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Automation for Agriculture

D.D. Ahire
Professor
Matoshri College of Engineering and Research Centre, Eklahare, Nashik.
Savitribai Phule University of Pune

Swapnil Kulkarni
BE Students
Matoshri College of Engineering and Research Centre, Eklahare, Nashik.
Savitribai Phule University of Pune

Amit Pimparkar
BE Students
Matoshri College of Engineering and Research Centre, Eklahare, Nashik.
Savitribai Phule University of Pune

Arjun Date
BE Students
Matoshri College of Engineering and Research Centre, Eklahare, Nashik.
Savitribai Phule University of Pune

ABSTRACT
It has been seen that, in the agriculture, wastage of water and valve controlling is one of the major concern. At present it is operated manually which leads to great man power requirement. Also adequate and required supply of water is needed in agriculture. Along with these concerns, fluctuations in electricity lead to damage the motor permanently. So we have made an attempt to design a system, which would control the valve action based on the sensors output through GSM. Along with this it also prevents permanent damage of motor from fluctuations in electricity.

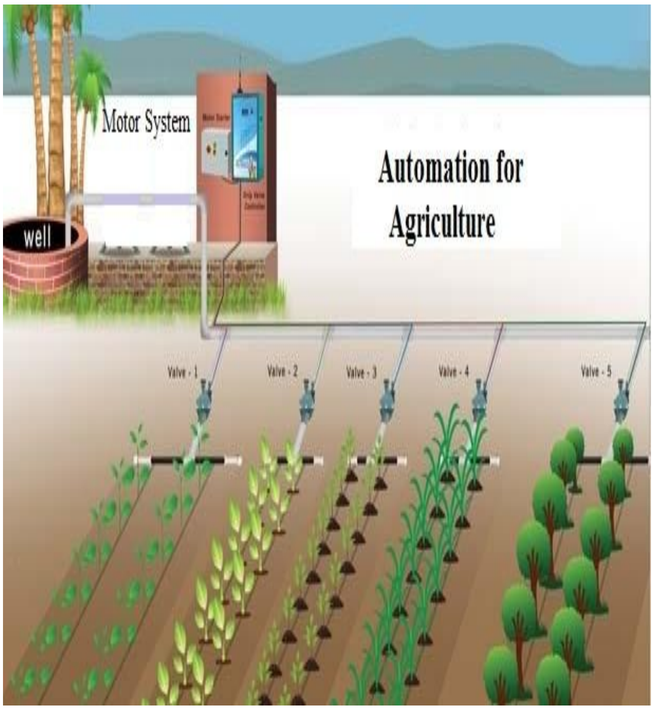
The main aim of the project is to read the sensors output and to control the valves through the GSM technology. Input signal 230v ac given to the transformer of 12vdc and 12v dc signal is send to microcontroller. Status of the field is sent through the GSM based on the output of the sensors. Depending on this status, valve controlling action is performed. After the adequate supply of water, valves are closed automatically depending on the updated status of the sensors. In this project, we have also improved on automatic action taken to control the valve action in case of GSM facility failure.

Keywords
GSM, Farm, Keil

1. INTRODUCTION
Water is a resource that all living species need. It is therefore very precious and has to be used with moderation to be preserved for the generations to come. Agriculture is an industry that uses a lot of water[2-6]. Most of the time, this resource is not used efficiently and substantial amount of water are wasted. In the near future, these wastes will represent a large sum of money. The ones who manage this resource efficiently will be winning time and money[1][16].

Indian agriculture is dependent on the monsoons, which is dependent on the nature and not a reliable source of water, so there is a need for an automated system in the country which can provide water to the farms according to their moisture, temperature [10-12]. For a big farm land with horticulture activity the solution will be an automated system. Water contained in the soil is called soil moisture. And it is very important for plant growth. The advantage of using sensors is to control all related parameters for better and efficient resource management [7] [9] [17].

In this project report, an automated system is suggested to minimize the water input and human intervention, while satisfying the plant needs. First, the details of the problems are summarized. The objective and the scope of the project are described. Some general approaches to design are reviewed. The results and conclusions of an experiment to determine the required amount of water are discussed. Then, the suggested design is explained in detail with the purpose, requirements and constraints, simulation and test results for each of its parts. A brief cost analysis is performed to viability of such a project on the market. Finally, the design is criticized and suggestions are made for future improvements.



Paper organisation:

Section I: Reviews introduction of the system.

Section II: Explores general block diagram of the proposed system.

Section III: Defines proposed system.

Section IV: Gives design and implementation of the proposed system.

Section V: Defines conclusion of the system.

Section VI: Explores future improvements to be done.

