ARDUINO BASED AUTOMATED IRRIGATON SYSTEM

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Abstract:The motivation of this project came from the countries where economy is based on agriculture and the climatic condition lead to lack of rains and scarcity of water. The farmers has to be dependant on rains and Bore well for irrigation. Even if the farm land has a water pump manual intervention by farmers is required to turn on/off the pump. The aim of our project is to minimize manual intervention by farmers. As there is no un-planned usage of water, a lot of water is served from being wasted. The irrigation is only when there is not enough moisture in the soil.

Keywords: Arduino,lcd,PSU,Relay,Pump,GSM for communication,Moisture sensor.

I . Introduction:

It is well known that in India's agriculture plays an important role in the development of thecountry's economy.Irrigated agriculture provides about 40 per cent of the world's food production from 18 per cent of the worlds cultivated land . The primary reason for irrigation is to improve agricultural productivity in areas where surface soils are naturally drier. Soil moisture measurements are important for a number of applications and for a number of different reasons. Applications include land slide studies, erosion, water shed studies, climate studies, predicting weather, flood warning,etc. Generally farmers and gardeners visit their agriculture fields periodically to check soil moisture level and based on requirement water is pumped by motors to irrigate respective fields. Farmers and gardeners need to wait for certain period before switching off motor so that water is allowed to flow in sufficient quantity in their

respective fields. This irrigation method takes lot of time. Traditionally farmers/gardeners will presentin their fields to do irrigation process, for our project we can make farmers and gardeners to manage their agriculture activity along with other occupation. So due to that our problem statement reads to design and implement an automatic irrigation system for farmers and gardeners in India, which will help them to manage their crops while they are in the field and away from the field. This paper is organised in to the following sections. Section 1 shows the complete explanation of the irrigation based on arduino. Section 2 gives the detail explanation of the software that we are used. The software here we used is IDE (integration development environment) which provides comprehensive facilities to computer programs

for software development. . This software programs help the controller to fix the moisture value and to pump the motor on/off given by the moisture level by arduino.

II. SOFTWARE USED:

A program for Arduino may be written in any programming language for a compiler that produces binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. It originated from the IDE for the languages Processing and Wiring. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple one-click mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus.A program written with the IDE for Arduino is called a sketch.[42] Sketches are saved on the development computer as text files with the file extension .ino. Arduino Software (IDE) .The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

III.HARDWARE USED:

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available. The source code for the IDE is released under the GNU General Public License, version 2.[8] Nevertheless, an official Bill of Materials of Arduino boards has never been released by Arduino staff. Although the hardware and software designs are freely available under copy left licenses, the developers have requested that the name *Arduino* be exclusive to the official product and not be used for derived works without permission. The official policy document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product.[9] Several Arduino-compatible products commercially released have avoided the project name by using various names ending in *-duino*.[10]. Most Arduino boards consist of an Atmel 8-bit AVR microcontroller (ATmega8, ATmega168, ATmega328, ATmega1280, ATmega2560) with varying amounts of flash memory, pins, and features[12]. The 32-bit Arduino Due, based on the Atmel SAM3X8E was introduced in 2012[13]. The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed *shields*. Multiple, and possibly stacked shields may be individually addressable via an I²Cserial bus. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator or ceramic resonator. Some designs, such as the Lily Pad, run at 8 MHz and dispense with the on boarrd voltage regulator due to specific form-factor restrictions.Transformer,Rectifier,Regulator,Moisture sensors, ADC, Filter, Arduino are the hardware we used in our system.

IV.PROPOSED WORK:

The purpose of this project is to make famers and gardeners to work much easier as well as to practice controlled irrigation. In this project we present a prototype for automatic controlling and remote accessing of irrigation motor. Prototype includes sensor node, controller node and mobile phone. In sensor node, soil moisture sensor, temperature sensor, wireless transceiver is integrated with microcontroller. In controller node, GSM module, wireless transceiver, keypad, LCD display and a motor is integrated with microcontroller. For experimentation we have abstracted three pots

