

Smart Agriculture Using Pic Microcontroller and GSM Based Technology

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Abstract – Agriculture plays vital role in the development of agricultural country. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. Issues concerning agriculture have been always hindering the development of the country. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence 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.

Key Words: Sensors, GSM, Motor, pic controller, Disease.

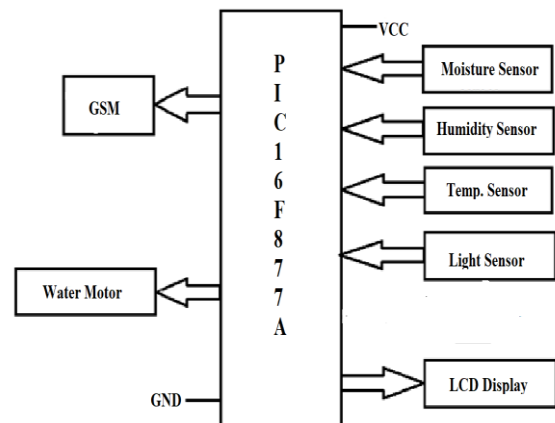
1. INTRODUCTION

Agriculture plays vital role in the development of agricultural country. Farming is still dependent on technique which were evolved hundreds of years ago & doesn't take care of conservation of resources. We have the technology to bridge the gap between water usages & water wastage. Technology used in some developed countries is too expensive and complicated for a common farmer to understand. Our project is to give cheap, reliable, cost efficient and easy to use technology which would help in conservation of resources such as water and also in automatizing farm.

Using GSM technology such as sensors, so that farmers can take actions quickly. They can make well founded decisions for their crops based on weather conditions, moisture and humidity, chemical compositions of the soil. Development of agriculture using technology will be very much useful in cultivation. For a new agricultural area, without knowing or monitoring the important parameters of the soil, cultivation will be difficult and so the farmers suffer financial losses.

The measurements of temperature, relative humidity measurement by using the sensors important in weather monitoring for agricultural. A device for weather monitoring is presented in this project to monitor the temperature, atmospheric pressure, relative humidity in crop field is detected and transmitted via GSM module, using analog and digital components.

1. Methodology



Block diagram consist of different types of sensors like temperature sensor, light sensor, humidity sensor, soil moisture sensor, GSM, LCD display and water motor etc. All sensors are connected to the pic microcontroller; LCD is also connected to the pic microcontroller.

The input voltage is 230volt AC is applied to the transformer. Transformer is 12volt so we get 12volt output at the output of transformer. Then we use bridge rectifier for filtering purpose. Regulator IC 7805 is used to regulate the output coming from bridge rectifier so we get 5volt DC output at the output of regulator IC 7805. Power supply is used for converting AC voltage to a regulated DC voltage.

LM35 is a temperature sensor, operating at 4volt to 30volt which is used to sensing the temperature from surrounding environment. DHT11 is a humidity sensor, operating at 3.3volt to 6volt which is used to sensing the relative humidity in the air.

Soil moisture sensor operating at 3.3volt to 5volt which is used to measure the moisture in the soil and similar

materials. LDR is a light sensor which is used to measure the light coming from sun.

This type of all data coming from the sensors which is given to the pic microcontroller. Data from sensor is displayed on the LCD. In pic microcontroller sets the threshold values for sensors reading because of that we get a particular name of disease. The pic microcontroller transmits all data collected by the sensors to the GSM and GSM is used to send the message on mobile phone. So on mobile phone we get a name of disease and medicine for that disease.

When soil moisture sensor take reading below 20% then water motor is turned on automatically. When soil moisture sensor take reading above 20% then water motor is turned off automatically.

1.1 GSM Sim 900A:



GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command.

The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The on-board Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet etc. through simple AT commands.

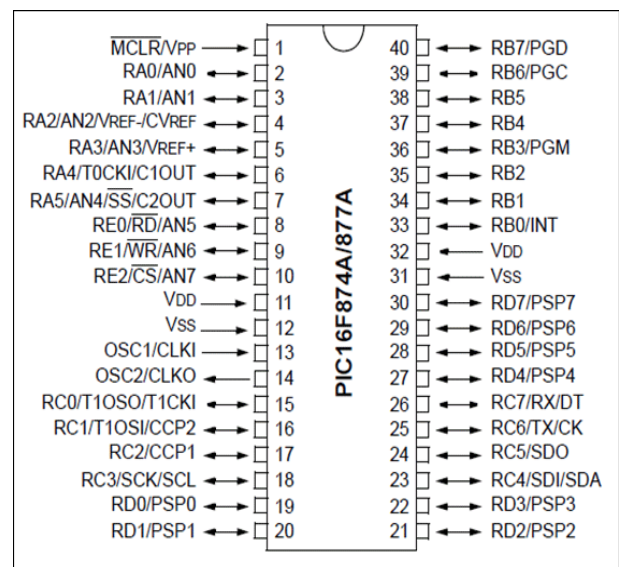
1.2 Water Motor:



Smaller electric water pumps, such as the kinds used in homes, usually have small DC motors. The DC motor is contained in a sealed case attached to the impeller and powers it through a simple gear drive. In the center of the motor is a rotor with coils around it. Around those coils are magnets, which create a permanent magnetic field that flows through the rotor.

