SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

A PROJECT REPORT ON

"Water Pump Controlling for Cooler using Mobile App"

SUBMITTED TOWARDS THE

PARTIAL FULFILLMENT OF THE REQUIREMENTS

OF CIA of TY BACHELOR OF TECHNOLOGY IN

COMPUTER ENGINEERING

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(TY B.Tech Computer Engineering)

UNDER THE GUIDANCE OF

Prof.Dr.A.B.Pawar

DEPARTMENT OF COMPUTER ENGINEERING

SANJIVANI RURAL EDUCATION SOCIETY'S

SANJIVANI COLLEGE OF ENGINEERING, KOPARGAON

(An Autonomous Institute)

2022-23

[AT3 Group id-4]

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CERTIFICATE

This is to certify that the Project Entitled

"Water Pump Controlling for Cooler using Mobile App"

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is a bonafide work carried out by students under the supervision of Prof./Dr. Guide A.B.Pawar and it is submitted towards the partial fulfillment of the requirement of CIA of TY Bachelor of Technology (Computer Engineering). During the academic year 2022-23

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Project Proposal

Project Title:

“Water Pump Controlling for Cooler using Mobile App”

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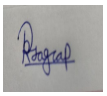
53	Jagzap Pratik Ratnakar	pratikjagzap530@gmail.com	8317213858	
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Project Proposal

Contents

Project Proposal

Water pump controlling using mobile refers to the ability to remotely turn on and off a water pump through a mobile app. This technology can be achieved by using a specialized pump controller that can connect to a mobile device through a wireless network or mobile data connection.

The water pump controller allows the user to control the water pump through a mobile.This application typically can be operated by turning the pump on and off, setting timers or schedules for the pump, and monitoring the pump's performance and status.

Controlling water pumps for coolers using a mobile app is becoming increasingly popular due to its convenience and efficiency.With this technology, users can easily turn the pump on or off. This is accomplished through a wireless connection between the app and the cooler's water pump, which allows for real-time control and monitoring of the system. The benefits of this technology include increased energy efficiency, reduced water usage, and improved comfort for the user. It is a promising development in the field of cooling technology, and it is expected to become even more prevalent in the future.

Overall, water pump controlling using mobile technology provides a convenient and efficient way to manage water resources, particularly in agricultural or rural areas where water pumps are often used.

1.1 Background

The history of water pump control can be traced back to the early 20th century when simple techniques of switches were used to turn the pump on and off. Later, electrical controls were developed that provided more sophisticated control over the water pump. These controls were typically wired into the home's electrical system and required manual adjustment. Water pump controlling for cooler using a mobile app is a relatively recent development in the field of home automation.

The primary benefit of using a mobile app to control a water pump is convenience. Homeowners no longer need to manually adjust their water pumps.Instead, they can use their smartphones to turn the pump on and off.In conclusion, water pump controlling for coolers using a mobile app is a modern technology that has revolutionized the way we control the temperature of our homes and offices. Its history can be traced back to the increasing demand for smart home and office automation technologies, and its benefits are numerous. As technology continues to advance, it is likely that we will see more advanced features added to this technology, further enhancing its usefulness and convenience.

1.2 Statement of the problem

The current manual method of controlling the water pump requires the user to be in close distance of the cooler, which is inconvenient and time-consuming. This problem can be solved using the messaging app from Mobile. It provides easy to use also is efficient method of control from Mobile and the user can also turn the water pump ON and OFF when needed.It also adjust the water flow rate, and monitor the temperature of the cooler from their mobile app.

1.3 Objectives

- To Ensure the system is compatible with different types of coolers and mobile devices.
- To provide users with an efficient and convenient solution that enhances the use of the cooler.
- To provide a secure and reliable system to the users.
- The app can also be used to send notification to the users when the water pump needs to be cleaned.

1.4 Technology/ Research Gap :

Technology used in controlling water pump from a mobile

Controlling a water pump from a mobile device includes the use of various technologies that work together to enable remote access and control of the pump. The following are the technologies used in controlling a water pump from a mobile device in detail...

1. IoT (Internet of Things) Technology:

IoT technology enables the connection of devices to the internet, allowing them to exchange data and communicate with each other. In controlling a water pump from a mobile device, Iot technology is used to connect the pump to the Internet, enabling it to be remotely monitored and controlled.