containing soil with different moisture level as irrigation fields. The soil moisture in each field is sensed by sensor node and the sensed data is sent to controller node. On receiving sensor value the controller node checks it with required soil moisture value. When soil moisture in a particular field is not up to required level then controller node switch on the motor to irrigate associated field and notification SMS is send to registered mobile phone. Mobile phone can also be used for requesting soil moisture information in irrigation field and commands can be sent as SMS to switch on/off the motor. The sensor node can be deployed in irrigation fields for sensing local soil moisture and the sensed data is sent to controller node using MRF24J40MA transceiver. The controller node checks the soil moisture of irrigation field and if the soil moisture is not up to the required level then controller node switch on the motor to irrigate associated field and alert message is sent to registered mobile phone. Mobile phone can be used for sending request to get soil moisture of irrigation field and commands can be sent as SMS to switch on/off the motor. The controller node has a navigation keys to set the mode of operation and an LCD display to view sensor data. The system can operate in 3 modes: manual mode, auto mode and remote mode. In manual mode, system operations are controlled by key pad. In auto mode, system operation is based on the feedback of soil moisture sensor. In remote mode, system operation is controlled from remote location by sending SMS from registered mobile phone.

2.Goals/objectives:

A goal (impact) represents the overall purpose or aim of the project and is intended to address what has been identified as the problem.For us we believe good irrigation water management will increase yields, improve crop quality, conserve water, save energy, decrease fertilizer requirements, and reduce non-point source pollution. Automated farm monitoring system will analyze the data received from sensors and it will send the condition of the farm in the form of text to the mobile handset of the farmer. So the farmer can take step on the basis of that data. And by doing so the farmer will achieve the following;

I. This will reduce physical work of the farmer
ii. Providing timely and adequate water supply in right areas
iii. Receiving exact requirements of water to the filed

Our next step from here we want to develop our system so as we can grow up as the technology advance. And this is because we believe when the technology became more advance also the system will more easily than this.Examplewhile applying the automation on large fields more than one such microcontroller units can be interfaced to the Centralized Computer.

V.The input parameters used in the system are:

(i)Power supply:

A 230 volt input AC supply is given to the transformer. It steps down into 12V AC supply and then it is fed to the 7805 & 7812 regulators converts it into regulated 5V & 12V DC supply. It is then distributed to all the driver and relay circuits. 5V is given to the microcontroller and to all ICs used in the system.

(ii)Temperature sensor:

It is a measure of temperature at different levels of the earth's atmosphere. It is governed by many factors, including incoming solar radiation, humidity and altitude. Here we are using the thermistor (temperature sensitive resistor) for monitoring the soil temperature at regular intervals. When it exceed the particular temperature, it sends the signal to the microcontroller. Then the process is carried out, it turns the motor ON and send water to the field.

(iii)Soil moisture sensor:

We are using the moisture sensor to monitor the moisture content of the soil. It consist of a connecting probe which is lay down in the soil. It is used to sense the moisture content of the soil and send the signal to controller, if the moisture level reaches the preset value. Then the water is sent to the field. The sensors have no moving parts, they are precise, never wear out, don't need calibration, work under many environmental

conditions and are consistent between the sensors and readings. Moreover they are not expensive and quite easy to use.

Images of moisture senor

VII.The output parameters used in the system are:

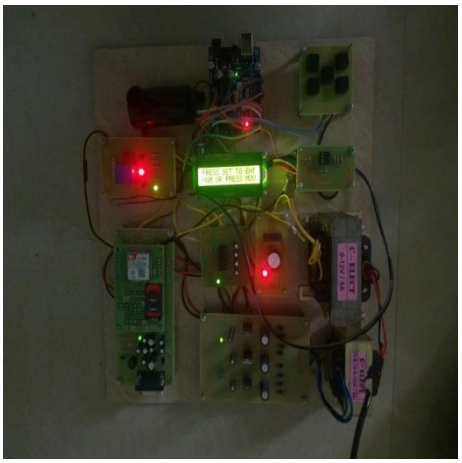
(i)Microcontroller:

This stage convert the water flow rate, temperature, air humidity, wind speed, light intensity to the actual well balanced readings. The microcontroller accepts the data from sensors and compare the data with the preset points, corresponding to that the signal is generated. According to this, the relay can switch on and off. Simultaneously is sends all sensor data from SIM300 to mobile user at control station. When we want to read data of all the sensor monthly/yearly we can access that data from external memory card storage.

