-urban areas where internet access may be limited or unavailable.

GSM MODULE:

Model: SIM800 or SIM900 GSM Module

Operating Voltage: 3.7V to 4.2V

Communication Protocol: Serial (UART)

Supported Commands: AT Command Set for sending and receiving SMS, call management, and network operations.

Network Support: Compatible with 2G GSM networks, requiring a valid SIM card for operation.

Application Purpose: Responsible for establishing wireless communication between the farmer's mobile device and the motor control unit.

RELAY MODULE:

Operating Voltage: 5V DC

Relay Type: SPDT (Single Pole Double Throw)

Load Capacity: AC 250V / 10A, DC 30V / 10A

Purpose: Acts as a switch to turn the irrigation motor ON or OFF, based on the received SMS command. It ensures electrical isolation and safe control over high-power equipment.

POWER SUPPLY:

Input: 230V AC mains supply (standard household electricity).

Output: 12V DC regulated adapter to power the Arduino board and GSM module.

Stability: The power supply must ensure steady voltage output for reliable operation of electronic components, especially during motor switching.

SOFTWARE:

Development Environment: Arduino IDE

Recommended Version: 1.8.x or later

Programming Language: Embedded C / Arduino Sketch

Role: Used to develop, upload, and debug the control code for the Arduino microcontroller, which interprets SMS commands and controls the relay and other components accordingly.

COMMUNICATION MEDIUM:

Type: GSM Network Service (SIM Card Required).

Command Transmission Method: SMS-based control using AT Commands.

Advantages: Eliminates the need for internet connectivity, ensuring the system is accessible even in remote farming regions with only basic mobile network coverage.

CHAPTER 6

PROPOSED PRODUCT

This chapter describes the functional workflow and real-time implementation of the GSM-based Agricultural Motor Control System using Arduino. The system allows farmers to control their irrigation motor remotely via SMS, reducing the need for physical intervention and improving efficiency in water management.

6.1 ARCHITECTURE DIAGRAM

The system architecture is based on the interaction between a GSM module (SIM800L), an Arduino Uno R3, a relay module, an LCD display, and a DC water pump. The farmer sends specific SMS commands ("Motor ON", "Motor OFF", or "State Motor") to the system, which are processed by the Arduino after being received via the GSM module.

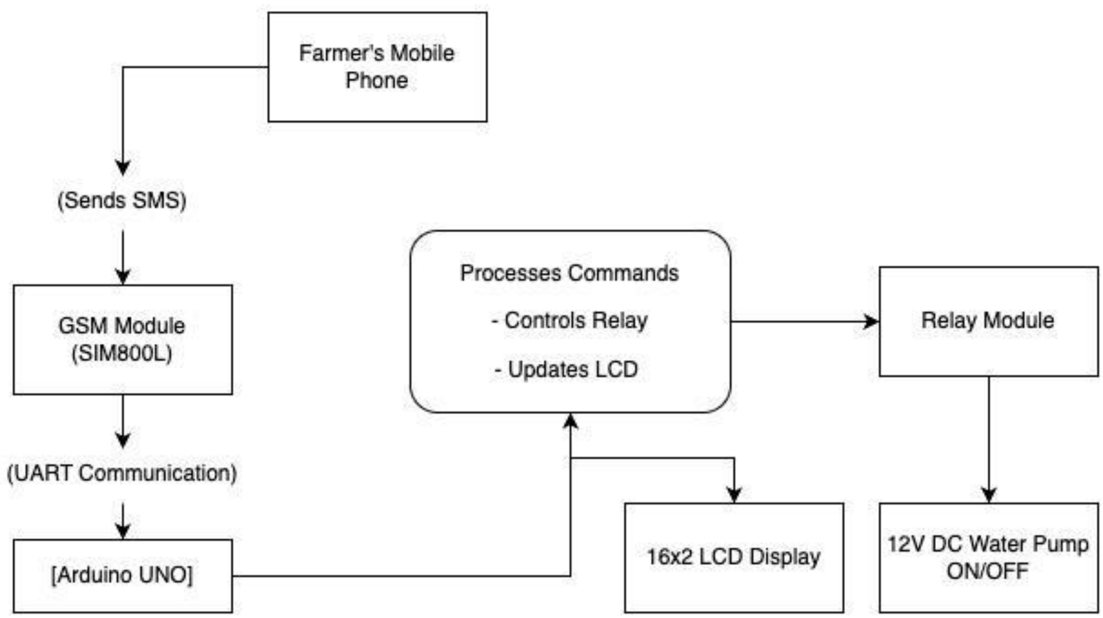

Fig.6.1 Architecture Diagram of GSM-Based Water Pump Automation System

Figure 6.1 illustrates the block diagram of the system. The GSM module receives SMS commands from the farmer's mobile phone and communicates with the Arduino via UART. The Arduino processes these commands to control the relay and update the LCD display, providing real-time feedback about the motor's status.

