Agricultural field monitoring and automation using PIC16F877A microcontroller and GSM.

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Abstract— **Agriculture is an important activity which directly and indirectly engages 70% of the population in India. Water feeding to the agricultural field has to be done regularly with continuous monitoring. Days and Nights continuously monitoring the water feeding and switching ON and OFF the motor becomes a burdensome task to the farmer. When power cuts are there this activity becomes a day long activity for the farmer. The authors of this paper are coming out with a system which monitors the water feeding activity. The motor can also be switched on and off using a mobile by the farmer. Not only that the motor also can be switched on/off wherever power goes and comes. The authors have successfully implemented a prototype of this mechanism using PIC16F877A microcontroller, GSM module, water level sensors and a mobile phone with other necessary electronic devices.**

Keywords- **PIC16F877A Microcontroller, Water level sensors, GSMmodule.**

I.INTRODUCTION

In the past few decades, monitoring and controlling the machines remotely has become an important area of research in many engineering fields. This paper is mainly focusing on two points 1) Monitoring 2) Controlling using PIC16F877A microcontrollers and GSM technology in agricultural fields. Agriculture in India has a significant history. India is ranking second in farm output. Monitoring and controlling the agriculture is an important task for the farmers as they have to regularly feed water days and nights. It is very important in agricultural fields to monitor and control

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agriculture and to provide high security to keep check on them otherwise which in turn leads to damages. The proposed system is based on PIC16F877A microcontroller, water level sensors and GSM MODEM SIM300 V7.03 GSM module which will be discussed one by one.

II. COMPONENTS USED

PIC16F877A

PIC referred to "peripheral interface controller" is a family of advanced Harvard architecture.PIC microcontrollers is popular due to their low cost, wider availability, serial programming capability, re-programming with flash memory.PIC16F87XA is a 28/40/44-pin enhanced flash microcontrollers [1]

PIC16F877A Features

- Program memory: 14.3K Bytes,8192 single word instructions
- DataSRAM(Bytes): 368
- EEPROM:256 Bytes
- I/O:33
- 10-bit A/D(ch):8
- CCP(PWM):2
- MSSP:SPI,MASTER I2P
- USART:yes
- Timers/Counters:8-bit-2,16-bit-1

GSM MODEM SIM300 V7.03: The GSM modem is a specialized type of modem which accepts a SIM card operates on subscriber's mobile number over a network, just like a cellular phone. Basically it is a cell phone without a display. MODEM SIM300 is a triband GSM/GPRS engine that works on EGSM900, DCS1800MHz and PCS1900MHz frequencies.GSM MODEM is a RS-232 logic level compatible. MAX-

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232 is used to convert TTL to RS232 logic level. [2]

III. PROPOSED SYSTEM

In the proposed work a water level sensor is placed in the agricultural field to indicate the average level of the water in the field. The sensor is attached to the microcontroller through a sensor driver. The microcontroller monitors the level of the water in the field. For example if the motor is running the water level goes on increasing in the field. When the water level reaches the required level the microcontroller senses it and activates the relay driver to switch off the motor. If the power goes before the water level reaching its prescribed level, the microcontroller generates a message and sends it to the farmer through GSM modem. When the power comes, the former receives the message that power is available. The former may send a message through his mobile to switch ON the motor. This message is received by the microcontroller and it send the necessary signal to swich ON the motor.
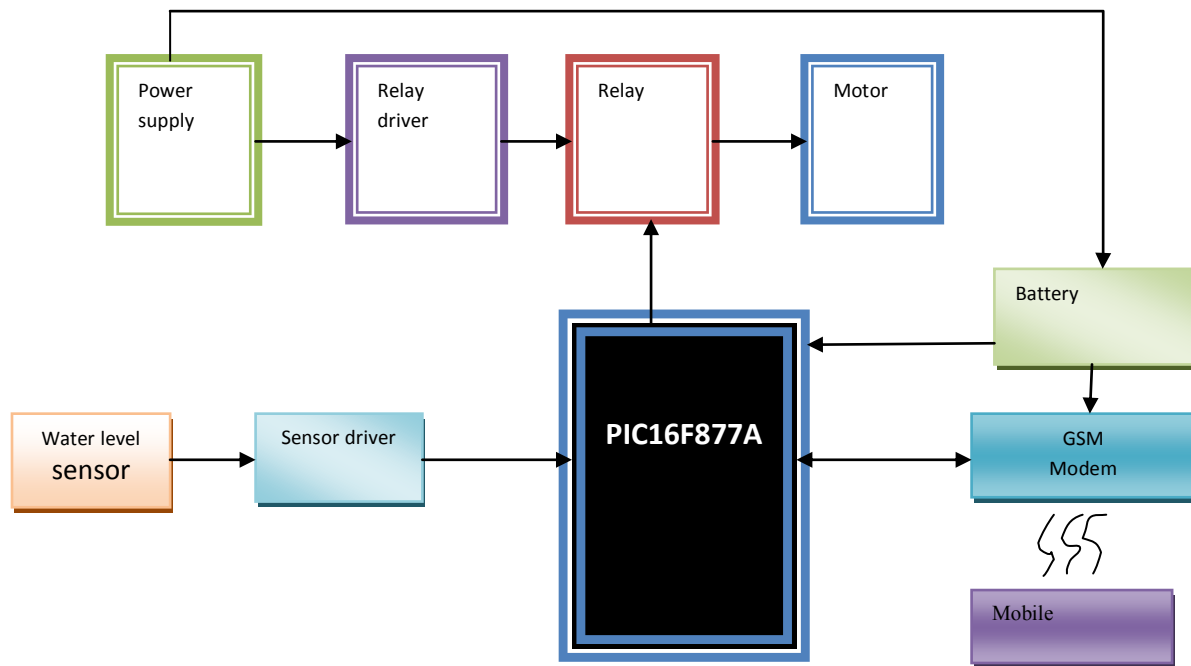

