INNOVATIVE REMOTE CONTROL SYSTEM FOR IRRIGATION USING GSM AND BLUETOOTH

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ABSTRACT

Now-a-days ratio of farmers is decreasing significantly. In such cases it is very complicated for the farmer to check the weather conditions at the green house personally. It is very complicated for him to go to all farm fields in person. In such cases our project can be help full for the monitoring and controlling the conditions of the farm field. We are considering the major parameters like temperature, humidity and light intensity. Our project monitors the conditions of the sensors and sends the status message which consists of the status of temperature, light intensity and humidity etc. It is very complicated for the farmer to switch on/off the motor personally if he noticed low moisture in status message. For that purpose we are implementing AC submersible motor which can be controlled by Micro Controller. Farmer can switch on/off the motor wirelessly whenever he wanted by sending text message. By this project farmer can monitor and he can control the weather conditions. Whenever farmer noticed the humidity of the farm field is less than minimum limit then he can switch on the motor with the help of the sms.

I. INTRODUCTION

We are considering important parameters like humidity, light and temperature for monitoring weather conditions. The main factor which influence the fields are temperature, day light and mainly water moisture in soil. Day light can influence the temperature to rise and the raised temperature can affect the soil moisture. We can monitor the temperature of the surrounding using temperature sensor. For the accurate out we are using a real time sensor DS1621. This can be communicated using I2C protocol.

Increase in moisture of soil can result in the loose of farm fields or reduce the productivity. So we are placing the humidity sensor in soil. Farmer can easily understand the moisture percentage in soil. Whenever the moisture in soil rises the humidity sensor alerts by triggering. Whenever the sensor alerts we can switch off the motor.

The sensitivity of the humidity sensor can be altered according to the crop conditions. Whenever the crop requires more water then we can alter the sensitivity of the humidity sensor to high. Sensor alerts only when the increase of the water contents then the fixed sensitivity.

To measure the light intensity we are using Light Dependent Resister. Which resistance can vary depending on the light intensity. We can adjust the light sensitivity. Whenever the light intensity is greater than the regular light sensor activates.

II. DESIGN

The main module that we have to consider to design our project are Temperature sensor, Humidity sensor, Light intensity sensor, LCD, GSM module and AC submersible motor which can controlled by micro controller using the relay as an interface.