6.2 DESIGN/CIRCUIT DIAGRAM

The circuit implementation shown in Figure 6.2 demonstrates the physical wiring between the GSM module, relay module, LCD display, and the Arduino Uno. The LCD is interfaced using digital pins to display the status messages, while the GSM module uses the RX and TX pins for serial communication. The relay is triggered by the Arduino to switch the motor ON or OFF based on the command received.

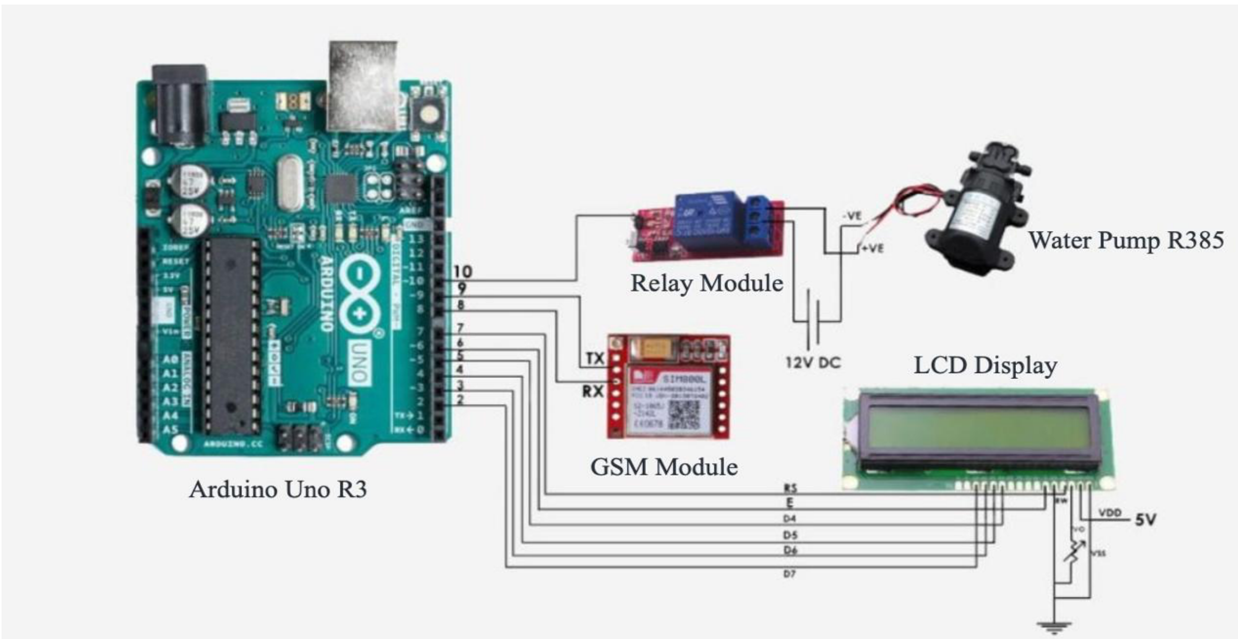

Fig.6.2 Circuit Diagram of GSM-Based Water Pump Control System Using Arduino UNO

6.3 FLOW DIAGRAM

The system follows a decision-making process based on the input strings received via SMS. Figure 6.3 presents the flowchart representing the system logic. When an SMS is received, the GSM module checks for data. If the message reads "Motor ON", the Arduino turns the motor ON and updates the state. If "Motor OFF" is received, the motor is turned OFF. If "State Motor" is received, the system responds with the current status of the motor to the sender's number.