2. WCT (Wireless Communication Technology):

Wireless communication technology is used to establish a communication link between the water pump and the mobile device. Technologies such as Wi-Fi, Bluetooth, and cellular networks are used for this type of work.

3. MC (Microcontrollers):

A microcontroller is a small computer that is used to control the operation of the pump. It receives input from the sensors and sends output to the actuators, based on the commands received from the mobile device.

4. MA (Messaging Application):

A messaging application is used to control the water pump from a mobile device. The mobile application gives an interface for the user to interact with the pump, it sends the message that turns on the motor or turns off the motor according to that it will action.

Controlling a water pump from a mobile device involves the use of IoT technology, wireless communication technology, sensors and actuators, microcontrollers, mobile applications. These technologies work together to enable remote access and control of the pump, allowing the user to monitor and control its operation from anywhere. Anyone with these technologies can access it.

The products presented in the market lack standardized control methods.As a result ,the efficiency and effectiveness of the cooling system vary widely depending on control method used.

Second reason is Energy efficiency and last reason is Real time monitoring

Due to the proper solutions have not been found on following problems the research must be done on it..

1.5 Deliverables

1) Making an efficient system that will maintain the water level of water.

2) The system will control the water pump through the mobile phone.

3) The system will automatically maintain the water level and will control the water level.

1.6 Resources and Budget

In order to complete and implement this project we will need some IoT devices as well ass other components to achieve our desired results. Following is a list of components required and their respective price :

- Arduino UNO R3 board = ₹300
- GSM module = ₹1100
- 5V 2 Channel Relay Module = ₹119
- DC Water Pump = ₹89
- 9V Battery = ₹25
- Connecting Wires = ₹65
- Breadboard = ₹89

The Total Cost of all devices and components at their retail price is roughly around ₹1700. All the components are tested and quality assured and the resources used are reliable.

1.7 Project Plan with Milestones

Sr. No.	Milestone	Activity	Duration in Days
1	Research and Strategy	This phase involves identifying the problem and searching for existing solutions, efficiency and strategy to improve.	15 Days
2	Requirement Gathering	Visit places where the air coolers are installed.	7 Days
3	Design and prototype	This involves design of the proposed system and development of prototype to check the work ability of the system	15 Days
4	Development,Implementation and Testing	This stage involves actual development of the system and testing as well as real life application.	15 Days

1.8 Category of New Technology/Product

Sr.No.	Category	Details
1	New-to-the-world Products/Technology	The alternative expression for new-to-the-world products/technology (new products/technology) already indicates that this is what most people would define as a new product. These products are inventions that create a whole new market.
2	New-to-the-firm Products/Technology (new Product Lines)	Products that take a firm into a category new to it. The products are not new to the world, but are new to the firm
3	Additions to existing Product Lines	These are simple line extensions, designed to flesh out the product line as offered to the firm's current markets
4	Improvements and Revisions to existing Products	Current products are made better.
5	Repositioning	Repositioning are products that are retargeted for a new use or application
6	Cost Reductions	Finally, cost reductions complete the six categories of new products. Cost reductions refer to new products that simply replace existing products in the line, providing the customer similar performance but at a lower cost

The category of the 'Water Pump Controlling for cooler using Mobile App' IOT project is Repositioning.

In this project we use the motor pump controlling system for cooler so one can directly operate the pump through mobile without touching physically to the button.Already this technique is used in Water management system in agriculture but we are repositioning this system for household purpose means it is also one type of Home Automation System. We automate the pump using the Messaging App.

Requirements And Specifications:

In a water pump controlling system that is controlled through a mobile device, the operation of the water pump is regulated by the microcontroller or microprocessor that is connected to the pump. The mobile app sends commands to the microcontroller or microprocessor to turn the water pump on or off and adjust its speed.

Requirements:

The requirements required for controlling water pump through mobile for cooler (air cooler) are as follows:

1.Hardware setup:

The water pump is connected to a microcontroller or a microprocessor that can communicate with a mobile device via Bluetooth or Wi-Fi. The microcontroller is also connected to sensors that detect the level of water in the cooler and the temperature of the surrounding environment.

