IoT Based Real Time Agriculture Environment using PIC16F877A Microcontroller

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Abstract— Recent trends and technologies involve more practical use in agriculture desires that may improve production potency, product quality, harvests, and cut back their environmental impact. Automation in agriculture brings a couple of elementary contribution to what's currently referred to as reality of being accuracy in agriculture farming. The period of time environmental parameter that makes an eternal impact on the crop from cultivating until harvest home it. It includes soil wetness, temperature, water level and pH scale of soil. The soil pH may be alive of the acidity and pH in soils. pH scale levels vary from zero to fourteen, with seven being neutral, below seven acidic and on top of seven a calescent. The optimum pH scales vary for many plants are between 5.5 and 7.0; but several plants have custom-made to thrive at pH scale values outside this vary. The most intend is to be specialized in economically growth of agriculture for developing it desires. Watching the environmental factors isn't the entire resolution to extend the yield and productivity of crops. There square measure variety of alternative factors that decrease the productivity to a bigger extent. Therefore the automation should be enforced in agriculture to beat these issues mistreatment PIC Microcontroller and sensors and Motor Drive Modules in IoT.

Keywords: PIC Microcontroller, sensors, DC Motor Drive Modules

I. INTRODUCTION

A. *Smart Agriculture System*

As today's scenario is trending into impact of new technologies and implementations it is a necessary goal to implement and trend up the agriculture. Many researches are undergone in the field of agriculture. Many existing results of projects adopt the methodology and use of wireless sensor network which in terms collect data from different sensors at various nodes and send it through the wireless protocol. The existing data provides the information about the various agricultural environmental factors. Apart from the environmental factors there are many other factors that decrease the productivity to a greater extent. Hence automation must be implemented in agriculture to overcome factors like time, cost, manpower and production increase. So, in order to overcome such problems, it is required to develop an integrated system which will make flexible and liability of all factors affecting the productivity in every stage. Hence the proposed system of this paper deals about developing smart agriculture using IoT which is to help the farmers for their future scope.

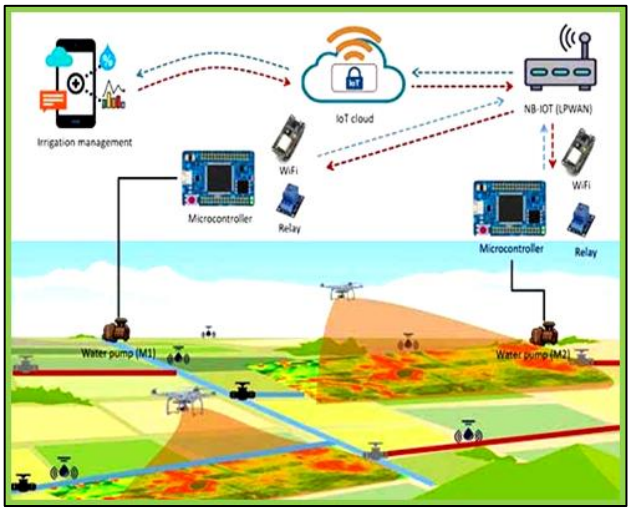

Fig. 1.1: IoT Environment

II. LITERATURE SURVEY

In the existing method and in the oldest ways the agriculture parameters are verified manually. In this method the farmers themselves they verify the required parameters to adopt the readings. [1] It measures to implementing on developing devices and tools for analyzing and to make the users alive by the use of a wireless sensor network system. [2]It aims to making agriculture smart using automation and IoT technologies. The prominence features are smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, human detection and trust surveillance. [3]The cloud computing devices that can create a whole computing system from sensors to tools that examine data from agricultural field images and from human factors on the land and precisely provide the data into the repositories along with the location as GPS coordinates.[4]This idea proposes a novel tactic for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology.[5]It proposes a low cost and efficient wireless sensor network technique to acquire the soil moisture and temperature from various location of farm and as per the need of crop controller to take the decision whether the irrigation is enabled or not.[6]It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information.[7]The atmospheric conditions are monitored and controlled online by using Ethernet IEEE 802.3.[8]It is designed for IoT based monitoring system to analyze crop environment and the method to improve the efficiency of decision making by analyzing harvest statistics.[9]In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. The variations are seen in color,

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texture and morphology. [10]In this paper, greenhouse is a building in which plants are grown in closed environment. It is used to maintain the optimal conditions of the environment, greenhouse management and data acquisition.