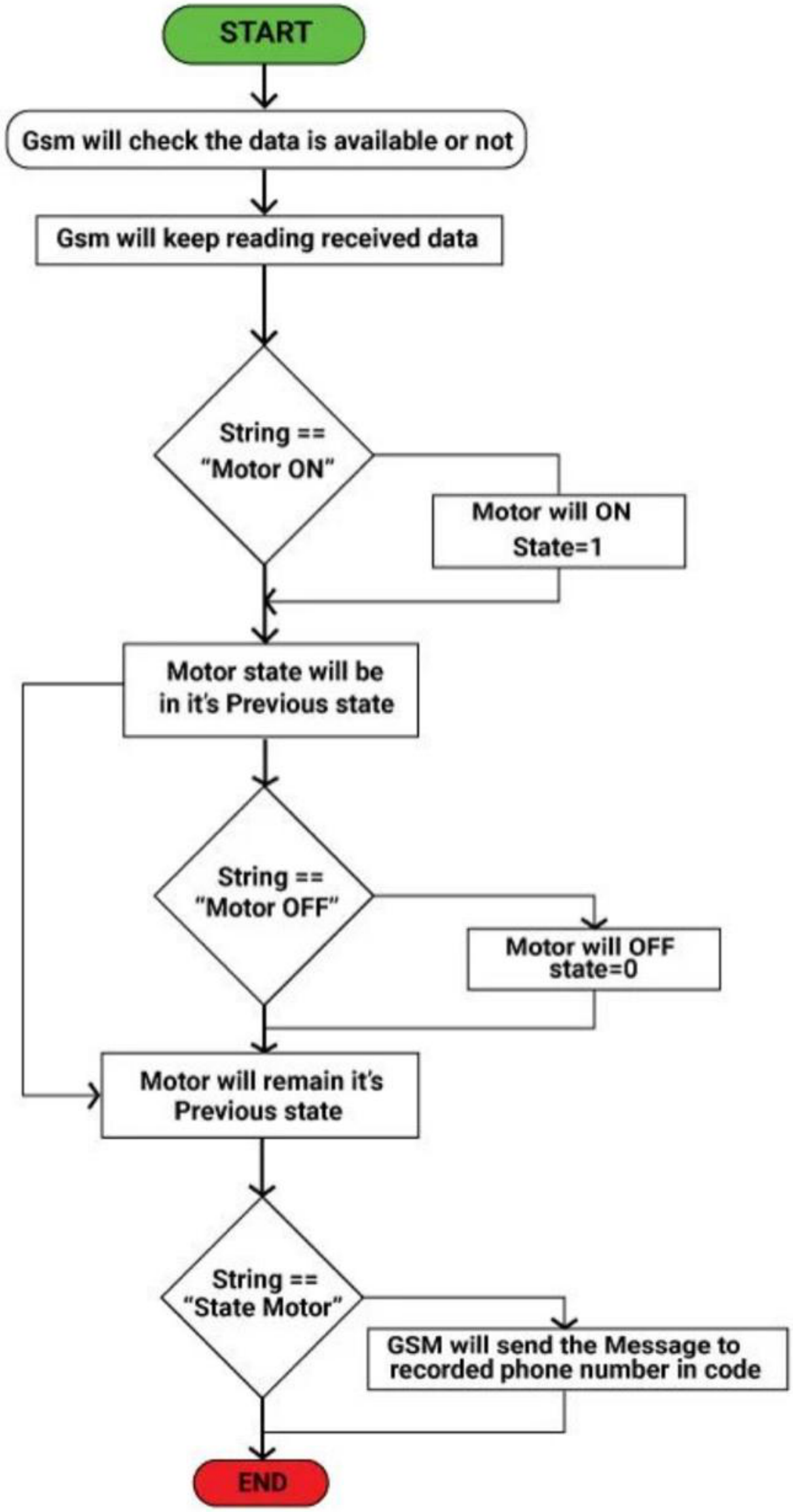

Fig.6.3 Flowchart of GSM-Based Motor Control Logic

6.4 PROTOTYPE

The final working model of the system is displayed in Figure 6.4. It shows all components mounted on a prototype board. The LCD displays the motor status, while the phone communicates with the GSM module. When the SMS "Motor OFF" is sent, the display confirms the current state, and the motor remains OFF. This real-time feedback ensures the farmer always knows the system status.

