SMART IRRIGATION SYSTEM USING WIRELESS SENSOR NETWORK

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Abstract

Watering is the most important cultural practice which is used for irrigation. The main aspect of this project is to ease the work of farmers. The Smart irrigation system is worn for plant care. The soil moisture sensor is used to sense the moisture level of the soil and considered for automatic irrigation, under three conditions (i.e.) dry, humid and wet. This process is on the go with the help of the Arduino board. Programs are embedded in the arduino microcontroller. The total information is gathered by Arduino board through GSM. The values are send to the relay. According to these values the motor will be turned on/off. Sufficient water will be pumped by the water pump in the field. If the water level in the field increases the motor will be turned off automatically and the SMS notification will be send to the farmer mobile. The farmer can control the motor via SMS. Thus saving the plants from being submerged.

Keywords

Arduino, GSM Modem, Soil Moisture Sensor , Water Pump, Wireless Sensor Network (WSN)

1. INTRODUCTION

All over the world agriculture depends on fresh water. In food production sector the agriculture is an upstream sector. Today's agriculture is in need of modern and new methods based on science and technology for the increase in food productivity and to minimize the usage of fresh water. In Traditional Farming sometimes only the farmer's observations is not sufficient.

Nowadays sensor play a vital role in automation. Internet of Things (IOT) is an emerging technology, which also requires sensor networks to connect things with the internet, IOT is the collection of connected physical devices impacted with software, electronics,sensors and network connectivity that help   objects to collect exchange data. Smart sensors used everywhere, make this world as smart. In Industries, Sensor are used to monitor health of machines and easy of care. In green house agriculture the climate conditions can be regulated with the help of. In forest areas, Sensors are used to track animals, detect forest fire, etc.

Sensors are transducer which converts a physical parameter in to electrical signals. It is a gadget for identity and beckon a changing condition. The changing condition is simply the present or absent of an   material. It can also be qunatifable volume like a change in height, fairness or weight. This sensor's output, is the basics for monitoring and control of a Formattion method. In sensor networks, improving energy efficiency and network life time is the major issues. Because battery power of sensor is very limited.

GSM is a standard. Their work is to Portray protocols for second generation (2G) Digital Cellular Network used by mobile Phones

This System is an artificial method of providing water to the plants. This system uses soil sensor, and an Arduino- controlled water pump. Soil moisture sensors placed in the soil is integrate to an automatic watering system. The smart irrigation system is used to provide required amount of water for plants and monitor the field. This system is mainly designed for the optimization of usage of water on agriculture field.

In this paper, the irrigation system is managed by the simple SMS. The GSM works with the aid of SIM card. The Sensors sends data to the Microcontroller which in turn receives the data in the form of codes. This System is used to reduce the work of farmers, reduce water wastage and saves electricity.

2. SYSTEM REQUIRMENTS

The important hardware requirements of this project are Arduino, Soil Moisture sensor, GSM, Relay and Water Pump.

An Arduino is a preamblee micro controller for indicative electro-mechanical devices. This Microcontroller is based on the ATmega328P and weighs 25 g. The operating voltage is 5v and the input voltage Limit from 6-20v. It has 14 digital input/output pins. 6 pins are PMW digital input/output pins and 6 pins are analog input/output pins.

The arduino Uno is programmed with the arduino software (IDE). In Arduino software IDE, the program can be upload easily by clicking the upload button. The microcontroller allows automatic reset.

Soil moisture sensor is mainly used for measuring the moisture content present in the soil. The device is simple and cheap. No power source is needed to check the soil moisture content in the plant.

The arduino GSM Modem is an open source hardware.GSM Modem is an open source hardware. It allows an

arduino board to connect to the internet, and send and receive messages

A Relay is an electric switch that use an electromagnet to move the switch from OFF to ON and OFF to ON position instead of a person moving the switch.

A water pump is a tool which contain a Cryptic imperentable motor close-coupled to the tube body. The whole assembly is douse in the liquid to be pumped. The main aid of this type of pumb is that it prevents pump lavitation, a problem associated with a high elevation difference between pump and the fluid surface.

