

SMART FARMING USING BIDIRECTIONAL PUMPING

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ABSTRACT

The project focuses an automation of farming by using smart bidirectional pumping including various sensing systems. Mainly focusing on automatic irrigation in farm in any environmental conditions. Nowadays, there are major losses to farmers due to improper weather conditions. Our project is mainly focussing on rainy and summer season, as we are including a reservoir in farm itself as per the area of farm, when there is a scarcity of water in summer the water will flow from reservoir to farm and in Rainy season the pumping will get reversed, as we are laying mulching papers all over the farm, extra water will get collected over farm which may harm the crops production. This bidirectional pump is used for inlet and outlet water. Water pumping has a long history; so many methods have been developed to pump water. People have used a variety of power sources, namely human energy, animal power, hydro power, wind, solar and fuels such as diesel for small generators. The most common pump are used in remote communities are solar submersible pumps, hand pumps direct drive diesel driven borehole pumps, electric submersible pumps with diesel generator. project is mainly highlights the conservation of electrical energy and ease of irrigation in the bad environmental conditions. The system is made up of basic components: Sensor, GSM MODULE, PIC controller, Relays to control the device. The second is the controlling part; It uses pH SENSOR, SOIL MOISTURE SENSOR, WATER MOTOR, LCD DISPLAY. The result of using the propose system is improving the efficiency of operation reducing delay time and cost of maintainance and human power and many power resources after implementing this system.

Keywords : EMBEDDED SYSTEM, PIC Microcontroller, PH SENSOR, SOIL MOISTURE SENSOR, REALYS, LCD DISPLAY

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I. INTRODUCTION

In this project we are introducing smart farming using bidirectional pumping. We are installing this bidirectional water pump at farm reservoir which will be controlled by Microcontroller. This smart farming system includes water turbine generator, array of sensors in soil, GSM Module, Water proof mulching sheet and LCD Display. At the time of raining, sensor will sense the condition and provide the data to controller, so accordingly pumping of water from farm to reservoir will takes place. In summer season the action will takes place in reverse manner.

In critical situation like heavy raining, the accumulated extra water of reservoir will be extracted outside through the gateway Which is connected to the turbine generator and electricity will be produce from it.

This generated electricity can be used again for the pumping.

Farmer can control the whole system by single missedcall. Hence the conservation of electricity, water, time & man power with providing healthy atmosphere to crops.

II. PROBLEM STATEMENT

Farmer faces huge financial losses due to wrong irrigation methods and wrong weather prediction. As Sensor Network has been developed, now it is very easy to apply them for enhancing the quality and quantity of crops.

Due to unawareness about the technique methodologies and tools used and type of soil content it has become huge problem in recent years. Currently inquiry of soil to

increase quantity of crop production is not utilized very much due to the high price. As there is very big field for crop so the soil sample cannot be efficient to send to lab which will represent the whole land because whole land has different types of soil. We are overcome this problem by implementing this project.

III. OBJECTIVES

1. To minimize water intake.
2. To operate the farming feasibly from home, office and co-operative firm.
3. To reduce manpower, Electric energy as well as cost.

IV. PROPOSED WORK

BLOCK DIAGRAM:

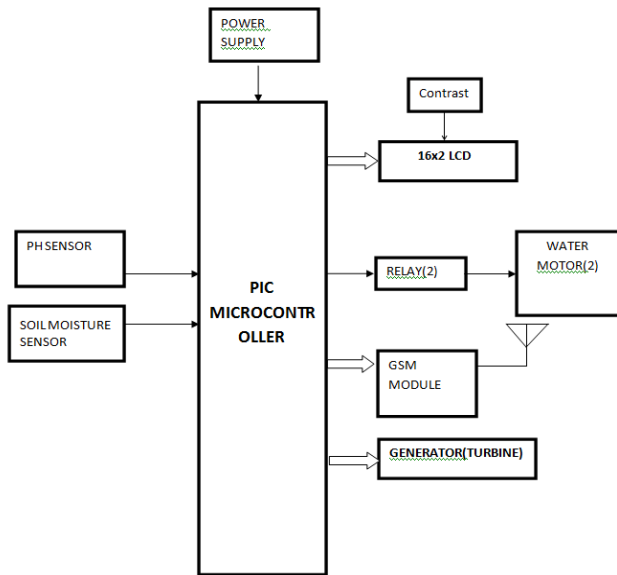


Figure 1: Block Diagram

COMPONENTS & WORKING:

1. PIC 16 microcontroller.
2. Small motor pump.
3. GSM Module.
4. LCD Display.
5. Sensors (PH,Moisture, Temperature, Water level indicator)
6. Turbine generator.
7. Water proof mulching sheet.