2.Mobile app(Messaging App):

An app is installed on the mobile device that can communicate with the microcontroller or microprocessor. The app allows the user to control the water pump by sending a message to turn off or on the motor.

3.Communication protocol:

The microcontroller or microprocessor and the mobile app use a communication protocol to exchange data. This protocol can be either Bluetooth or Wi-Fi.

4.User interface:

The user interacts with the system through the mobile app. The app provides a user-friendly interface that allows the user to control the water pump and monitor the status of the cooler.

Components required:

The components required for controlling water pump through mobile requires components as follows:

1.GSM module:

A GSM (Global System for Mobile Communications) module is a hardware component that enables communication over a cellular network. It provides a means to establish voice calls, send and receive SMS (Short Message Service) messages, and access data services such as internet connectivity.

2. Single channel relay:

It can be used in a water pump controlling system for coolers that is controlled through a mobile device. A relay is an electronic switch that allows a low-voltage circuit, such as the one used in a microcontroller or microprocessor, to control a high-voltage circuit.

3. Jumper wires

Jumper wires and a breadboard are commonly used components in electronic circuits. Jumper wires are used to make temporary connections between two points in a circuit, while a breadboard is a prototyping tool that allows for the creation of a temporary circuit without the need for soldering.

4. 9-volts DC power supply

A 9-volt DC power supply can be used in a water pump controlling system that is controlled through a mobile device. The power supply provides the necessary voltage and current to run the system.

5.The Arduino Uno

The Arduino Uno is a popular microcontroller board based on the ATmega328P microcontroller. The Arduino Uno R3 can be effectively used in water pump coolers to automate and control the cooling process.It is widely used in various electronic projects and prototyping due to its simplicity, versatility, and extensive community support.

Analysis Report:

We visited various coolers placed at Sanjivani College of Engineering, Kopargaon during our analysis we found that the coolers (air coolers as well as water coolers) placed in the college require manual operation to turn the motor ON/OFF. So, we can use our model for both types of coolers and try to reduce the work.

By implementing the system of water pump controlling through the mobile we can operate the pump through a distance. It will no longer be needed to turn on/off the pump manually.The operator just needs to send a message on the mobile number which we have fitted in the gsm module. It can start working as it will receive a message and the same process will be carried out to turn off the motor.

From the institution point of view, we can reduce the workload of the employees who do the work of operating that water pump. Our model can be helpful for them.This project is built towards conservation of the most important natural resource on Earth.The only thing that we need to do is send the message on the number which we had put in the GSM module then it will act according to the message we have sent.

System Design and Analysis:

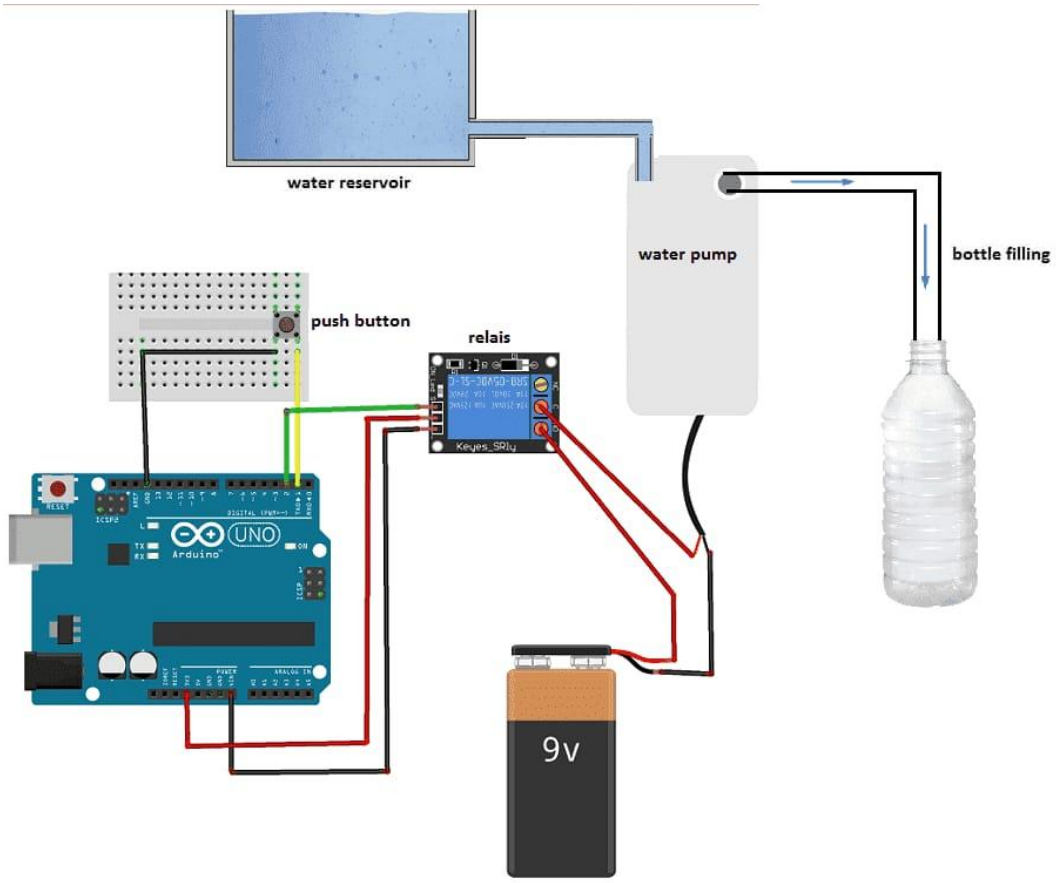
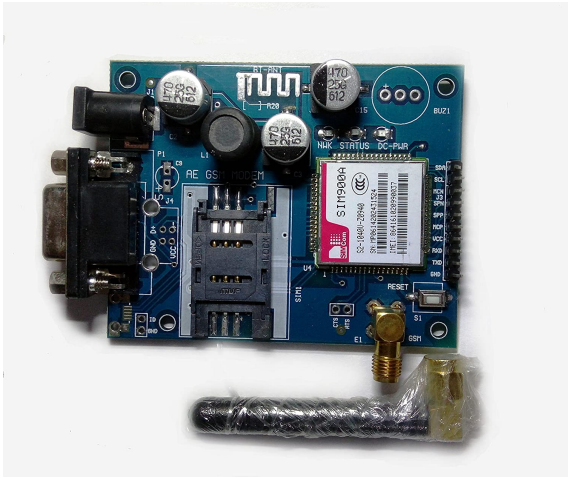


fig: Circuit Diagram for Water Pump Control through Messaging app

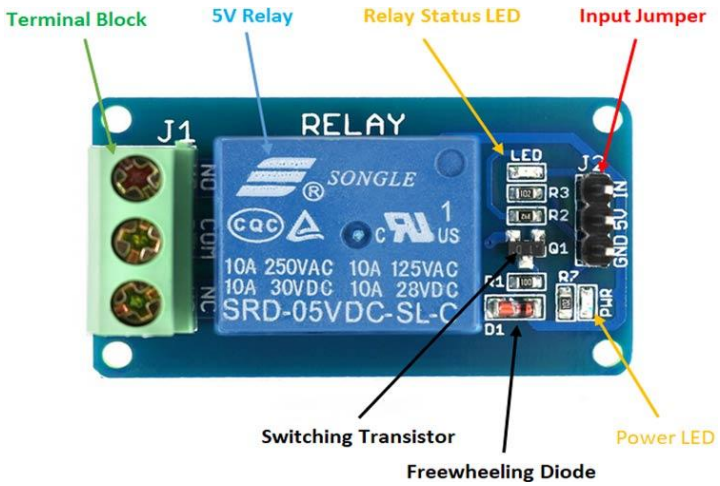
A multipurpose system that can be operated from the ease of your house and sofa with just one tap on your mobile phone.A system with huge scope and multiple additionable technologies and innovations. This System uses Arduino UNO , GSM Module and single channel relay module to automate the process of water pump switch ON/OFF and much more. Here is a detailed illustration of a typical system architecture:

1.GSM Module:



A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM modems are used in mobile telephones and other equipment that communicates with mobile telephone networks.

2.Single Channel Relay:



A relay is an electronic switch that allows a low-voltage circuit, such as the one used in a microcontroller or microprocessor, to control a high-voltage circuit. The relay consistent of three major pins namely Positive,Negative and Signal. The positive and negative are of the single channel relay are connected to the positive and negative terminals of the battery.