Fig.1 Block diagram of the system

IV. IMPLEMENTATION

In the prototype of the system, a water tub is taken as the agriculture field. And the water level sensor is put into it. Air coller motor is used as a agricultural motor. The system consists of a power supply, Water level sensor, sensor driver, PIC16F877A microcontroller, SIM 900A GSM Module, Motor and Motor Relay as shown in the Fig.1. Valid SIM card with sufficient recharge amount is put in the GSM module. The circuit is powered by 5V- DC regulated power supply. The PIC microcontroller is connected to the water level sensor circuit, Relay driver and GSM Modem. The microcontroller is programmed to perform necessary actions. The mobile number used in the GSM modem is included in the code before burning the code into the microcontroller. When water in the tub(field) reaches an average level, Water level sensor circuit senses the level, the PIC microcontroller gets the signal from the sensor driver. The microcontroller then generates a message and sends it through GSM modem to the mobile number that is written into its program. Now the motor can be turned OFF by sending the SMS from the mobile phone to the SIM number in the GSM modem. Whenever there is a power cutoff, the motor gets switched off automatically .But when the power

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comes the farmer need not come to the field and switch ON the motor. Rather he can switch it ON through his mobile.

V. FLOWCHART OF THE PROCESS
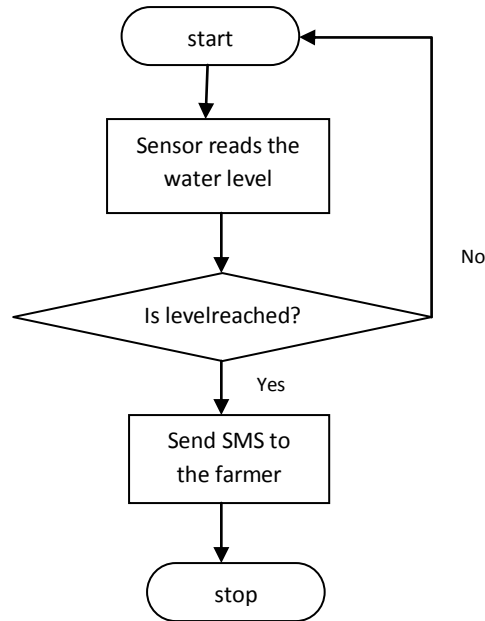
The programs written in the Assembly langrage and the corresponding hex codes are developed using the assembler. The hex code is finally dumped into the microcontroller using the Topwin Universal Programmer. In order to activate the message sending using GSM MODEM, AT Commands are used. Microcontroller controls the devices through relays depending on the code received by the GSM modem. Below figure shows the receiver side.

VI.CONCLUSION

In this paper, the authors have implemented the water level monitoring in agricultural field and motor controlling system based on GSM technology using PIC16F877A microcontroller. An advantage of this system is very simple, more competent and low cost. Future work can be done by designing a system based on 3G camera for visual identification of water level from remote level.

IV.REFERENCES

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V.BIOGRAPHY

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