SPECIFICATIONS:

1. PIC MICROCONTROLLER

We are using 8 bit PIC Microcontroller to control the whole smart farming system.

2. RELAY Module

Relays are used in low power signal applications. It acts like an electromagnetic switch which can be used to couple the low power signal to high power signal.

Wiring Diagram

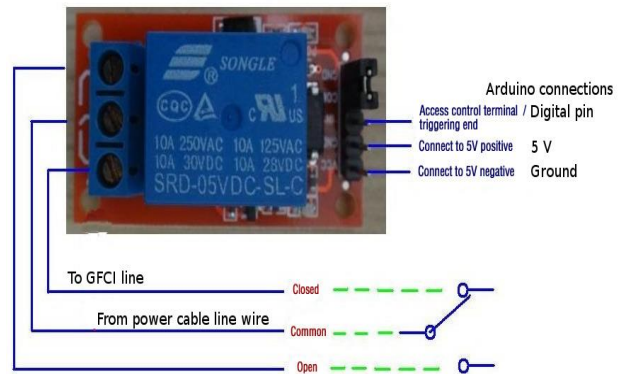


Figure 2: RELAY Module

3. Water Motor

Water motor is basically a submersible pump which is used to draw fluid from one end to other using electrical energy. The whole system has to be deeped in fluid to be pumped.

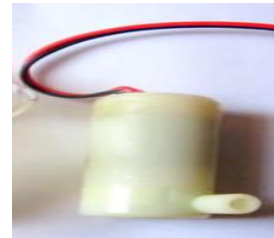


Figure 3: Water Motor

4. PH sensor

A pH meter is a device that measures the amount of hydrogen ion in particular water based solutions, it indicates acidity or alkalinity of given solution. It has wide range of applications.





Figure 4:PH sensor

5. Soil Moisture sensor

To measure the water content of soil the moisture sensor is used. During the water shortage, the of module is high otherwise the output of the module is low. By observing and monitoring the moisture content this sensor can remind the user to water their plants.

- Working Voltage :5V
- Working Current : <20mA
- Analog Interface
- Temperature Range :10°C~30°C

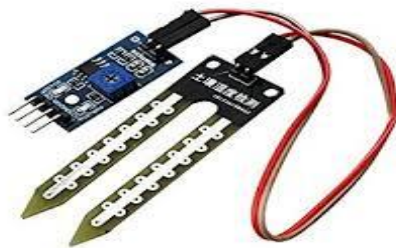
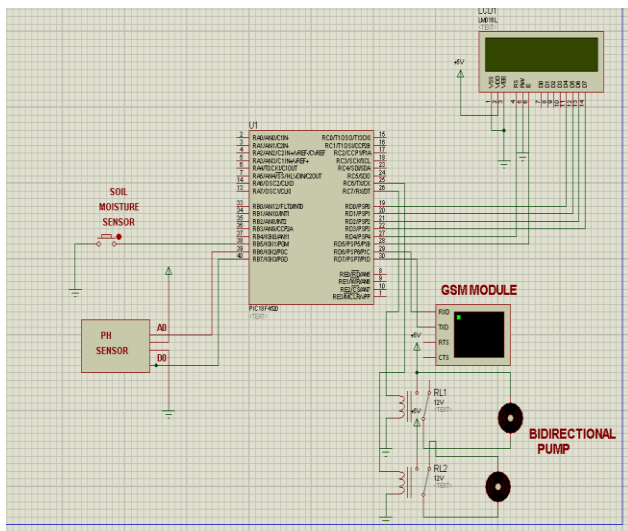


Figure 5 :Soil Moisture sensor

● HARDWARE DESIGN:



● SOFTWARE DESIGN:

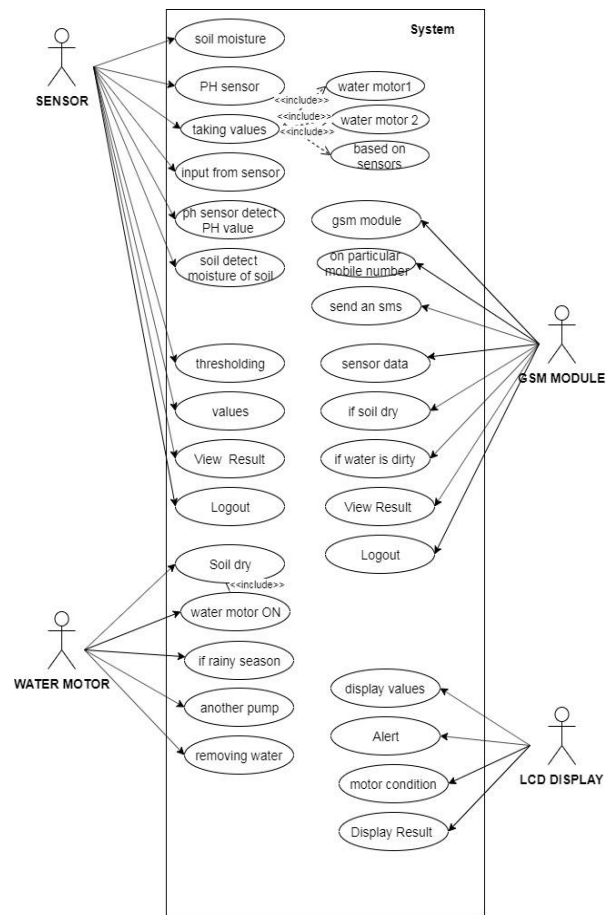
The softwares we are using for our project are Proteus, MPLAB and PICKIT-3.

The softwares we are using are easily available online free of cost and also open source applications.

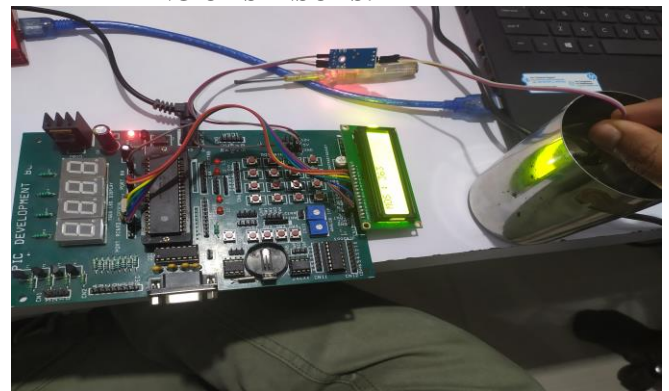
We used Proteus for simulation and for PCB designing. MPLAB and PICKIT are used for embedded programming of PIC controller.

Embedded C Programming language is so easy and reliable to understand and logic design.

Embedded C is much easier to implement logic than machine language.



● READING OF SENSORS:



Readings of moisture sensor

Level of moisture sensor dipped inside water	Analog readings
low	1023
half	458-553
full	328

V. EXPECTED RESULT

This system of smart farming should fulfilled following functionalities:

1. The water pump should able to pump whole water from farm which will get collected over mulching paper .
2. Sensors in soil should provide real time data correctly to controller so as necessary action of controller will take place.
3. The generated electricity should be sufficient enough for driving the pump.
4. Water level should get detected properly in reservoir so extraction of water through gateway occur properly.

VI. CONCLUSION

With a wide range of application and various benefits of the system has became one of the significant option available for the farmers. Enhancing interest in this field of research may bring about more and more customer efficient system. The main problem of water scarcity is maintained by this system. The problems occurring due to climate change and global warming can be overcome only by this system. This automatic irrigation system will be every farmers choice in upcoming years.

The important benefit of this system is without observation of farmer the motor pump automatically switches the motor on or off with the help of moisture sensors. It saves water as well as time. Thousands of gallons of water can be saved with this irrigation system by turning itself off at the right time. It saves your financial investment.

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