PROPOSED SYSTEM

The proposed system uses the arduino micro controller for automatic irrigation system. The soil moisture level is bang by the Soil moisture sensor. Based on the moisture level present in the soil the water flow is controlled. Sensor sends an output to the arduino. The Arduino Microcontroller decides what action would be performed next. Initially the environment is partitioned into three parts. To monitor the moisture level, the soil moisture sensor and arduino. The water pump will pump the water. While each function is performed a SMS will be send to the user by using the GSM and the user can able to control the motor via SMS.
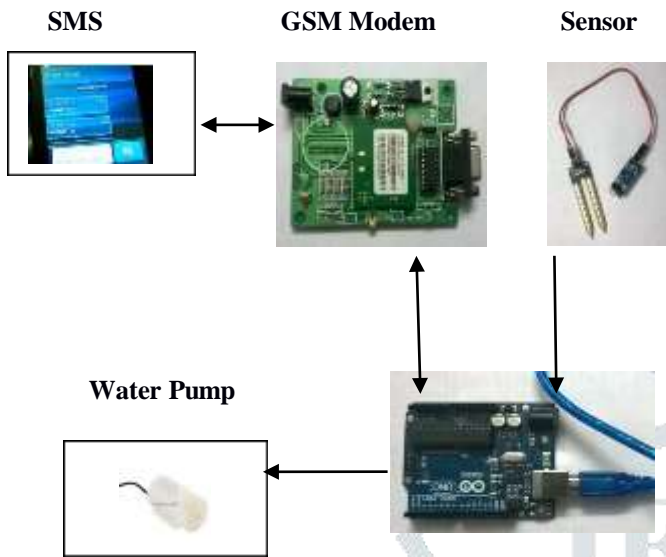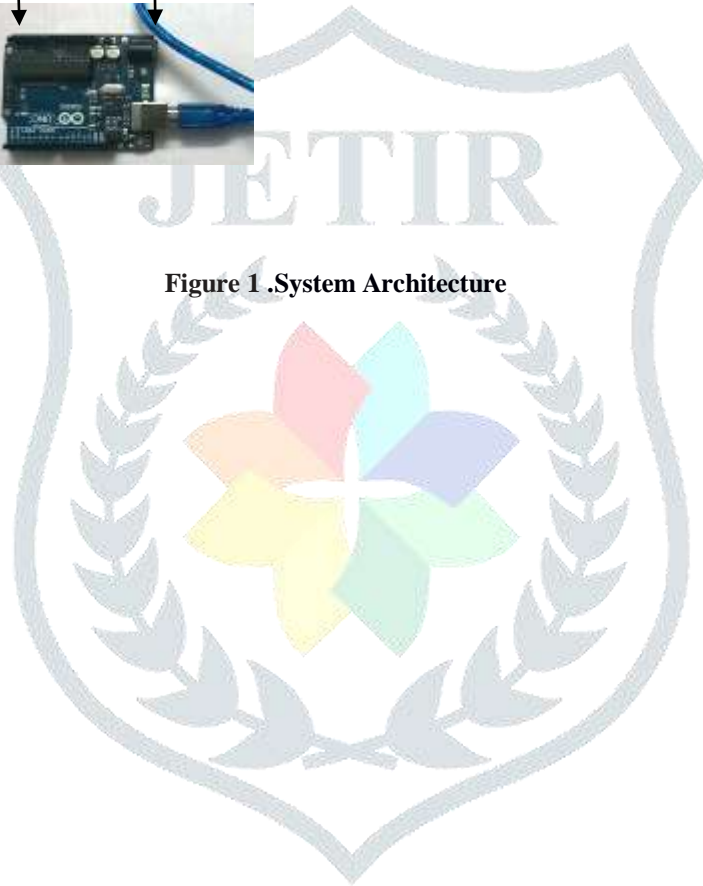
SYSTEM ARCHITECTURE