2.1 Block Diagram

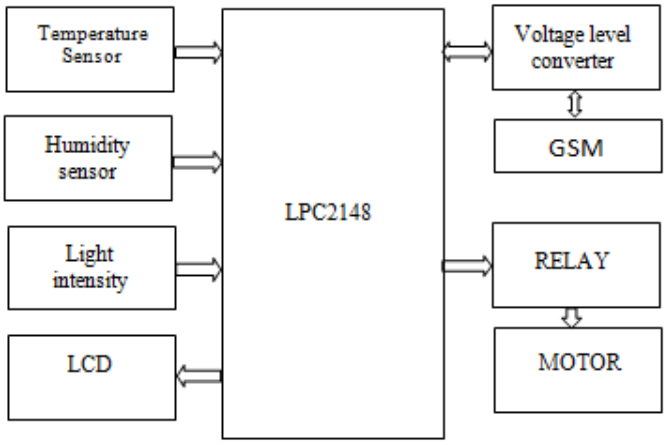

Fig: 1 Block Diagram

2.2 Schematic Diagram

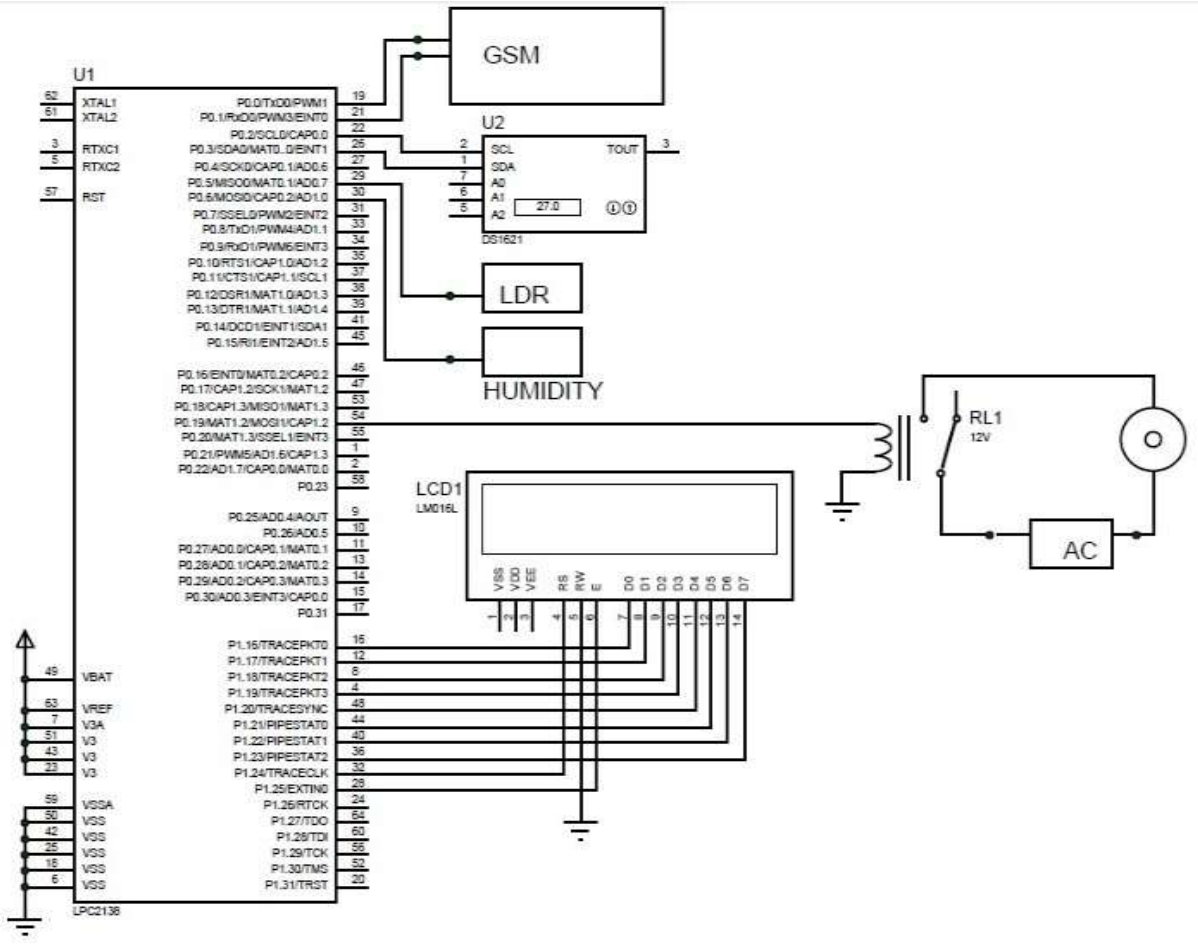

Fig: 2 Schematic Diagrams for Green House Monitoring

2.3 Temperature Sensor

Since we are using our temperature sensor at the farm fields we need high accurate temperature sensor. We are going for the DS1621 which is real time sensor. DS1621 can measure temperature form -55^{o}C to +125^{o}C with resolution of ½^{o}C. DS1621 temperature sensor is digital sensor. To communicate with the DS1621 we need to follow I2C protocol. Which takes two lines to communicate. The two lines are SDA and SCK for data transfer and clock respectively. Since DS1621 is real time sensor we can get most accurate temperature of the surroundings. Since we are using digital sensor instead of analogue sensor we can get accurate value with high resolution. Instead of high and low we can get the temperature value which is ranging from –55 to +125. I2C protocol is known as Inter Integrated Communication. I2C protocol communicates in synchronous serial communication. So the data loss in synchronous communication is less when compared to the Asynchronous communication.