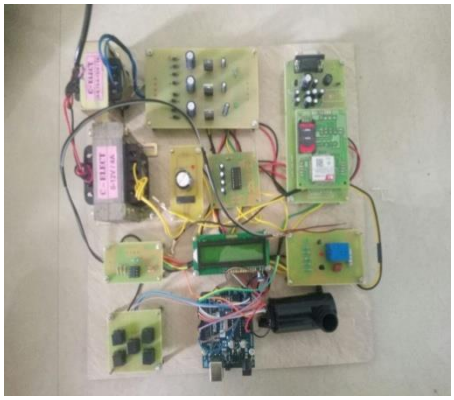
(ii)Gsm modem:

Short message service use GSM techniques to transfer data from distant places such as from one area to the area of the same city or from another city. In our project we are using SMS technique to instant or quick transfer of data or notice to the required destination. It is s convenient facility of the GSM network. A message consisting of a maximum of 160 alphanumeric characters can be sent to or from a mobile station. If the subscriber's mobile unit is powered off or has left the coverage area, the message is stored and offered back to the subscriber when the mobile is powered on or has re-entered the coverage area of the network. This function ensures that the message will be received.

WORKING IMAGES OF OUR PROJECT



HARDWARE SETUP OF OUR PROJECT



CONCLUSION:

In this work, we successfully develop a system that can help in an automated irrigation system by analysing the moisture evel f the ground. The smart irrigation system proves to be a useful system as it automates and regulatesthe watering without any manual intervention. The primary application for this project are for farmers and garderners who donot have enough time to water crops/plants. The moisture sensor measure the moisture level of different plants. If the moisture level is found to be below the desired level, the moisture sensor send the signal to the arduino board which triggers the water pump to turn ON and supply the water to respective plant. Also without visiting will get the status of the motor on mobile. The system feautures a custom sensor design for power efficiency, cost effectiveness, cheap components, as well as scalability and ease of use. In future there are some tasks that should be done and would develop the system to a more mature state. A modular design that gives an opportunity to users of using energy sources, connectivity and sensors as modules could be a very usefull and easy to use.

REFERENCE:

[1]. N.Agrawal and S. Singhal "Smart Drip Irrigation System using Raspberry pi and Arduino" in International Conference on Computing,Communication and Automation (ICCCA2015), 2015

[2]. Gutierrez J, Villa-Media, J.F; Nieto- Garibay,A; Porta- Gandara;"Automated Irrigation System Using a Wireless Sensor Network and GPRS Module" IEEE transaction on Instrumentation and Measurement Year: 2014, Volume: 63, Issue: 1 Pages: 166 – 176

[3]. R.Hussain, J.Sehgal, A.Gangwar, M.Riyag " Control of irrigation automatically by using wireless sensor network" International journal of soft computing and engineering, vol.3, issue 1, march 2013, pp.48t 324-328

[4]. Chuang Yu, Yi Wu, Yang Yu, "Intelligent Irrigation System Based on Fuzzy Control", Artificial Intelligence And Computational Intelligence (AICI), 2010 International Conference on, 2010, pages 519-521

[5]. R.Karthikeyan, P.Mahalakshmi, N.GowriShankar, "Wireless Sensor Networks For Efficient Irrigation System Using Hybrid PV -Wind System

[6]. Shi-feng Yang, Jian-ying Guo, Xiu-Qing Wang, "Detecting Of Water Storage Information In Crops WithAcoustic Emission Technology And Automatic Irrigation System" Symposium on Piezoelectricity, Acoustic waves and device applications, 2008, pp. 566- 569

[7]. Suzuki, Y; Ibayashi, H; Mineno, H; "An SVM Based Irrigation Control System for Home Gardening", Consumer Electronics (GCCE) IEEE 2nd Global Conference, October 2013, pp.365-366

[8]. Ameer S, Chaubey S.S, Joseph M., Rajeshirke P., " Automatic Irrigaton System Trough Solar Power", International Conference on Electrical, Electonics, Signals, Communication And Optimization (EESCO)IEEE, Jan 2015,pp. 1-5

[9]. Tarange, P.H; Mevekari, R.G; Shinde, P.A.; "Web Based Automatic Irrigation System Using Wireless Sensor Network And Embedded Linux Board" , International Conference On Circuit , Power And Computing Technologies (ICCPCT), March 2015, pp. 1-5

[10]. Chikankar P.B, Mehetre D, Das S, "An Automatic Irrigation System Using Zigbee in Wireless Sensor Network", International Conference on Pervasive Computing (ICPC), January 2015

[11]. Rani M.U, Kamlesh S, "Web Based Service To Monitor Automatic Irrigation System for the Agriculture Field Using Sensors", International Conference on Advances in Electrical Engineering (ICAEE), Jan 2014