2. BLOCK DIAGRAM

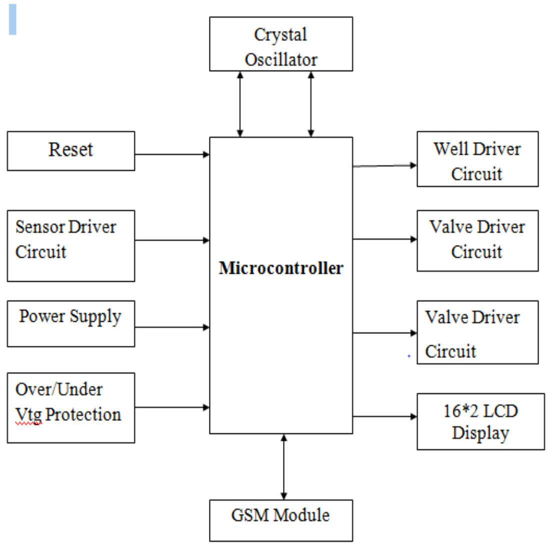


Fig.1 Block diagram of proposed system

3. PROPOSED SYSTEM

The betterment of agriculture depends on various environmental parameters such as soil temperature, soil moisture, relative humidity, pH of soil, light intensity, fertilizing property of the soil, etc. Any small changes in any of these parameters can cause problems like diseases, improper growth of plant, etc. mainly resulting in lesser yield. The proposed system consists of different types of sensing unit such as soil moisture sensor to measure water content of soil. The output of sensors are converted to analog using D/A converter at the input side and converted back to digital using A/D converter at the output side. The data obtained from different types of sensors are transmitted to the microcontroller using sensor network. Later, the status of the field is transmitted to the farmer and monitored from remote place through GSM technology. Automatic control should be taken by the system in case of GSM technology failure. Further, signal sequence checker circuit is designed to provide security to the system in case of electricity fluctuations and to make it a 'closed-loop control system'. This system is divided into three parts as given below:

3.1 Microcontroller Circuit

The controller is the heart of entire system, and the whole system should be analysed in selecting the proper controller. We are using ATMEL's AT89S51 microcontroller. It is a 40 pin microcontroller with 128 bytes RAM & 4kb flash memory. It performs all the functions like getting data from ADC, comparing the current temperature to set temperature, turning ON/OFF the relay & displaying the temperature & Set point on the LCD.

3.2 LCD

The LCD requires 3 control lines (RS, R/W & EN) & 8 (or 4) data lines. The number on data lines depends on the mode of operation. If operated in 8-bit mode then 8 data lines + 3 control lines i.e. total 11 lines are required and if operated in 4-bit mode then 4 data lines + 3 control lines i.e. 7 lines are required. How do we decide which mode to use? It's simple if you have sufficient data lines you can go for 8 bit mode & if there is a time constrain i.e. display should be faster then we have to use 8-bit mode because basically 4-bit mode takes twice as more time as compared to 8-bit mode.

3.3 Keypad

The adjoining figure of a matrix keypad ,it is interfaced with the controller. As you can see no pin is connected to ground, over here the controller pin itself provides the ground. We pull one of the column pins low & check the row pins if any of the pin is low then we come to know which switch is pressed. Suppose we make column 1 pin low and while checking the rows we get Row 3 is low then we come to know switch 7 has been pressed.

4. CIRCUIT DESIGN AND IMPLEMENTATION

4.1 Power supply

Power supply is supply of electrical power. A device or system that supplies electrical or other types of energy to an output load is called a power supply unit or PSU. There are different types of power supplies e.g. Battery power supply, unregulated power supply, linear or regulated power supply etc. All digital circuits require regulated power supply. In this article we are going to learn how to get a fixed regulated positive supply from the mains supply. Design of power supply is as shown below:

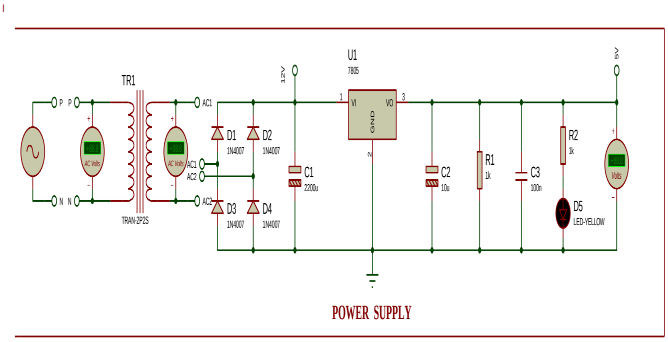


Fig.2 Design of power supply

4.2 Microcontroller circuit

Interfacing of AT89C51 is as shown below:

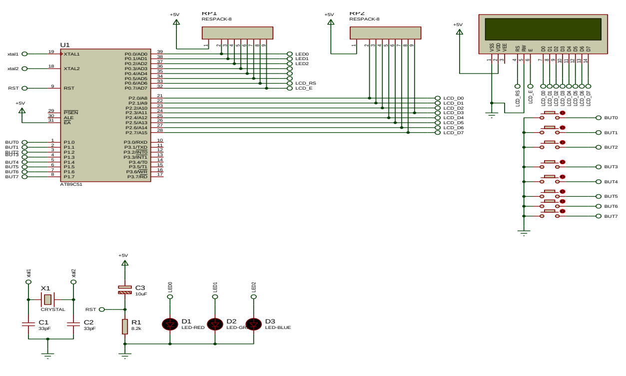


Fig.3 Testing of microcontroller

5. CONCLUSION

An automated system for agriculture was successfully designed and assembled. It serves to reduce the consumption of water used, the human monitoring time and the labour associated with standard methods. This design uses a timed feedback control to measure the soil moisture and turn on the valve on demand, in regular intervals. Such a system can be manufactured at a relatively low cost using simple electronic parts. The soil moisture probe is the most expensive component. It can be installed easily in a home environment and requires little resources. The design is still in a prototype stage. More tests need to be conducted before the efficiency, durability, and reliability can be demonstrated. Additionally, many improvements can be made to make the system more versatile, customisable, and user-friendly.

6. POSSIBLE FUTURE IMPROVEMENTS

1. More options may be customizable, such as the size of the geotextile.
2. All electronic components may be incorporated on a printed circuit board. They
3. may also be integrated onto a single chip (so-called System On Chip).
4. Wireless sensors can be used to get data and exact parameters of that area.

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