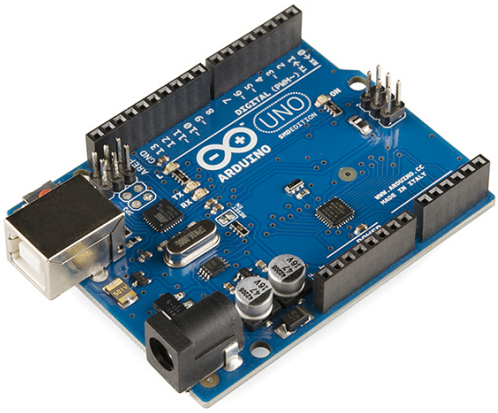
3.DC water pump:

The water pump is used to pump the water for the desired use and has two terminals namely positive and negative which are connected to the relay and breadboard respectively as shown in the circuit diagram above.

4.9V DC battery:

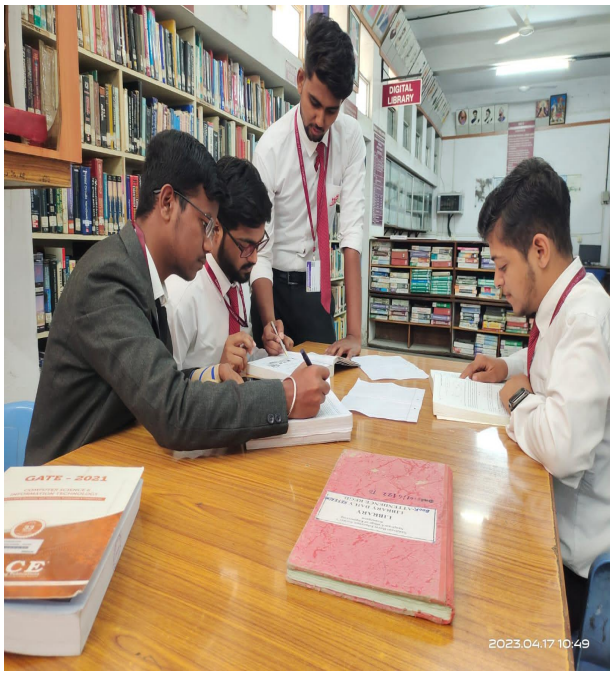
A 9-volt DC power supply can be used in a water pump controlling system that is controlled through a mobile device. The power supply provides the necessary voltage and current to run the system. The necessary connections of the battery are depicted in the circuit diagram above.

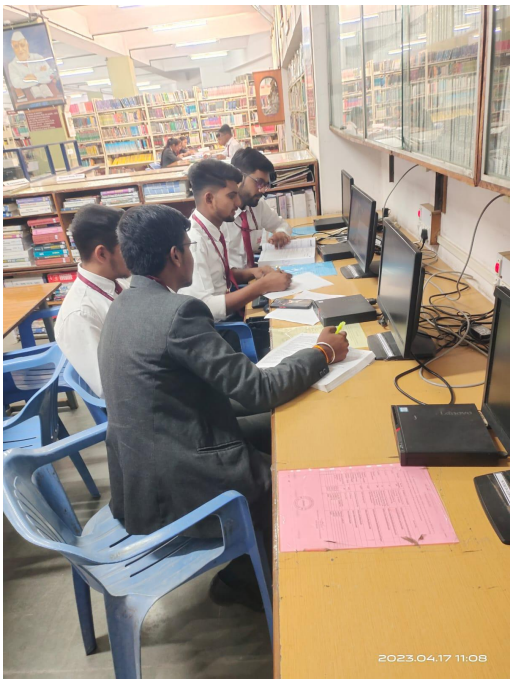
5. Arduino UNO:



The Arduino Uno is a popular microcontroller board based on the ATmega328P microcontroller. The Arduino Uno R3 can be effectively used in water pump coolers to automate and control the cooling process.It is widely used in various electronic projects and prototyping due to its simplicity, versatility, and extensive community support.