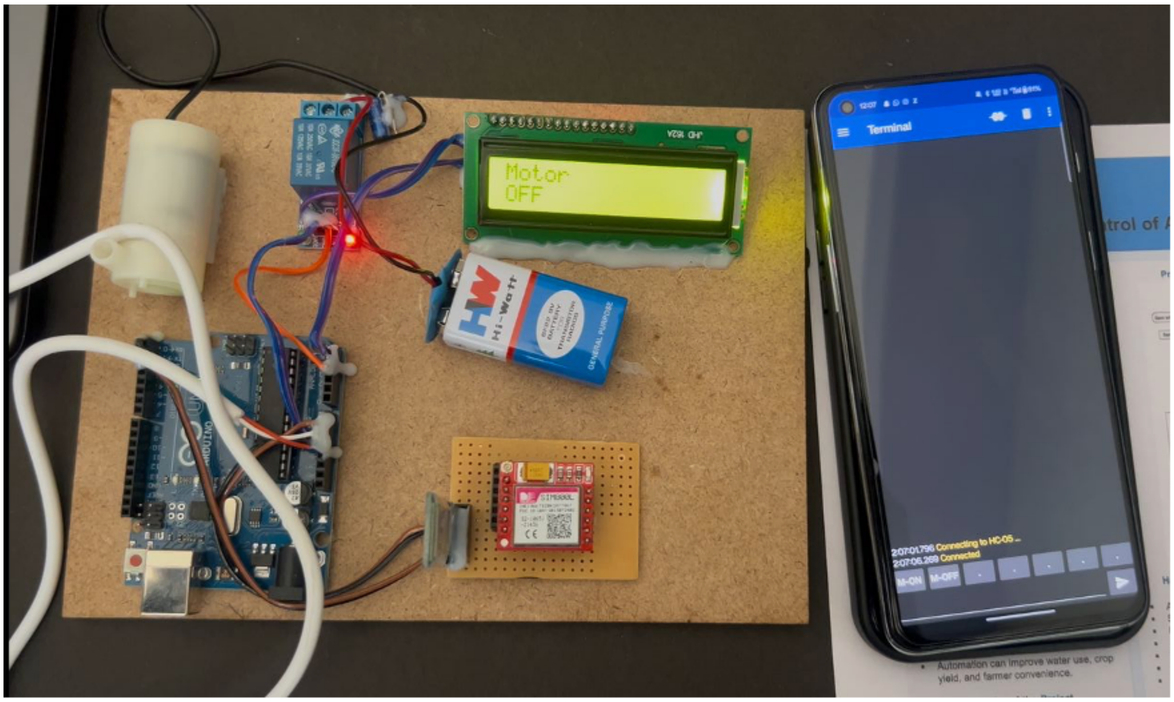

Fig.6.4 Real-Time Implementation of GSM-Controlled Water Pump with Arduino UNO

CHAPTER 7

FEASIBILITY STUDY

The feasibility study is an essential part of the project to determine whether the proposed system for remote control of agricultural irrigation motors using GSM and Arduino is technically, economically, and practically viable. It helps assess the system's capability to meet the real-world needs of farmers while ensuring affordability, reliability, and ease of use.

The proposed system is based on using GSM modules for communication and Arduino for hardware control, which makes it both cost-effective and efficient for rural and semi-urban agricultural fields. The use of mobile networks for communication ensures that the farmer can control the motor from any distance, reducing manual effort and saving valuable time.

From a technical point of view, the components used are widely available, simple to integrate, and require basic knowledge for operation and maintenance. Economically, the system is affordable for small and medium-scale farmers when compared to modern IoT-based systems. The solution also supports environmental sustainability by promoting better water usage through precise and timely irrigation control.

Overall, the feasibility study confirms that the system is not only possible but practical for real-world implementation in agricultural practices, especially in areas where farmers face challenges related to distance, water management, and manual motor operation.

In addition to its technical and economic feasibility, the system offers practical advantages for farmers in terms of scalability and adaptability. As the agricultural field continues to evolve, this system can be easily expanded to include additional features, such as soil moisture sensors or weather-based irrigation triggers, further enhancing its functionality. The modular nature of the system allows for gradual upgrades without significant additional investments, making it highly flexible. Furthermore, the system's user-friendly interface ensures that even farmers with minimal technological expertise can operate it with ease. By integrating GSM and Arduino technologies, the solution presents a sustainable, low-maintenance option that aligns well with the needs of farmers in resource-constrained environments, offering long-term benefits in terms of both productivity and cost savings.

