

# Agriculture Pump Control Using Pic Microcontroller

T.Akila<sup>1</sup> S.Balachandar<sup>2</sup> S.Deepika<sup>3</sup> B.Dharani<sup>4</sup> D.Malathi<sup>5</sup>

<sup>1</sup>Assistant Professor

<sup>1,2,3,4,5</sup>Department of Electronic & Communication Engineering

<sup>1,2,3,4,5</sup>Kathir College of Engineering, Coimbatore, Tamilnadu, India.

**Abstract**— The main aim of this project is to identify the water availability condition to soil and to automatically control the water supply to land in order to prevent dry condition. The embedded technology is used to indicate status of soil. In agriculture field the soil should be maintain in proper condition. Thus it is done with the help of embedded technology using PIC micro controller. In this project a humidity sensor is used to sense the wet condition of the soil. The water level in the tank is sensed by using water level sensor. The sensed condition is given as input to PIC micro controller and based on condition a PIC will give signal to relay which drives the pump and to mobile phone which displays the condition of the soil. If sensed condition is found to dry “SOIL IS DRY” will get displayed in phone and simultaneously relay will turn on the pump in order to wet the soil. If the sensed condition is found to wet “SOIL IS WET” will be get displayed and signal to relay will be given in order to turn off the pump to stop availability of water to soil. The main advantage of this project is soil maintenance can be achieved effectively and water supply.

**Key words:** Soil moisture sensor, microcontroller, moisture content, automatic irrigation system

## I. INTRODUCTION

We consider the problem of monitoring soil moisture and water level in the soil evolution using a wireless GSM. The main sensor used is water level sensor. Based upon the water availability of the crop that is cultivated in the field. The water can be supplied to the crop effectively. Continuously sampling moisture levels with these soil moisture sensors incurs high-maintenance and energy consumption costs, which are particularly undesirable for wireless networks. By using this sensor, we can find whether the soil is wet or dry. If it is dry, pumping motor will pump the water. The soil moisture sensor is used to find the dry and wet condition of the soil. The water level sensor is used to determine the water level in the soil. In this system, the main controlling device is microcontroller. The PIC Microcontroller is used in this project. Here soil sensor will give the status of the soil and water level sensor give the status of water level in the soil, based on that microcontroller will display the status of the soil on the LCD and switch on or off the pumping motor through relay. The pumping motor will pump the water into the field by until the field is wet which is continuously monitor by the microcontroller.

## II. LITERATURE SURVEY

### A. Effective Irrigation System and Crop Suggestion

This paper focus on smart irrigation system which is cost effective and middle class farmer use it in farm field. Today we are living in 21th century where automation plays important role in human life. It not only provide comfort but

also reduce energy, efficiency and time saving. I This paper develops a small embedded system device which takes care of a whole irrigation process. The Raspberry Pi micro controller interfaced with GSM module works as a brain and several sensors like temperature, soil moisture. The power detecting circuit and battery backup unit take this ESD to next level by informing presence of three phase power supply in the field. The farmer needs to send commands through SMS from her/his mobile phone to this ESD to carry out irrigation process. If and only all parameters are within a safe range, the Raspberry Pi starts irrigation process by starting the irrigation pump. The farmer gets time to time notification about the action that has taken place by Raspberry Pi. The GSM module allows farmers to control a remotely placed rrigation pump from anywhere. In this way, this new engineering technology makes farmers life easier by providing remotely operated, more efficient and cost effective irrigation system. state is the state when motor is running in the absence of water. This state damages Irrigation pump by increasing motor winding temperature beyond safe limit. This new technology makes farmer life easier by providing remotely operated, more efficient and cost effective irrigation system.[1]

### B. IOT Based Smart Agriculture

The project aims at making agriculture smart using automation and IoT technologies. The highlighting features of this project includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc. Secondly it includes smart irrigation with smart control and intelligent decision making based on accurate real time field data. Thirdly, smart warehouse management which includes temperature maintenance, humidity maintenance and theft detection in the warehouse. Controlling of all these operations will be through any remote smart device or computer connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi or ZigBee modules, camera and actuators with micro-controller and raspberry pi.[2]

### C. Automatic Irrigation System on Sensing Soil Moisture Content

This project on "Automatic Irrigation System on Sensing Soil Moisture Content" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In the domain of farming, utilization of appropriate means of irrigation is significant. The benefit of employing these techniques is to decrease human interference and still make certain appropriate irrigation. This automated irrigation project brings into play an Arduino board ATmega328 micro-controller ,is programmed to collect the input signal of changeable dampness circumstances of the earth via dampness detecting system.[3]