Fig: 3 DS1621 Temperature Sensors

2.4 Humidity Sensor

Humidity is the main parameter that we have to consider such that we can find out that we have to supply water to field or not. For calculating the humidity we are using the humidity sensor. Humidity sensor is manufactured by placing RH sensitive material on ceramic structure. Humidity sensor is based on resistance. Whenever the humidity increases it results in decrease of the resistance. The principle we are using for the calculation of the humidity is voltage divider principle. We are placing a resister which is constant in series. Whenever the change in the humidity sensor it results in the change of voltage drop at humidity sensor. The increase of the humidity results in the decrease of voltage drop at the humidity sensor. We are setting the sensitivity of the humidity sensor. Whenever the increase of the humidity than the require value then sensor alerts.

Fig: 4 Humidity Sensor

2.5 Light Intensity Senor

For the Measurement of light intensity we are using Light Dependent Resistor which is known LDR. The principle of the LDR is the increase in the light intensity results in the decrease in the resistance. We are placing resister in series as we placed for the humidity sensor and at the same time we are placing a circuit for the switching of the sensor output to high/low according to the light intensity. With the help of the light intensity any one can estimate the climate conditions such that is the weather is cloudy or sunny etc. We can easily change the sensitivity of the sensor according to our requirements.

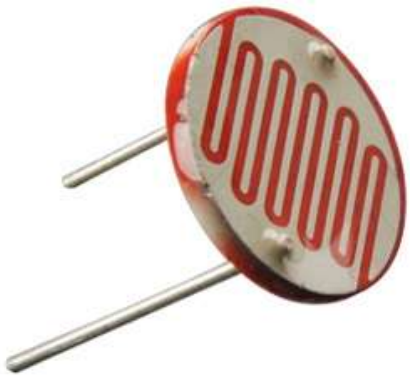

Fig: 5 Light Dependent Resister

2.6 Liquid Crystal Display

Liquid crystal display which is well known as LCD and which consists of two display lines having 16 character in each line. The character display resolution of the LCD display is 7*5 size. For the communication with this device we are using parallel communication of 8 bits or 4 bits. LCD is mostly used for the displaying characters.

2.7 GSM

GSM is known as Global System for mobile communication. GSM uses mobile network for the communication. Now a days we are having wide range of networks so that we can communicate everywhere we have mobile network. We have to place our GSM modem at the farm field where our project is place. Since we are having wide area network the problems due to the network coverage are very less. In India we are using the frequency bands of 800 and 1900 for uplink and down link respectively. To communicate with the GSM modem we have to communicate with the asynchronous mode with 9600 bits/sec. We have to use attention commands for the GSM communications. GSM can capable of sending and receiving of messages, dialing and receiving of calls. GSM modem is capable of the transfer data through the GPRS. GSM modem can capable of saving and deleting of contacts from the sim phone book. We are using SIM 900 module for the communication. Since we using asynchronous serial communication there is chance of data loss, but in our project we are using the modem at short distance the data loss is very less. The voltage levels of the GSM modem are RS232 which means -3v to -25v for high voltage level and +3v to +25v for low voltage level. While coming to arm micro controller the voltage levels are TTL voltage levels. Which mince +3.3v to +5.0v for high and +0.0v to +1.5v for low. Since there is the voltage level difference we are using an interface to convert RS232 voltage level to TTL voltage level and TTL voltage level to RS232 voltage level. MAX232 is used to convert voltage levels.

Fig: 6 Global Systems for Mobile Communication Modem

2.8 AC Submersible Motor

Submersible Motor is used for the pumping water from wells etc. The submersible motor runs with AC power supply. Submersible motor is widely used in the fields of agriculture, home appliances, Industrial appliances etc. We are using submersible motor to drill from the boars and supply water to the farm fields. Whenever the water level or humidity is very less then we have to switch on the motor to maintain required humidity in soil. We need high voltage to run such kinds of motors. Micro controller was unable to control the ac power directly. In such case we are using relay as an interface for the controlling. Relay can capable of controlling of the voltage of 230v and current of 4-5Amp. Relay is well known as combination of the electromagnetic coil and single pole double through switch. Whenever the electromagnetic coil is powered up magnetic field is generated and the generated magnetic field forces the switch the poles.