CHAPTER 8

PROTOTYPE AND IMPLEMENTATION

The prototype and implementation of the Remote Control of Agricultural Irrigation Motors Using GSM and Arduino aim to demonstrate the practical application of a low-cost, efficient, and easy-to-use irrigation control system for farmers. The prototype is designed with basic electronic components, ensuring reliability and flexibility for field conditions.

The system uses an Arduino UNO as the central controller and a GSM module (SIM800 or SIM900) for wireless communication. The Arduino is programmed to receive SMS commands from the farmer's mobile phone. When the correct command is received, the Arduino triggers a relay module to switch the irrigation motor ON or OFF.

The relay module acts as an interface between the low-voltage control circuit and the high-voltage motor circuit, ensuring safe operation. A feedback mechanism can also be implemented to notify the farmer via SMS whether the motor is successfully turned ON or OFF.

IMPLEMENTATION:

1. **CIRCUIT ASSEMBLY:**

   Connect the GSM module to the Arduino using UART serial communication (TX and RX pins).

   Connect the relay module to the Arduino digital output pins.

   Ensure the motor is connected to the relay circuit with proper insulation and safety measures.

2. **PROGRAMMING:**

   Use the Arduino IDE to write code that listens for SMS commands and controls the relay accordingly.

   Include verification steps in the code to avoid false triggering.

   Integrate acknowledgment messages to confirm motor status back to the sender.

3. **TESTING ENVIRONMENT:**

   Simulate the motor control process using LEDs before connecting to an actual motor.

   Test the GSM signal strength and reliability of SMS delivery in the farm area.

4. **DEPLOYMENT:**

   Install the hardware setup in a weather-protected control box near the irrigation motor.

   Ensure stable power supply for Arduino, GSM module, and relay board.

   Regularly update the program to enhance performance and security as needed.

5. **FUTURE ENHANCEMENTS:**

   Integrate soil moisture sensors for automated irrigation decisions.

   Develop an Android app interface for more advanced control and monitoring.

   Enable solar-powered operation for energy efficiency.

CHAPTER 9

TESTING

Testing is an essential phase of the project to ensure the accuracy, reliability, and efficiency of the Remote Control of Agricultural Irrigation Motors Using GSM and Arduino system. Through systematic testing, each component of the prototype is verified to perform its intended function under real-world conditions.

The testing process began with the verification of hardware connections, including the Arduino board, GSM module, relay module, and motor connections. Once the circuit was successfully assembled, the Arduino program was uploaded, and initial tests were conducted using LEDs to simulate motor ON/OFF commands. This ensured that the GSM module could accurately receive SMS commands, and the Arduino could process the instructions correctly.

After validating the circuit with simulated loads, the system was connected to an actual irrigation motor. A series of tests were conducted by sending SMS commands from a mobile phone to the GSM module. The motor was observed for correct switching, and feedback responses were checked to ensure the motor's status was accurately reported to the user.

Testing also covered:

1. **Network signal reliability** in rural locations.
2. **Response time** between sending commands and receiving motor actions.
3. **Electrical safety and stability** under varying voltage conditions.
4. **Long-term endurance** of the system under field conditions.

CHAPTER 10

APPLICATIONS

The GSM-based irrigation motor control system has broad applications across various sectors of agriculture, offering flexibility, convenience, and enhanced resource management. By leveraging mobile communication technology, this system addresses the limitations of traditional irrigation practices and provides a reliable solution for efficient water usage in diverse farming environments. Its versatility makes it a valuable tool for both individual farmers and collaborative agricultural efforts.

1. **Agricultural Farms:** Enables farmers to control irrigation pumps remotely, reducing the need for physical travel to the field and ensuring timely irrigation.
2. **Horticulture and Plantations:** Suitable for gardens, nurseries, and plantation crops where irrigation scheduling is essential for plant health and growth.
3. **Greenhouses:** Can be used to manage watering systems remotely in greenhouses where controlled irrigation is critical for maintaining plant conditions.
4. **Remote and Hard-to-Reach Areas:** Ideal for farms located in distant rural locations where manual operation is difficult and time-consuming.
5. **Water Conservation Projects:** Helps regulate the use of water resources by allowing precise control over irrigation duration and frequency.
6. **Community Farming Systems:** Useful in shared farming lands where multiple users can control and monitor the irrigation system without conflicts.

