SUBMERSIBLE PUMP CONTROL FOR AGRICULTURE IRRIGATION USING IOT TECHNIQUES

S.Vaseela[1], K.Rajasukumar[2], D. Aravinthkumar[3], R.Gowtham[4], R.Geethanjali[5]
[1](Dept of EEE, Assistant Professor, SNS College of Engineering, Coimbatore, India, vaseela.161@gmail.com)
[2](Dept of EEE, SNS College of Engineering, Coimbatore, India, rajasukumarkrs@gmail.com)
[3](Dept of EEE, SNS College of Engineering, Coimbatore, India, aravinthkumar0704@gmail.com)
[4](Dept of EEE, SNS College of Engineering, Coimbatore, India, gowtham.loveapple@gmail.com)
[5](Dept of EEE, SNS College of Engineering, Coimbatore, India, rangarajgeethanjali@gmail.com)

Abstract*—Embedded System based submersible motor control to prevent it from over load, dry run and single phasing using Internet of Things (IoT) the Simple Link Wi-Fi ESP8266 device is the first industry standard general purpose Microcontroller (MCU) with built-in Wi-Fi connectivity Launch pad, customizable for any specific application. This project provides the development of mobile phone as remote control application for submersible motor pump which is used in agriculture irrigation. The motor connections depends upon its horse power, it may be Direct on line or Star Delta. The motor is controlled by the micro controller and the present status of motor is sensed and it is automatically controlled by itself and the information is transmitted to the corresponding person through Internet of Things (IoT) network. It is proposed to continuously sense various parameters of the submersible pump, take decisions accordingly for better functioning of the pumping system, conveying the collected information to the farmers apart from enabling remote control. A micro controller is used to detect the three types of fault which cause damage to the motor. The first one is single phase absence fault detection and if it occurs the micro controller will automatically turn of the motor. The micro controller also includes the protection against over current or over load and also from dry running. It is expected that this application will be comfortable for the farmers and this provides easy access of motor to a greater extent. All these control process are achieved by using a MSP-EXP430G2 Launch Pad which is a simple development kit for the Value Line series of control circuits.*

Keywords*—*IOT (Internet of Things), Wi-Fi (Wireless Fidelity)

1. INTRODUCTION

India is mainly an agricultural country. Agriculture is the most important occupation for most of the Indian families. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming, agriculture contributes about sixteen percent of total GDP (Gross Domestic Product) and ten percent of total exports. Agriculture is the backbone of Indian economy. Though, with the growth of other sectors, the overall share of agriculture on GDP of the country has decreased. Still, Agriculture continues to play a dominant part in the overall economic scenario of India.

In the present Agriculture plays vital role in the development of agricultural country. 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 (Internet of Things) technologies. The highlighting feature of this project includes smart mobile based remote control. Many farmers use induction motor based pump sets to irrigate their farms from wells, rivers and nearby streams. Though electricity is free in most of the parts, the availability of the power is restricted for agricultural purpose due to several factors. Further, in view of certain unavoidable reasons, there may be unexpected power failures which force the manual presence for switching the pump-sets on, once the power returns.

This problem is further aggravated when the location of the pump-set and the region of water distribution are far away. In this view point it is necessary to replace conventional control of pump sets using a versatile user friendly system for the ease of operation and the convenience. Hence, a dedicated MSP430 single chip microcontroller based online control of pump-sets with IoT is proposed in this work. This system will monitor various parameters such as dry run, over/under voltage, over current, single phase faults and the like and takes measures in the event of fault with information to the farmers over internet.

Monitoring the soil parameters is the most important aspect of agriculture because it has a direct impact on the production and maintenance of field crop. Soil parameters such as moisture content, temperature, humidity and pH play a vital role in agriculture production cost and improved yield.

Real-time monitoring of these parameters can be accomplished using appropriate sensors connected to the Internet using Wi-Fi connectivity. Such a method comes under the study of Internet of Things (IoT). In the past days, timers and switches were used to control the ON and OFF of the water delivery motor in the irrigation system. The present day cellular phone technology and the extension of 3G and 4G net-works for rural areas makes it easy in monitoring and controlling of agriculture parameters using with IoT technology.

The IoT connects things to the internet for communicating-with the sensing devices with suitable protocols and exchanging data with each other by using wireless sensor

networks. Using an IoT different parameters are monitored regularly in real time without any delay. IoT gives the information in all sectors of agriculture, healthcare, home appliances etc.