III. PROPOSED WORK

Many sensors are utilized in the field work such as temperature sensor, Moisture sensor PIR sensor which involves playing a major action in this proposed work. Data which is received is verified in the control section with the appropriate parameters along with their set threshold level. If the parameters overcome the threshold level then the LED is turned ON along with the Buzzer for the notification.

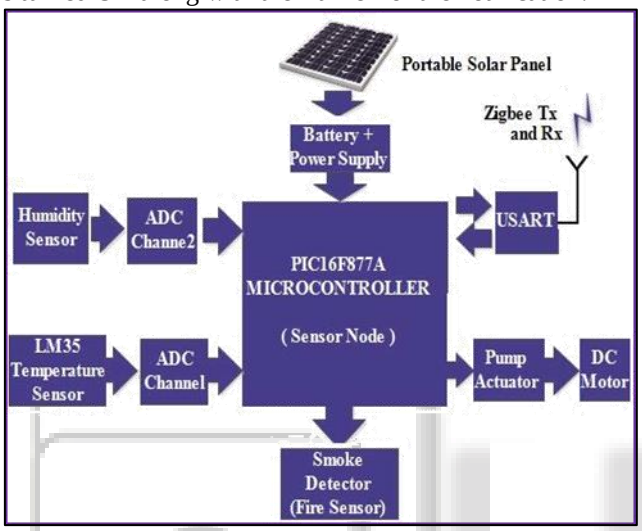

Fig 1.2: Block Diagram of the system

At that time the DC motor is automatically turned ON to intend and start roof cover to rotate from bottom of the field to top to protect the crops. By this method a small area of land is rescued. In olden days manual transmission is required to set the threshold level and to RESET the buzzer, but in automatic mode the GSM along with the microcontroller used to SWITCH ON and SWITCH OFF. Here along with other parameters the water sensor is used to indicate the level of water and its resource in the land.

IV. HARDWARE USED

A. PIC16F877A-Microcontroller

The PIC microcontroller 16F877A is one of the most popular microcontrollers in the industry. It is user convenient and easier to handle. The coding or programming of this controller is also easy. The program that is coded can be easily erased due to the flash memory technology. The microcontroller has wide range of applications used in many huge industries. It is used in security, remote sensors, home appliances and industrial automations. An EEPROM is also featured which is used to store the information permanently like transmitter codes and receives frequencies and some other related data.