CHAPTER 11

FUTURE ENHANCEMENTS

To enhance the capabilities and scalability of the GSM-based irrigation system, several future improvements can be considered. These advancements aim to further automate irrigation, increase energy efficiency, and improve user experience, ultimately supporting smarter and more sustainable farming practices.

1. **INTEGRATION WITH SOIL MOISTURE SENSORS**:
   By incorporating soil moisture sensors, the system can automatically trigger irrigation based on real-time soil conditions, preventing water wastage and improving crop health.
2. **MOBILE APPLICATION FOR CONTROL AND MONITORING**:
   A dedicated mobile app can offer a user-friendly interface for farmers to monitor and control irrigation systems, receive alerts, analyze usage history, and optimize schedules with ease.
3. **IOT-BASED SMART IRRIGATION**:
   Shifting to an IoT-based architecture would allow internet-based remote access and advanced analytics, with sensors tracking multiple environmental parameters for intelligent decision-making.
4. **SOLAR POWER INTEGRATION**:
   Using solar energy to power the system components can make the setup more eco-friendly and suitable for remote locations lacking stable electricity access.
5. **SECURITY ENHANCEMENTS**:
   Adding password protection, two-factor authentication, and power-backup systems would ensure secure and uninterrupted operation, even during outages or unauthorized access attempts.
6. **VOICE COMMAND SUPPORT**:
   Integrating voice control through platforms like Google Assistant or Amazon Alexa could allow farmers to operate the system hands-free, offering added convenience and accessibility.