IoT provide new opportunities in IoT-based applications and services. This makes the existing system more efficient and reduces the cost. It has high flexibility, accessibility and device independence. In this project, have designed and developed a -system which automatically monitors the moisture -present in the soils using IoT.

Agriculture Internet of Things ensures accurate and timely communication of real time data or information related to dynamic agricultural processes like plantation, harvesting etc. and weather forecasts, soil quality, availability and cost of labor required to the farmers before-hand. Farmer's with availability of such important real time information in advance are able to plan their course of activities pre-hand and take corrective/preventive measures for future contingency.

2. PROPOSED SYSTEM

The Internet of things (IoT) is the internetworking of physical devices, vehicles buildings, and other items ,embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society".

The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

3. BLOCK DIAGRAM AND FLOW CHART OF PROPOSED SYSTEM

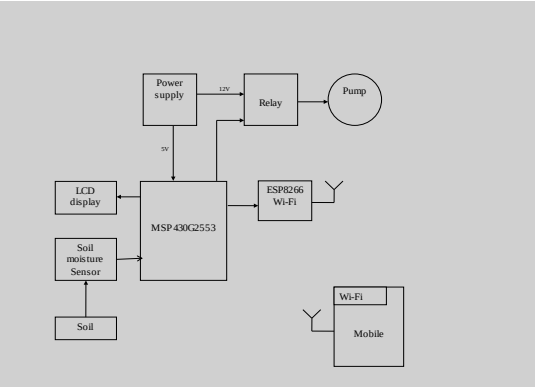

Figure.1 Block Diagram Representation proposed system

From this Figure.1.Block Diagram and Figure 2 Flow Chart the working of the proposed system is explained briefly First the sensor is placed in the soil hence the sensor's sensing unit functions to sense the soil moisture and reads the soil moisture level to take the soil moisture level as input.

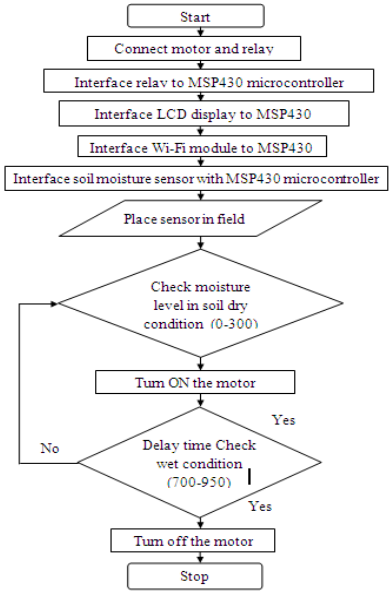

Figure.2 Flowchart of Proposed System

Hence the sensor is interfaced with MSP430 microcontroller. The sensing unit gathers information and communicates with each other. Then process the sensed data. The MSP430 programmed by using CCS software. The processed data is compared with preprogrammed data feed in the MSP430.When the soil moisture level is too low. Then MSP430 generate signal to relay.

The relay is connected to the MSP430, when the input signal is generates the relay and it makes to turn ON the motor and after reached the sufficient water the motor turned OFF automatically. The soil moisture values are displayed in LCD display.

The MSP430 is interfaced with Wi-Fi module and ESP8266. It has an IP address to control the motor from anywhere through to internet.

4. IMPLEMENTATION

In this project irrigating agricultural land with the help of the MSP430 microcontroller by using soil moisture sensor. The sensor is interfaced with MSP430.so that it senses the moisture level of the soil. Hence, the motor is also connected to MSP430 along with Wi-Fi module. So that motor pumps water according to the soil moisture level. By using code composer studio software motor Wi-Fi module, sensor everything is interfaced with MSP430.

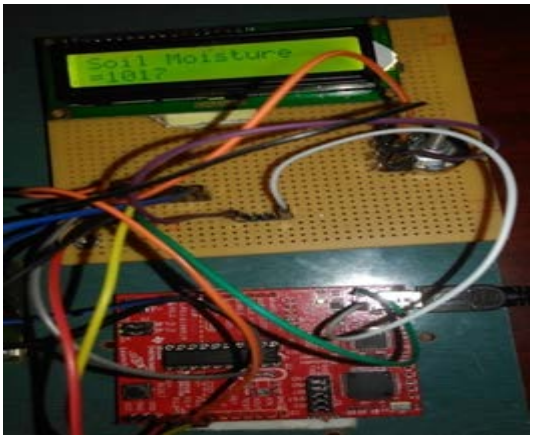

Figure.3 Working Model for GSM Control

Here the RX and TX pins are used for the serial communication with the microcontroller. There are various AT commands to check the signal strength and connection and SIM status etc. Here the Hyper Terminal is used to initially interface with the computer to check the module. It also has an antenna to receive the GSM signal from the user's phone. The basic AT commands are loaded into the program of microcontroller for it to interface with the GSM module.