SMS   **GSM Modem**   **Sensor**

Water Pump

Figure 1 .System Architecture

DATA FLOW DIAGRAM

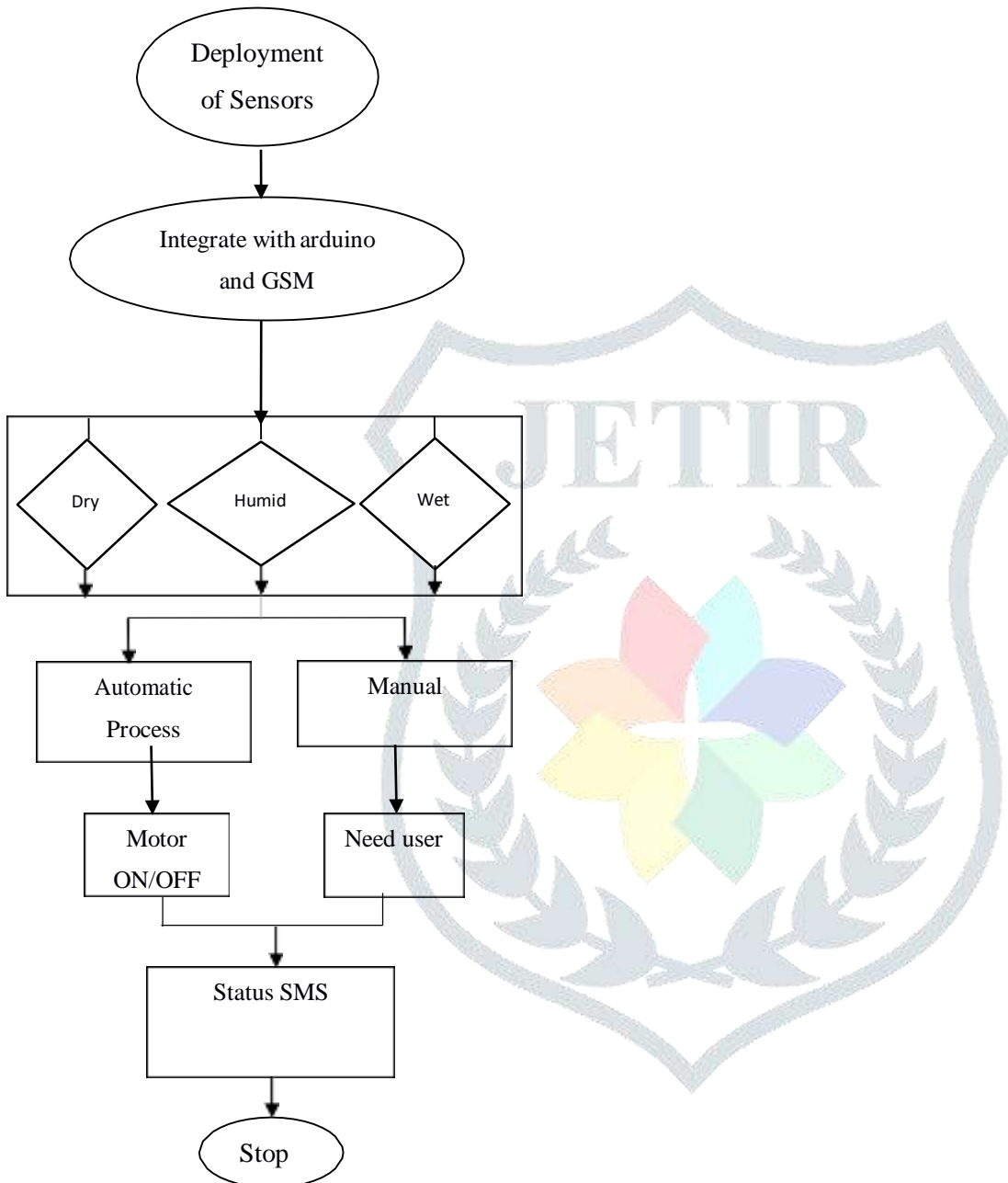This diagram depicts the graphical representation of the

System.

Figure 2 .Data Flow Diagram

SYSTEM OPERATION

First the sensor is inserted to the ground since it is used to find the status of the soil. This sensor is integrated with arduino and GSM where arduino acts as the microcontroller which is used to control the sensor and GSM. The arduino receives the voltage as the output from the sensor.

Sensor in dry soil	0	~	500
Sensor in humid soil	500	~	900
Sensor in water	900	~	1050

Table 4.1 Moisture Level

AUTOMATIC PROCESS

In an automatic process the motor functions automatically based on the soils condition, if the soil is dry then the microcontroller switches on the motor and switches it off automatically once the soil becomes moist. If the soil is moist then it doesn't switches the motor on. The soil moisture sensor sense the moisture level of the soil. The arduino microcontroller processes the analog output from the sensor. If the sensor value is below the threshold value the water pump is automatically turned on and if the value exceeds the humid value (300 ~ 700) the water pump is automatically turned off.

MANUAL PROCESS

In the manual process the sensor senses the condition of the soil, if the sensor value is below the threshold value, the motor ON/OFF status is sent the SMS to the user's mobile and user can able to control the motor via SMS.