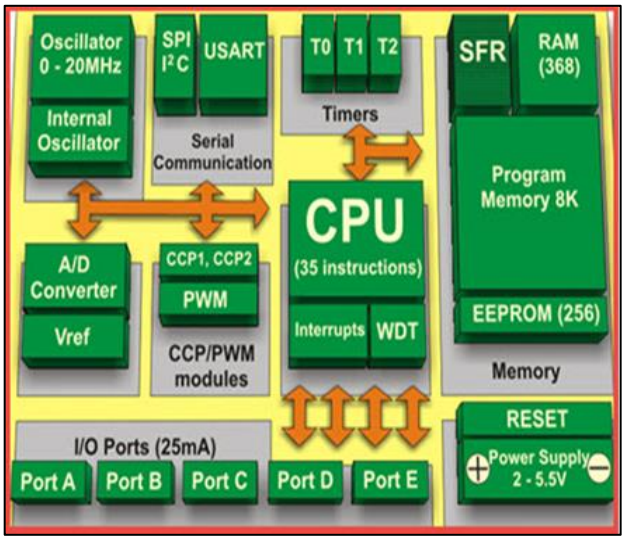

Fig. 1.3: Architecture of PIC16F877A

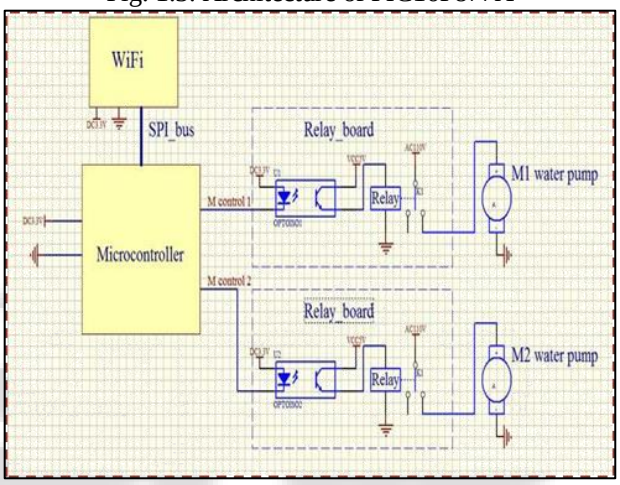

Fig. 1.4: Proteus Design

B. GSM Module

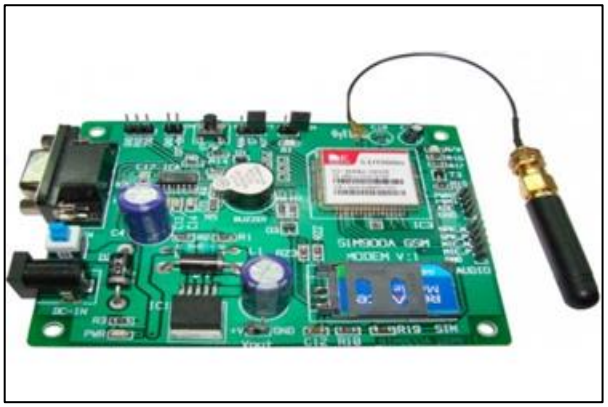

Fig. 1.5: GSM Module

GSM Modem allows GSM network operator SIM and it can perform like a mobile phone with its own unique Identified phone number. The purpose of using this is it can use RS-232 protocol which can be easily connected to the microcontroller. GSM can be used like a mobile phone in which we can send and receive SMS and make a call. The GSM modem is connected to the microcontroller through RS- 232. The SMS is sent through the terminal to the number using AT Commands. "AT-Attention" commands which is used by the controller to control the GSM to

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perform the desired function. It also has reverse voltage protection and the LED notifications. It is operated in 900/1800 MHz

C. Soil Moisture Sensor

Fig. 1.6: Soil Moisture Sensor

Soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. It works on the principle of open and short circuit. The output is high or low indicated by the LED. When the soil is dry, the current will not pass through it and so it will act as open circuit. Hence the output is said to be maximum. When the soil is wet, the current will pass from one terminal to the other and the circuit is said to be short and the output will be zero.

D. Temperature Sensor

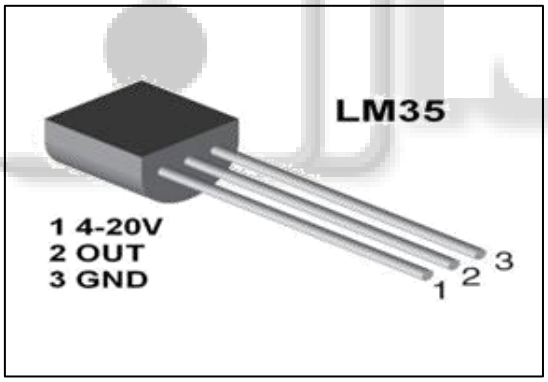

Fig. 1.7: Temperature Sensor

These types of temperature sensor vary from simple ON/OFF thermostatic devices which control a domestic hot water heating system to highly sensitive semiconductor types that can control complex process control furnace plants. Plants require the proper environmental conditions for optimal growth and health. If the mixture of temperature, humidity and light are incorrect, fruit and vegetable yield can be affected. It can help you monitor and maintain the optimal mix of environmental conditions for plant growth. Most commonly used sensor use is LM 35 because the output voltage is linear with along with the Celsius scaling of temperature .It has wide operating range with the output as 5v.