#### D. Automatic Irrigation System Based on RF module

In this paper, automatic irrigation system based on ARMs and RF module. All the system will be setup using ARM and RF module. The most important factor of this system is RF module which is used to send and receiving the message to the controller. This system used three nodes which communicate each other and irrigate paddy field automatically. The aim of our project is to modernizing agriculture technology by programming components and built the necessary component for the system. The system is real time based and extracts the exact condition of paddy field. There is one central node used which to control other node. The main function of RF module is to pass the message to the node and operate the system.[4]

#### E. DTMF Based Agriculture Pump Control

The human mind always needs information of interest to control systems of his/her choice. In the age of electronic systems it is important to be able to control and acquire information from everywhere. Although many methods to remotely control systems have been devised, the methods have the problems such as the need for special devices and software to control the system. This paper suggests a method for control using the DTMF tone generated when the user pushes mobile phone keypad buttons or when connected to a remote mobile system. The proposed work has been done experimentally and has been verified in real time.[5]

### III. PROCESS DESCRIPTION

#### A. GSM Modem

A GSM Modem is a specialized type modem which accepts a SIM card, operates over a subscription to a mobile operator, just like mobile phone. The detailed information about the system is send to mobile through GSM.

The below fig shows the complete block diagram,

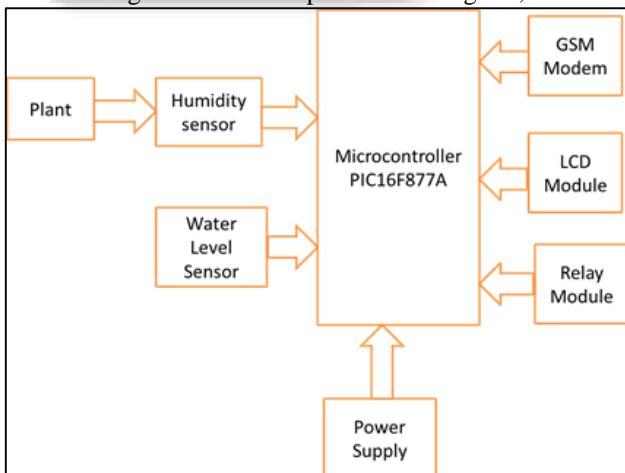


Fig. 1:

#### B. Soil Moisture Sensor

The heart of the sensor module is the Microcontroller to which the soil moisture sensor, temperature sensor and wind sensor modules are interfaced. That the system will checks the moisture conten in th soil, based on that pumping motor will automatically pumps the water into the field. Here we are using soil moisture sensor. By using this sensor, we can find whether the soil is wet or dry.

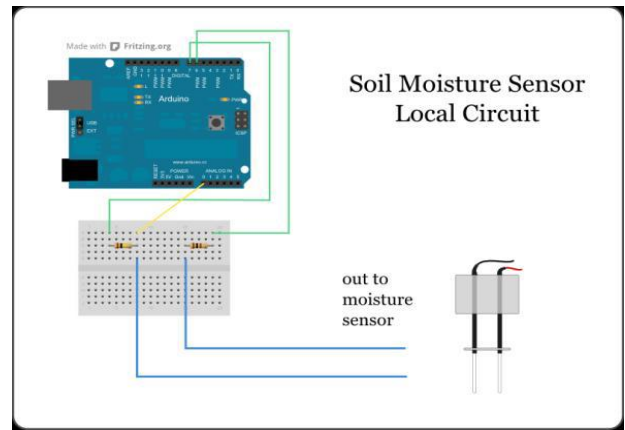


Fig. 2:

#### C. Microcontroller

The Intel MCS-51 commonly referred to as 8051 is a Harvard architecture, CISC instruction set, single chip microcontroller (μC) series which was developed by Intel in 1980 for use in embedded systems. Intel's original versions were popular in the 1980s and early 1990s and enhanced binary compatible derivatives remain popular today. Intel's original MCS-51 family was developed using NMOS technology, but later versions, used CMOS technology and consume less power than their NMOS predecessors. This made them more suitable for battery-powered devices

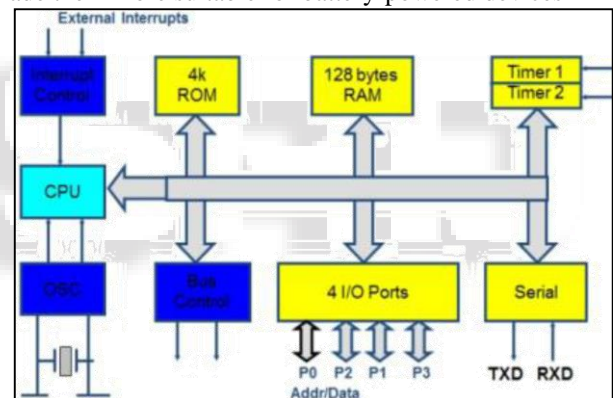


Fig. 3:

#### D. The Relay Module

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.