CHAPTER 12
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APPENDIX

A SCREENSHOTS

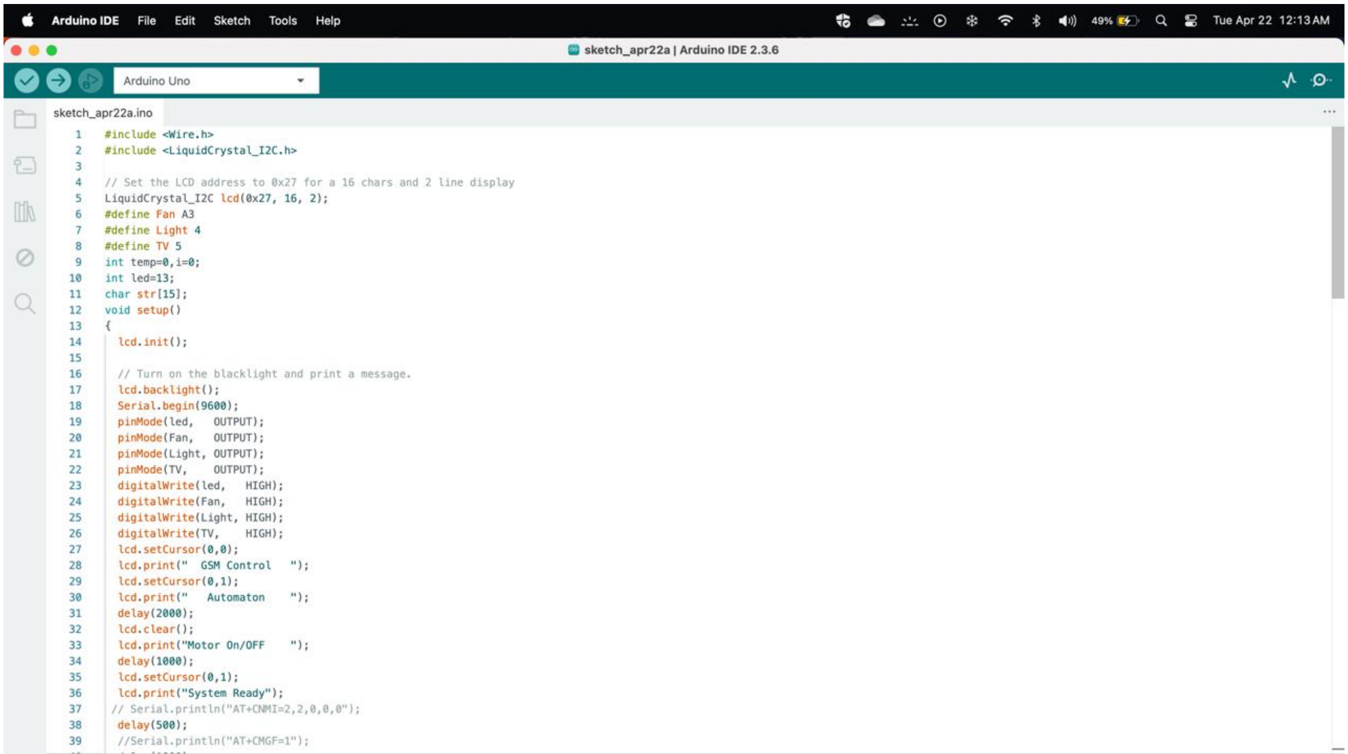

Fig.A.1 Arduino Sketch Setup for GSM-Based Irrigation Control System

B SOURCE CODE

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

// Set the LCD address to 0x27 for a 16 chars and 2 line display
LiquidCrystal_I2C lcd(0x27, 16, 2);
#define Fan A3
#define Light 4
#define TV 5
int temp=0,i=0;
int led=13;
char str[15];
void setup()
{
  lcd.init();

  // Turn on the blacklight and print a message.
  lcd.backlight();
  Serial.begin(9600);
  pinMode(led,   OUTPUT);
  pinMode(Fan,   OUTPUT);
  pinMode(Light, OUTPUT);
  pinMode(TV,    OUTPUT);
  digitalWrite(led,   HIGH);
  digitalWrite(Fan,   HIGH);
  digitalWrite(Light, HIGH);
  digitalWrite(TV,    HIGH);
  lcd.setCursor(0,0);
  lcd.print("  GSM Control   ");
  lcd.setCursor(0,1);
  lcd.print("   Automaton    ");
  delay(2000);
  lcd.clear();
  lcd.print("Motor On/OFF    ");
  delay(1000);
  lcd.setCursor(0,1);
  lcd.print("System Ready");
 // Serial.println("AT+CNMI=2,2,0,0,0");
  delay(500);
  //Serial.println("AT+CMGF=1");
  delay(1000);
  lcd.clear();
```

```
  lcd.setCursor(0,0);
  lcd.print("Motor           ");
  lcd.setCursor(0,1);
  lcd.print("OFF              ");
}
void loop()
{
  lcd.setCursor(0,0);
  lcd.print("Motor          ");
  if(temp==1)
  {
    check();
    temp=0;
    i=0;
    delay(1000);
  }
}
 void serialEvent()
 {
  while(Serial.available())
  {
    if(Serial.find("#A."))
    {
      digitalWrite(led, HIGH);
      delay(1000);
      digitalWrite(led, LOW);
      while (Serial.available())
      {
      char inChar=Serial.read();
      str[i++]=inChar;
      if(inChar=='*')
      {
        temp=1;
        return;
      }
      }
    }
   }
 }
void check()
{
   if(!(strncmp(str,"tv on",5)))
    {
```

```
    digitalWrite(TV, HIGH);
    lcd.setCursor(13,1);
    lcd.print("      ");
    delay(200);
  }
 else if(!(strncmp(str,"tv off",6)))
  {
    digitalWrite(TV, LOW);
    lcd.setCursor(13,1);
    lcd.print("       ");
    delay(200);
  }
  else if(!(strncmp(str,"fan on",5)))
  {
    digitalWrite(Fan, HIGH);
    lcd.setCursor(0,1);
    lcd.print("ON   ");
    delay(200);
  }
  else if(!(strncmp(str,"fan off",7)))
  {
    digitalWrite(Fan, LOW);
    lcd.setCursor(0,1);
    lcd.print("OFF    ");
    delay(200);
  }
  else if(!(strncmp(str,"light on",8)))
  {
    digitalWrite(Light, HIGH);
    lcd.setCursor(7,1);
    lcd.print("      ");
    delay(200);
  }
  else if(!(strncmp(str,"light off",9)))
  {
    digitalWrite(Light, LOW);
    lcd.setCursor(7,1);
    lcd.print("       ");
    delay(200);
  }
  else if(!(strncmp(str,"all on",6)))
  {
    digitalWrite(Light, LOW);
```

```
      digitalWrite(Fan, LOW);
      digitalWrite(TV, LOW);
      lcd.setCursor(0,1);
      lcd.print("ON               ");
      delay(200);
    }
    else if(!(strncmp(str,"all off",7)))
    {
      digitalWrite(Light, HIGH);
      digitalWrite(Fan, HIGH);
      digitalWrite(TV, HIGH);
      lcd.setCursor(0,1);
      lcd.print("OFF               ");
      delay(200);
    }
}
```