E. PIR Sensor

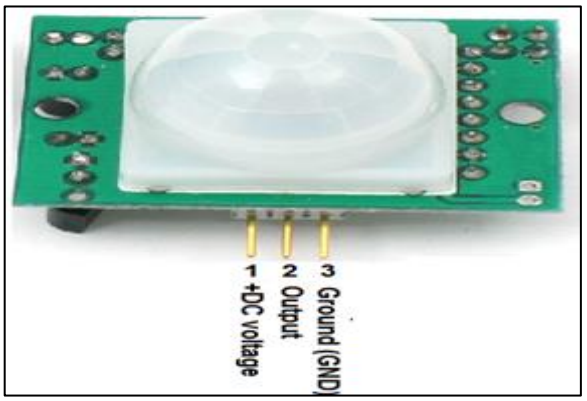

Fig .1.8: PIR Sensor

PIR sensor is also called as passive infrared, pyroelectric or IR motion sensor, it senses an infringement based on the IR levels. Emittion of IR radiations, some emits low some high depending on humidity preent. A PIR sensor has two slots in it which are made of IR sensitive material. When there is no movement in front of the slots, both the slots detect same levels of IR. When something humid like a human being and animal passes in front of the slots then the first slot detects some change in IR level and creates a positive differential change between the two slots. As the human being and animal passes from the second slot, it creates a reverse effect i.e., negative Differential between the two slots. The changing levels of IR are detected by the PIR.

V. SOFTWARE USED

A. Proteus Simulator

Proteus 8 is one of the best simulation software for various circuit designs of PIC microcontroller. It has inbuilt technology availing all microcontrollers and electronic components readily in it which is widely used. It can be used to codec programs and implanted designs for electronics before tangible hardware testing. The simulation of programming of microcontroller can also be done in Proteus. Simulation avoids and prevents the hardware design and manages the risk of damaging hardware due to the wrong design.

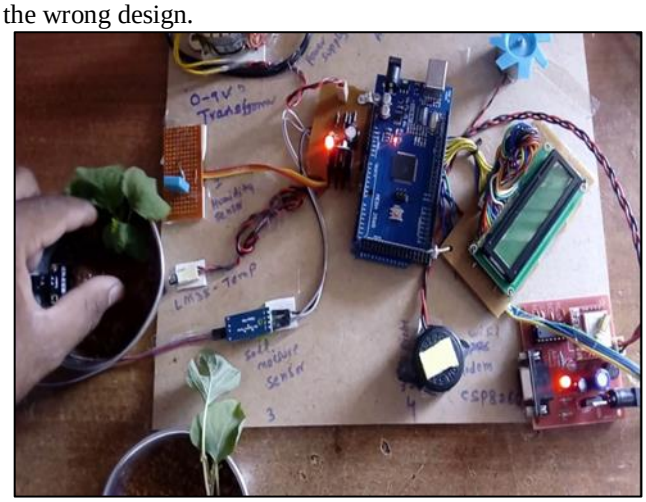

Fig .1.9: Project Module

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VI. CONCLUSION AND FUTURE WORK

This paper completes the description of the PROTEUS - based applications for real time agriculture production and quality assessment. The future work could be aimed to extend the set of applications to cover even more areas of agriculture fields and lands. Many researchers are currently working on development of new applications for quality assessment in the field of agriculture. For future developments it can be enhanced by developing this system for large acres of land. Also the system can be integrated to check the quality of the soil and the growth of crop in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. All observations and experimental tests induced that this project may find clear solution to field activities and irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production.

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