MODULES OF PROPOSED SYSTEM

➢ Interfacing soil moisture sensor with Arduino

➢ Interfacing Relay with Arduino

➢ Interfacing GSM Moderm with Arduino

Interfacing soil moisture sensor with Arduino

To acquire the data readings from the sensor to arduino, power supply of 5Voltage is provided from the arduino by connecting Vcc of ground of sensor to 5V of arduino and GROUND of sensor to GROUND of arduino. Readings are get backed at analog pin of arduino by connecting A0 pin of soil moisture sensor to any analog pin of arduino. Those retrieved values are displayed via Light cathode display or sent as SMS using GSM-SIM 900A.

Interfacing Relay with Arduino

To conjoin the Relay the Arduino is simple and let on user to turn ON/OFF a large number of devices, both AC and DC. The first network to the ground and power clasp ,you need to connect the Arduino pin of +5v to the Relay board VCC pin and the Arduino ground to the Relay board GROUND pin.

**Interfacing GSM with Arduino**

The Arduino software is an easy place to use and enforce device for encapsulated applications. By connecting the Transmitter and receiver serial pins of the Global service module device with the Receiver and transmitter serial pins of the Arduino, will apt us to communicate messages between platforms with as little as 4 pins

This will send an GSM text message to the master that can receive up to 140 bytes of control that allows the microcontroller to take answer what is the response of each message.

5. RESULT
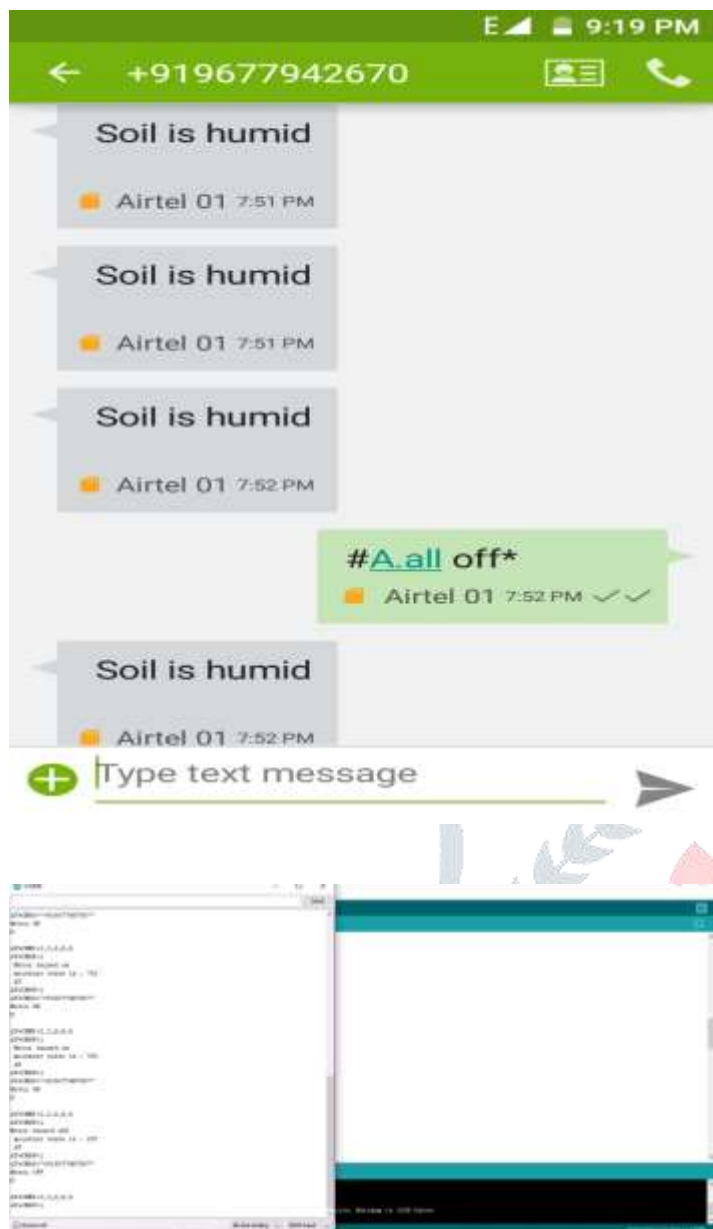
6. CONCLUSION AND FUTURE WORK

The smart irrigation system can be used to monitor and control the field. This system reduces the man power, optimize the growth, and save the water. System is activated according to the changes of the soil content.

In Future, this project implements the visually monitoring of the field and also send the Image (MMS). Additionally it also includes the solar power panel and exhaust fan. Exhaust fan is used to exhaust the heat produced from the devices. Solar power panel reduces the power consumption. Also able to connect the database from cloud.

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