When the motor turns on, electricity runs through the coils, producing a magnetic field that repels the magnets around the rotor, causing the rotor to spin around 180 degrees. When the rotor spins, the direction of the electricity in the coils flips, pushing the rotor again and causing it to spin the rest of the way around. Through a series of pushes, the rotor continues to spin, driving the impeller and powering the pump.

1.3 Pic microcontroller



PIC16F877a is a 40-pin PIC Microcontroller and is used mostly in Projects and Applications. Few of its features are as follows:

It has five Ports on it starting from Port A to Port E.

It has three Timers in it, two of which are 8 bit Timers while 1 is 16 Bit.

It supports many communication protocols like:

Serial Protocol.

Parallel Protocol.

I2C Protocol.

It supports both hardware pin interrupts and timer interrupts.

Here's the PIC16F877a Pin Diagram, I have mentioned the names of all the Pins and have also given different colours to different Ports.

PIC16F877a has 5 Ports in total which are:

Port A: It has 6 Pins in total starting from Pin # 2 to Pin # 7. Port A Pins are labelled from RA0 to RA5 where RA0 is the label of first Pin of Port A.

Port B: It has 8 Pins in total starting from Pin # 33 to Pin # 40. Port B Pins are labelled from RB0 to RB7 where RB0 is the label of first Pin of Port B.

Port C: It has 8 Pins in total. Its pins are not aligned together. First four Pins of Port C are located at Pin # 15 – Pin # 18, while the last four are located at Pin # 23 – Pin # 26.

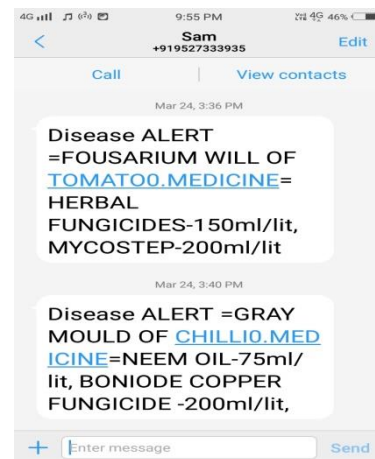
Port D: It has 8 Pins in total. Its pins are also not aligned together. First four Pins of Port D are located at Pin # 19 – Pin # 22, while the last four are located at Pin # 27 – Pin # 30.

Port E: It has 3 Pins in total starting from Pin # 8 to Pin # 10. Port E Pins are labeled from RE0 to RE2 where RE0 is the label of first Pin of Port E.

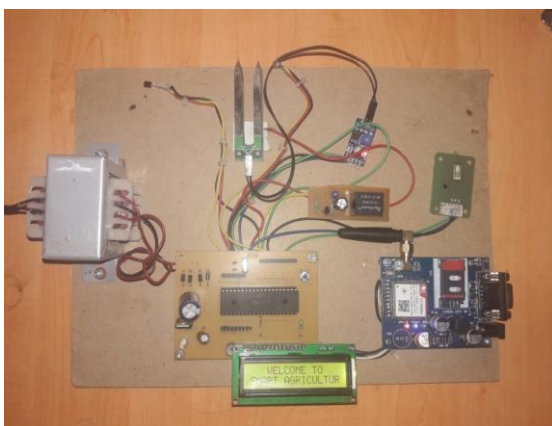
In smart agriculture using pic microcontroller based GSM technology consist of temperature sensor, humidity sensor, soil moisture sensor, light sensor, GSM module. All sensors are successfully interfaced with pic microcontroller. Each sensor is separately connected to the pic microcontroller. The pic microcontroller used interfaced with GSM. This pi microcontroller transmits all the data collected by the each sensor to the GSM and this data displayed on the LCD.



The GSM module sends a message on mobile phone. So on mobile phone we get a particular name of disease and medicine for that disease which we are going to detect the or identifying from our sensor data.



2. System Overview



3. CONCLUSIONS

The system includes both the hardware and software interfaces and provides an easily accessible and user friendly mobile device. In mobile device, message provides suggestions and notifications to almost all the problems faced by the farmers. Hence the farmer can perform instant actions to any problem.

The results obtained from the measurement have shown that the system performance is quite reliable and accurate. The implementation is made easier thus this system in the field can definitely help of improve the yield of the crops and overall productions. Each parameter is viewed by separate sensor. Wi-Fi is advanced technique so which is useful for future work.

4. REFERENCES

- [1] J. Dhivya, R. sivaSundari, S. Sudha, R. Thenmozhi, "Smart Sensor Based Soil Monitoring System" published by International journal of advanced research in electrical, electronic and instrumentation engineering in 4 April 2016.
- [2] Ms.ShraddhaAshokKumarMaurya, "IOT Based Agriculture" published by International journal of latest trends in engineering and technology.
- [3] S. R. Nandurkar, V. R. Thool, R. C. Thool, "Design and Development of Precision Agriculture System Using Wireless Sensor Network" published by IEEE international conference on automation, control, energy and system in Feb 2014.
- [4] NikeshGondchawar, Prof.Dr. R. S. Kawitkar, "Smart Agriculture Using IOT and WSN Based Modern Technologies" published by International journal of innovative research in computer and communication engineering in 6 June 2016.