A Theme based Project Report

On

# AUTOMATIC IRRIGATION AND MONITORING SYSTEM

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# 1. INTRODUCTION

In the fast paced world human beings require everything to be automated. Our life style demands everything to be remote controlled. Apart from few things man has made his life automated. In the world of advance electronics, life of human beings should be simpler. Hence to make life simpler and convenient, we have made “AUTOMATIC IRRIGATION SYSTEM”. A model of controlling irrigation facilities to help millions of people. This model uses sensing arrangement technology with microcontroller to make a smart switching device.

The continuous increasing demand of food requires the rapid improvement in food production technology. In a country like India, where the economy is mainly based on agriculture and the climatic conditions are isotropic, still we are not able to make full use of agricultural resources. The main reason is the lack of rains & scarcity of land reservoir water. Irrigation has always been an ancient practice which has evolved through so many stages over the years.

Our ancestral farmers in a bid to irrigate their farm sought for various methodologies. Manual irrigation using buckets and watering cans, flood irrigation, drip irrigation, sprinkler irrigation were and are still being used today. The existing system has several limitations; leaching off of soil nutrients, erosion due to flooding, loss of water from plant surfaces through evaporation, water wastage which can result to water scarcity in drought areas and production of unhealthy crops. This problem can be rectified if we use microcontroller based automated irrigation system in which the irrigation will take place only when there will be acute requirement of water.

# 2.DESCRIPTION

The various hardware components used for making the project are listed below.The description of the components is made.

1. 8051 Microcontroller
2. Transformer
3. Bridge Rectifier
4. Comparator
5. Submersible pump
6. Voltage Regulator
7. Led
8. Lcd
9. Relay
10. Soil moisture sensor.

1. **8051 Microcontroller:** AT89S52 is an 8-bit microcontroller and belongs to Atmel's 8051 family. AT89S52 has 8KB of Flash programmable and erasable read only memory (PEROM) and 256 bytes of RAM. AT89S52 has an endurance of 1000 Write/Erase cycles which means that it can be erased and programmed to a maximum of 1000 times.
2. **Transformer:** Step down transformer converts 230V from AC mains into 12V AC by using a center tap transformer. Transformer selection is based on the fact that regulator ICs require around 11v as input considering dropout voltage, in order to obtain 12v power supply. Transformer steps down ac voltage from 230v ac to 12v ac. It is then given to bridge rectifier. Bridge rectifier converts ac voltage into pulsating dc. It is then given to regulator ICs which output constant dc voltage.
3. **Bridge Rectifier:** Rectifier converts ac voltage into dc voltage. 4 diodes are connected in bridge. Its input is from transformer and output is given to the voltage regulator IC’s.

4. **Comparator:** Soil sensing arrangement is used to measure the volumetric water content of soil. It consists of two prongs, which must be inserted in the soil, an LM358, which acts as a comparator and a pot to change the sensitivity of the sensing arrangement.

5. **Submersible Pump:** pump is a device used to move fluids, such as liquids, gases or slurries. A pump displaces a volume by physical or mechanical action, this pump requires 12V DC of power supply. A submersible pump (or electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitations, a problem associated with a high elevation difference between pump and the fluid surface. Submersible pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersibles are more efficient than jet pumps.

6. **Voltage Regulator:** The LM7805 is a three-terminal positive regulator that is available in the TO-220/D-PAK package and with 5V as fixed output voltage. It employs internal current limiting, thermal shutdown and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, it can deliver over 1A output Current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

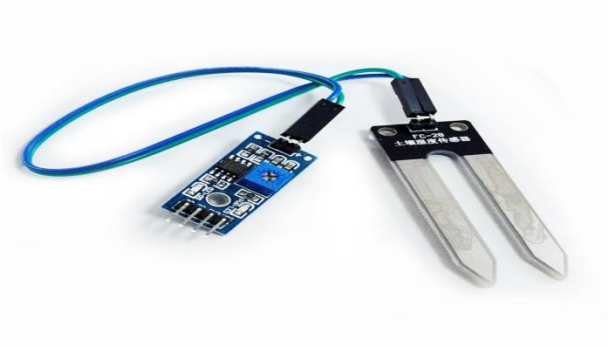
7. **Led:** LED's are semiconductor devices that are made out of silicon. When current passes through the LED, it emits photons as a byproduct. Normal light bulbs produce light by heating a metal filament until its white hot. LED's posses many advantages over traditional light sources including lower

energy consumption, longer lifetime, improved robustness, smaller size and faster switching.

8. **Lcd:** A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images, such as preset words, digits, and 7-segment displays as in a digital clock.

9. **Relay:** A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

## 10. Soil moisture sensor:



Measuring soil moisture is important for agricultural applications to help farmers manage their irrigation systems more efficiently. Knowing the exact soil moisture conditions on their fields, not only are farmers able to generally use less water to grow a crop, they are also able to increase yields and the quality of the crop by improved management of soil moisture during critical stasplant growth stages.

# 3.DESIGN

# 4.WORKING

The soil moisture sensors which are nothing but copper strands are inserted in the soil. The soil sensing arrangement measures the conductivity of the soil. Wet soil will be more conductive than dry soil. The soil sensing arrangement module has a comparator in it. The voltage from the prongs and the predefined voltage are compared and the output of the comparator is high only when the soil condition is dry. This output from the soil sensing arrangement is given to the analogue input pin of the microcontroller. The microcontroller continuously monitors the analogue input pin. When the moisture in the soil is above the threshold, the microcontroller displays a message mentioning the same and the motor is off. When the output from the soil sensing arrangement is high i.e. the moisture of the soil is less. This will trigger the microcontroller and displays an appropriate message on the LCD and the output of the microcontroller, which is connected to the base of the transistor, is high. When the transistor is turned on, the relay coil gets energized and turns on the motor. The LED is also turned on and acts as an indicator. When the moisture of the soil reaches the threshold value, the output of the soil sensing arrangement is low and the motor is turned off.

# 5.CONCLUSION

The system provides several benefits and it can operate with less manpower. The system supplies water only when the humidity in the soil goes below the reference. Due to the direct transfer of water to the roots water conservation takes place and also helps to maintain the moisture to soil ratio at the root zone constant to some extent. Thus the system is efficient and compatible to changing environment. The concept in future can be enhanced by adopting DTMF technology. This project is basically dependent on the output of the sensing arrangement. Whenever there is need of excess water in the desired field then it will not be possible by using sensing arrangement technology. For this we will have to adopt the DTMF technology. By using this we will be able to irrigate the desired field in desired amount.

## References:

http://www.circuitstoday.com/automatic-plant-watering-system-using-8051