III. FLOW CHART

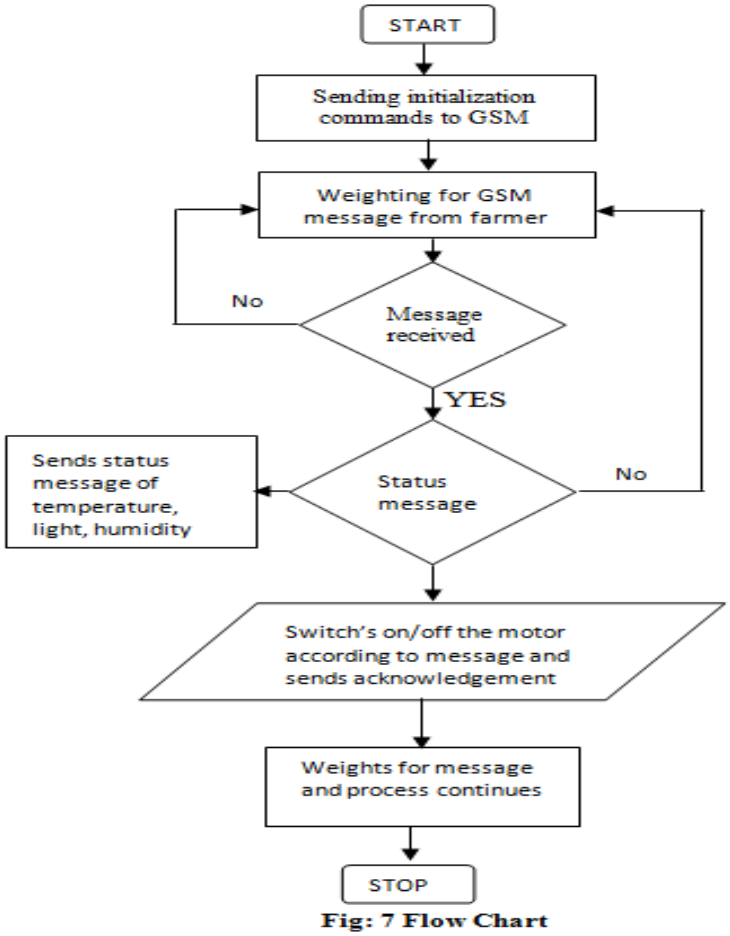

Fig: 7 Flow Chart

IV. WORKING PRINCIPLE

1. Send initialization commands to the GSM modem and LCD display.
2. Reads status form Temperature sensor, Intensity sensor and Humidity sensor and displays status on LCD.
3. Wait's for message from GSM modem.
4. After message received from GSM modem, it compares message regarding status or motor.
5. If message regarding status micro controller reads the status and sends status message to the farmer through GSM modem and starts from step 3.
6. If message regarding motor then micro controller switch on/off the motor according to the message and sends the status of motor condition as an acknowledgement. Then starts from step 3.
7. If message is garbage then starts from step 3.

V. RESULT

When we switch on our project we got an SMS regarding status of farm field. When we requested a status of farm field we got replay sms from our project consisting live status of temperature, light intensity, humidity and motor on/off condition. When farmer requested to switch on/off of submersible motor, motor is switched on/off and farmer got an acknowledgement from project to the farmer regarding the status of the motor on/off.