Overall, the water pump controlling system is a very crucial and multipurpose application in day-to-day life. The water motor in an air cooler can be switched ON by one click on your phone. Also, the same system can be deployed in a kitchen garden to water your plants from time to time with the help of a soil moisture sensor or directly switching on the motor from the Messaging app. This system may cut down the manual time wasting methods and automate the process of water management .





Visited the Knowledge Hub for System Design and Analysis

Implementation Details with Stimulation Testing:

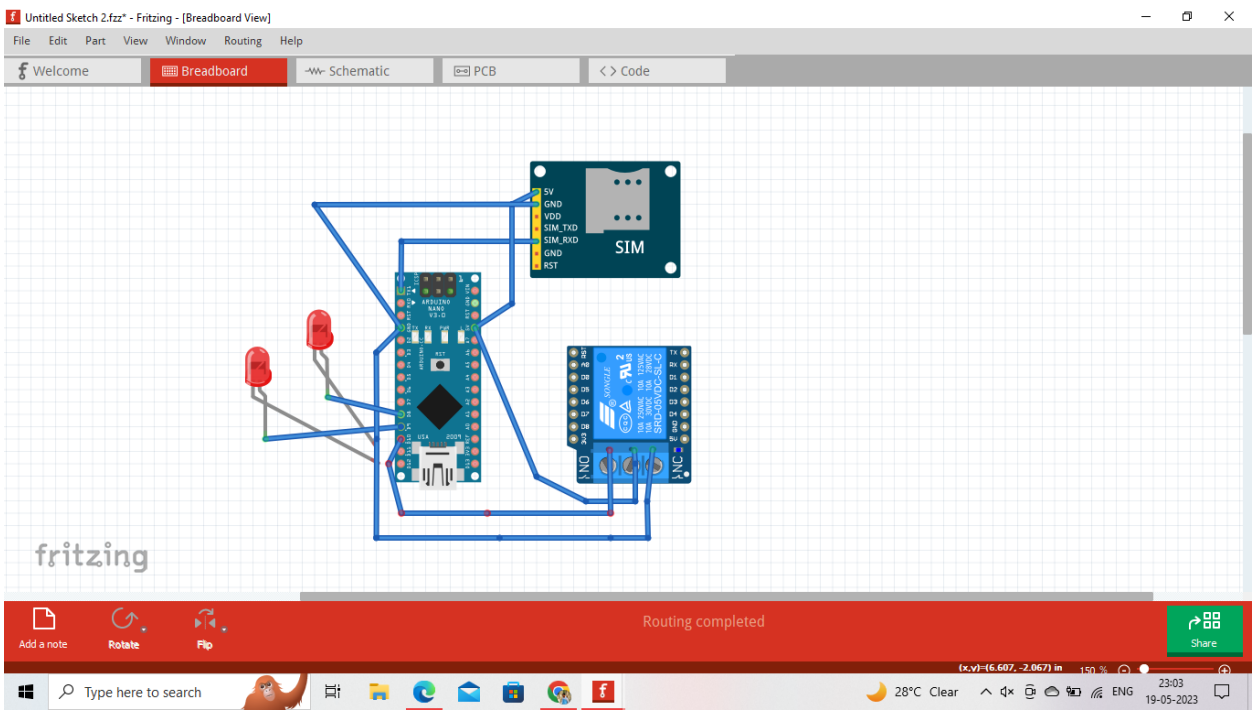


Fig: Circuit Diagram for water pump controller

We are virtually implement our Water Pump Controlling System using Fritzing app with appropriate devices.

Here's a step-by-step guide on how to implement the water pump control:

1. Connect the GSM module to the Arduino board:
    - Connect the VCC pin of the GSM module to the 5V pin on the Arduino.
    - Connect the GND pin of the GSM module to the GND pin on the Arduino.
    - Connect the TX pin of the GSM module to the RX pin (pin 0) on the Arduino.
    - Connect the RX pin of the GSM module to the TX pin (pin 1) on the Arduino.
    - Make sure to cross-connect the TX and RX pins between the Arduino and GSM module.
2. Connect the relay module to the Arduino board:
    - Connect the VCC pin of the relay module to the 5V pin on the Arduino.
    - Connect the GND pin of the relay module to the GND pin on the Arduino.
    - Connect the IN pin of the relay module to a digital pin (e.g., pin 2) on the Arduino.
3. Connect the water pump to the relay module:
    - Connect one terminal of the water pump to the COM (common) pin of the relay module.
    - Connect the other terminal of the water pump to the NO (normally open) pin of the relay module.
4. Power the Arduino board using an external power supply.
5. Insert the SIM card into the GSM module and ensure it has an active data plan.
6. Write the Arduino code to control the water pump based on SMS commands. Below is a sample code.