The GSM Association evaluates that advances characterized in the GSM standard serve 80% of the worldwide portable for business, including more than 212 nations and domains, making GSM the most numerous guidelines for many systems. Today's GSM stage is living, developing and advancing and offers an extended and characteristic of voice and empowering administrations. The Global System for Mobile Communication (GSM) system is cell telecommunication system with an adaptable structural planning following the ETSI Gsm900/GSM 1800 standard.

5. CONCLUSION

The soil moisture sensor is successfully interfaced with MSP430 microcontroller and wireless communication is achieved using Wi-Fi module.
All observations and experimental tests prove that the existing system problems in the irrigation field can be overcome using IoT techniques. Implementation of this project in the field can definitely help to improve the yield of the crops and overall production and reduce the wastage of water and also save electricity by efficient usage of motors.

6. FUTURE SCOPE

To make the automatic irrigation process for different types of crops can achieve by developing this project using smart wireless sensor and video capturing mms facility about crop position. This system can improve the production and reduce the wastage of water.

REFERENCE

[1] R.Suresh, S. Gopinath, K. Govindaraju, T. Devika, N. SuthanthiraVanitha "GSM Based Automated Irrigation Control using Raingun Irrigation System" International Journal of Advanced Research in Computer and Communication Engineering Vol.3, Issue 2, February 2014.
[2] N. Prakash, D. Swathika "Embedded System Based Monitoring and Control System of Submersible Pump" International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Vol.3, Issue 6, November-December 2014.
[3] D. Deweshvree Rane, P. R. Indurkar, M. Khatri "Review Paper Based on Automatic Irrigation System Based on RF Module" IJAICT, Vol.1, Issue 9, January 2015.
[4] Nagarajapandian M, Ram Prasanth U, Selva Kumar G, Tamil Selvan S "Automatic Irrigation System on Sensing Soil Moisture Content" International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering Vol.3, Issue 1, January 2015.
[5] Nikesh Gondchawar1, Prof. Dr. R. S. Kawitkar "Iot Based Smart Agriculture" International Journal of Advanced Research in Computer and Communication Engineering, Vol.5, Issue 6, June 2015.
[6] Arshid Iqbal khan, Insha Altaf "Development of an Intelligent Condition based Soil Moisture Control System" IJIRST – International Journal for Innovative Research in Science & Technology Vol.2, Issue 05,October 2015
[7] Mritunjay Ojha, Sheetal Mohite, Shraddha Kathole, Diksha Tarware, "Microcontroller Based Plant Irrigation" International Journal of Science and Research, Vol .3, Issue 11, October 2015.
[8] P.Patil and N. D.Pergad "Review Paper on GSM Based Water Management In Irrigation System Using ARM7"International Journal of Science Research, Vol.4, Issue 10, October 2015.
[9] Chandan Kumar sahu, Pramitee Behera "A Low Cost Smart Irrigation Control System"International Journal on Electronics and Communication System , Vol.2 , Issue 3 ,2015.
[10] Xiaoqing.Y, Wenting.Han, Zenglin.Zhang, "Study on Wireless on Underground Sensor Networks for Remote Irrigation Monitoring" International Journal of Hybrid Information Technology, Vol. 8, No 1, 2015.
[11] Manish Sharma, Mamta Kumara and Vikas Kumar "Automatic Humidity Monitoring and Pumping System for Farmers" International Journal of Development Research, Vol. 4, Issue 6, April 2016.
[12] Bhaudip Mehta , Ujiaval joshi ,karit A Bhatt "Wireless Data Acquisition System for Real Time Monitoring and Controlling Pump Application" International Journal of Engineering Research and Development , Vol.4 , Issue 1, 2016.
[13] K. Rajeshkumar and S. Vaseela, "Automatic Home Appliance Control Using GSM & Bluetooth", International Journal of Research in Electrical Engineering, volume 3, issue 2, 2016
[14] S. Vaseela, "Security System using Rasberry PI model B+", International Journal of Research Electrical Engineering, vol 3, issue 3, May 2016
[15] N. P. Ananthamoorthy, S. Vaseela and Dr. K. Baskaran ,: Simulation and Analysis of Intelligent FLC for BLDC Drive: International Journal of Innovative Research & Development (IJRD), Vol. 3 Issue, March, 2014, Page no. 439- 446.