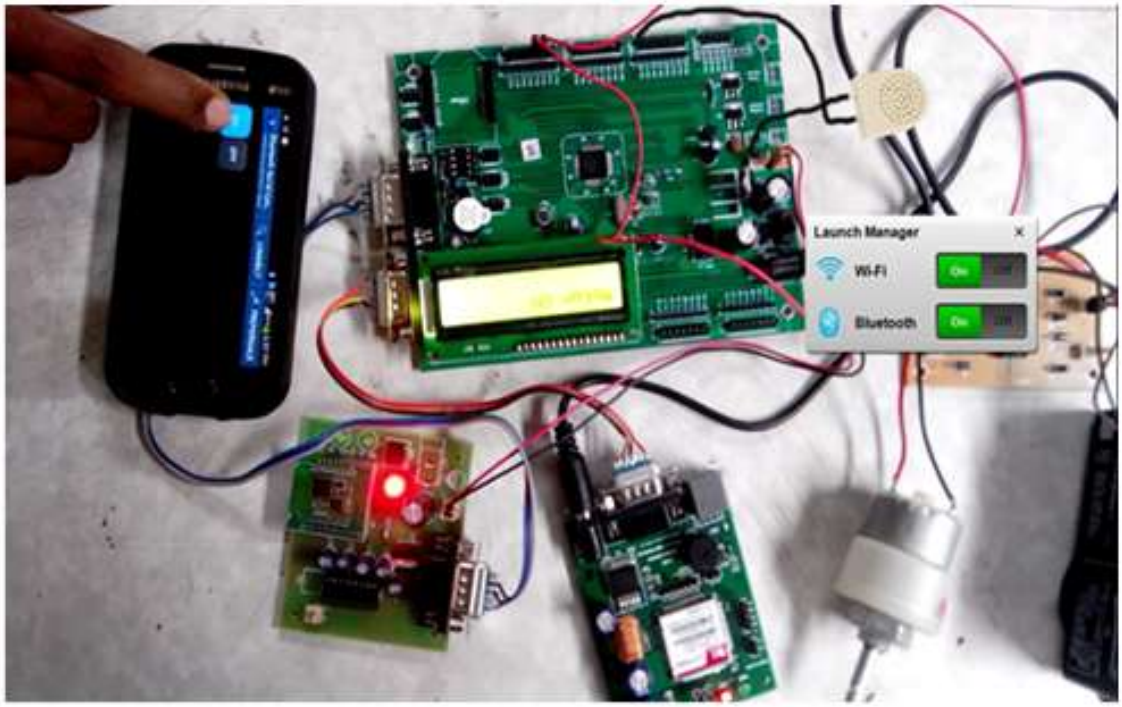

Fig: 8 Sending the Information from Mobile to Kit

VI. CONCLUSION

With the help of our project we can reduce the problems for the farmers so that it can reduce the tension regarding his farm field. In normal situations he must have to go to his field at least two times a day. But with the help of our project he don't have to go to his farm not even one time. He can get his farm field status whenever he wanted and where ever he wanted.

REFRENCES

[1] A 'Green Wave' Reprieve, Blaise Kelly B.eng *MSc*, Blaise@kello.co.uk Available at "http://gse.cat.org.uk/papersDownload=6%3Ablaise-kellya- green-wave-reprieve".
[2] Karmakar, N. Handbook of Smart Antennas for RFID Systems, Wiley-IEEE Press, Pages: 13 -56.
[3] Want, R. Intel Res., Santa Clara, CA, USA, Pervasive Computing, IEEE, Jan.-March 2006**,** Volume**:** 5, Issue:1 Page(s): 25 – 33
[4] Introduction to high speed microcontrollers, available at http://www.atmel.com/Images/doc2545.pdf
[5] Image Processing: Principles and Applications by Camastra, F. Neural Networks, IEEE Transactions Volume: 18, Issue: 2 Publication Year: 2007
[6] Preradovic, S. Electro. & Computer. Syst. Eng., Monash Univ., Clayton, VIC. Karmakar, N; Balbin, I. "RFID transponders" Volume**:** 9, Issue: 5 Microwave magazine, IEEE Page(s): 90 – 103
[7] Digi International Inc, "XBee/XBee-PRO RF Modules", available http://ftp1.digi.com/support/documentation/90000982_B.pdf
[8] Atmel Corporation, "Atmega16 Datasheet", available http://www.atmel.com/dyn/resources/prod_documents/doc2466.pdf
[9] RFID reader manufactured by rhydoz labs, documentation available at http://www.rhydolabz.com/documents/rfid/RFID_Reader_Serial_TTL.pdf.
[10] Passive transponders "http://www.rhydolabz.com/documents/rfid/EM4102_DS.pdf".
[11] Atmel AVR Studio 5 available at www.atmel.com/tools/studioarchive.aspx
[12] Guojiang Shen "Urban Traffic Trunk Two-direction Green Wave Intelligent Control Strategy and Its Application" Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress. Volume: 2 Publication Year: 2006, Page(s): 8563 – 8567
[13] Wei Cheng; Xuemin Li; Pengcheng Du " Urban arterial road green-wave control based on genetic algorithm Awareness Science and Technology (iCAST), 2011 3rd International Conference" , Publication Year: 2011 , Page(s): 68 – 79

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