Implementation Code:

```
 GSM Module >

              Tx Pin >  8 Pin

              Rx Pin >  9 Pin

              Gnd Pin > Gnd Pin

              Vcc Pin > 3.7V - 4.2V (Power supply should be 2A)

   Device 1 (LED 1) > 13

   Device 1 (LED 2) > 12


*/
```

```
#include <SoftwareSerial.h>

//GSM Module TX is connected to Arduino D8

#define SIM800_TX_PIN 8

//GSM Module RX is connected to Arduino D9

#define SIM800_RX_PIN 9

SoftwareSerial mySerial(SIM800_TX_PIN, SIM800_RX_PIN); //Create software
serial object to communicate with GSM Module

int device_1 = 13; // attach pin D13 of Arduino to Device-1

int device_2 = 12; // attach pin D13 of Arduino to Device-2

// defines variables

int index = 0;

String number = "";

String message = "";

char incomingByte;

String incomingData;

bool atCommand = true;

void setup()

{

  Serial.begin(9600); // Serial Communication for Serial Monitor is
starting with 9600 of baudrate speed

  mySerial.begin(9600); // Serial Communication for GSM Module is starting
with 9600 of baudrate speed

  pinMode(device_1, OUTPUT); //Sets the device_1 as an OUTPUT

  pinMode(device_2, OUTPUT); //Sets the device_2 as an OUTPUT

  digitalWrite(device_1, LOW); //Sets the device_1 in to OFF state at the
beginning

  digitalWrite(device_2, LOW); //Sets the device_2 in to OFF state at the
beginning

  // Check if you're currently connected to SIM800L
```

```
  while (!mySerial.available()) {

    mySerial.println("AT");

    delay(1000);

    Serial.println("connecting....");

  }

  Serial.println("Connected..");

  mySerial.println("AT+CMGF=1");  //Set SMS Text Mode

  delay(1000);

  mySerial.println("AT+CNMI=1,2,0,0,0");  //procedure, how to receive
messages from the network

  delay(1000);

  mySerial.println("AT+CMGL=\"REC UNREAD\""); // Read unread messages



  Serial.println("Ready to received Commands..");

}

void loop()

{

  if (mySerial.available()) {

    delay(100);

    // Serial buffer

    while (mySerial.available()) {

      incomingByte = mySerial.read();

      incomingData += incomingByte;

    }

    delay(10);

    if (atCommand == false) {

      receivedMessage(incomingData);

    } else {
```

```
      atCommand = false;
    }
    //delete messages to save memory
    if (incomingData.indexOf("OK") == -1) {
      mySerial.println("AT+CMGDA=\"DEL ALL\"");
      delay(1000);
      atCommand = true;
    }
    incomingData = "";
  }
}
void receivedMessage(String inputString) {
  //Get The number of the sender
  index = inputString.indexOf('"') + 1;
  inputString = inputString.substring(index);
  index = inputString.indexOf('"');
  number = inputString.substring(0, index);
  Serial.println("Number: " + number);
  //Get The Message of the sender
  index = inputString.indexOf("\n") + 1;
  message = inputString.substring(index);
  message.trim();
  Serial.println("Message: " + message);
  message.toUpperCase(); // uppercase the message received
  //turn Device 1 ON
  if (message.indexOf("D1 ON") > -1) {
    digitalWrite(device_1, HIGH);
```

```
    delay(1000);
    Serial.println("Command: Device 1 Turn On.");
  }
  //turn Device 1 OFF
  if (message.indexOf("D1 OFF") > -1) {
    digitalWrite(device_1, LOW);
    Serial.println("Command: Device 1 Turn Off.");
  }
  //turn Device 2 ON
  if (message.indexOf("D2 ON") > -1) {
    digitalWrite(device_2, HIGH);
    delay(1000);
    Serial.println("Command: Device 2 Turn On.");
  }
  //turn Device 2 OFF
  if (message.indexOf("D2 OFF") > -1) {
    digitalWrite(device_2, LOW);
    Serial.println("Command: Device 1 Turn Off.");
  }
  delay(50);// Added delay between two readings
}
```