#### E. LCD Module

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.

### IV. RESULT ANALYSIS

The technical questions arising in precision agriculture are all focusing upon increasing the efficiency of the field which results from networking sensors to monitor important spatiotemporal patterns in the field and integrating the data

to display or record information, and also to actuate further human or automatic responses.

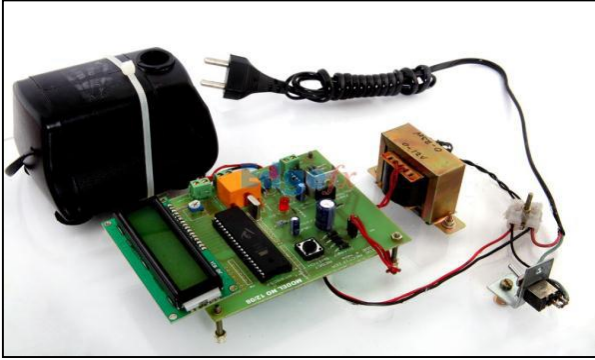


Fig. 4:

In the field of agriculture the most important part is: firstly, to get the information about the fertility of soil and secondly moisture content of soil. After measuring these two factors a farmer can start sowing of seeds. Here a system is developed based on GSM network. The sensor nodes can obtain the soil moisture, temperature, humidity information in real time, and then transferred to the remote monitoring centre by the gateway via the transmission network. This intelligent agriculture monitoring system has the useful characteristics of low power consumption, low cost, large network capacity, flexible disposition, and minor influence on the natural environment. In irrigation process the water level is sensed by the sensors and the information are processed by the controller and transmitted over the GSM module. At the base station the data is received by the Receiver module and transferred to PC through RS232 interface. The data will be processed by the microcontroller and then can be transmitted to farmer's mobile phone using GSM module. Then these commands can be further given by the farmer through GSM which will initiate the irrigation process via relay controlled motor depending on the moisture conditions of the soil.

#### V. ADVANTAGES

By this project we can control the moisture content of the soil and in the cultivating field. The water level in the soil can be identified using water level sensor. Based on soil moisture and water level in the, pumping motor will be automatically switch on or off through relay. This saves the water at the same time and on the other hand the plant can get optimum level of water, so increasing productivity of crop.

#### VI. APPLICATIONS

- 1) Industrial automation.
- 2) Can also be used for security purpose after modification.
- 3) In places where control of action has not any time limit.

#### VII. CONCLUSION

The Soil moisture content and water level based irrigation system was developed and successfully implemented. Salient features of the system are: Closed loop automatic irrigation system, temperature and water usage monitoring. User can easily preset the levels of the Moisture and is regularly updated about current value of all Parameters on

LCD display. In future, other important soil parameters namely soil pH, soil electrical conductivity will also be incorporated in the system.

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SANJUKUMAR, R.V.KRISHNAIAH  
(M.Tech, Dept of ECE, D.R.K. Institute of Science and Technology, Hyderabad, India)  
(Principal, Dept of ECE, D.R.K. Institute of Science and Technology, Hyd, India)  
sanjumelshetty@gmail.com, r.v.krishnaiah@gmail.com
- [4] Automatic Irrigation System Based on RF mod  
Ms. Deweshvree Rane  
PG Scholar - VLSI,  
Sevagram, Wardha, India  
Prof. P. R. Indurkar  
Professor, BDCE, Sevagram,  
Sevagram, Wardha, India  
Prof. D. M. Khatri  
Assistant Professor, BDCE, Sevagram,  
Sevagram, Wardha, India
- [5] DTMF Based Agriculture Pump Control  
<sup>1</sup>Prof. Poornima Mahesh, <sup>2</sup>Sayali Khismatrao, <sup>3</sup>Varsha Gadge, <sup>4</sup>Aishwarya Thampi, <sup>5</sup>Kiran Kalambe  
Assistant Professor, 2, 3, 4, 5 Students, Department of Electronics Engineering, K C College of Engineering & Management Studies & Research, Mith Bunder RD., Kopri Thane (E), Maharashtra, India.