Implementation Snapshots:

Implementation Video:

https://drive.google.com/file/d/1su6aSsh8lm_6qxc8gLDhn4MeXIfEjm86/view?usp=drive_link

Result Details

To analysis the “Water Pump Controlling system “ we are considering some key points which will cover the whole performance of the system:

1)Pump Operation:

The pump operates correctly as intended .It will turn OFF/ON according to the desired condition that the user wants.

2)Arduino Functionality:

The performance of the Arduino is as the user want.It successfully takes the input and triggers the pump’s operation accordingly.The Arduino’s code executes without errors and executes the expected behavior.

3)GSM modem communication:

The Arduino sends the message and the GSM modem receives commands from the Arduino and acknowledges their execution .Verify if any status updates or any error notification from the system are transmitted successfully via SMS.

4) Remote Control:

We can remotely control the pump’s operation i.e turn OFF/ON using SMS .

5)System Reliability:

We are test the system over an extended period and it is observed that the water pump control consistently operates as expected . The GSM modem maintains a stable connection and system remains responsive to commands and code works without any failure.

6) Safety and Security:

The water pump mechanisms doesn’t pose any risks such as overheating of the Arduino and Relay. The proper security measure also takes while accessing the system via GSM network.

7) User Experience:

We gather feedback from the users who interact with the system .Evaluting their experience in terms of ease of use ,reliability and overall satisfaction with the water pump control system .They also suggest some areas for improvement based on their input.

Conclusion

In conclusion, we have successfully developed a water pump controlling system for a cooler using a mobile app and Arduino with a GSM module. This system allows users to remotely control the water pump of their cooler through a mobile application, providing convenience and flexibility

By integrating the Arduino microcontroller with a GSM module, we were able to establish a wireless communication link between the mobile app and the water pump. This enables users to turn the pump on or offThe implementation of this system offers several benefits. Users can easily control their cooler even when they are away from it, ensuring that it operates only when necessary and saving energy.

Future Scope

1. Voice Control and Integration with Virtual Assistants: Adding voice control functionality to the mobile app or integrating the system with virtual assistants like Amazon Alexa or Google Assistant would enhance user convenience and accessibility. Users could control the water pump and adjust cooler settings using voice commands, making the system even more user-friendly.

2. Advanced Scheduling and Automation: Expanding the scheduling features to allow for more advanced automation would be a valuable addition. Users could set specific cooling schedules based on different days.

3. Remote Monitoring and Notifications: Implementing remote monitoring capabilities would allow users to receive real-time information about the cooler's performance and status. The system could send notifications to the mobile app regarding issues like low water levels, abnormal pump behavior, or maintenance reminders.

3. Integration with Smart Home Ecosystems: Integrating the water pump controlling system with existing smart home ecosystems and platforms would provide a seamless and integrated experience. This could involve compatibility with popular smart home protocols such as Zigbee, allowing users to control the cooler alongside other smart devices in their home automation setup.

4. Multi-Device Support: Extending the mobile app compatibility to different platforms and devices, such as tablets and smartwatches, would increase the flexibility and accessibility of the system. Users would have the freedom to control the water pump and monitor the cooler's status from their preferred device.

5. Enhanced Security Features: Strengthening the security measures of the system would ensure the protection of user data and prevent unauthorized access. This could involve implementing encryption protocols, secure authentication methods, and regular security updates to keep the system robust and resilient against potential threats.

In summary, the future scope for the water pump controlling system for a cooler using a mobile app and Arduino with a GSM module includes voice control integration, advanced scheduling and automation, remote monitoring and notifications, integration with smart home.

References

1. **Control Water Pump From Mobile | IOT Projects | Home Automation**
2. **https://www.researchgate.net/publication/354455908_Efficient_Smart_Water_Management_System_Using_IoT_Technology**
3. **https://www.researchgate.net/publication/320249968_IoT_based_smart_water_tank_with_Android_application**
4. **“Introduction to Internet of Things” course NPTEL.**