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REAL TIME AUTOMATION OF AGRICULTURAL ENVIRONMENT FOR SOCIAL MODERNIZATION OF INDIAN AGRICULTURE

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Abstract :- Agriculture is the broadest financial area and plays an important role in the overall economic growth of a nation. India is an agriculture-based country and 75%of a people where live in rural areas. Now a days most of the peoples migrate rural to urban places. Because of the technological development people could not more interest to work with oldest method of farming. So, overcome this problem to go with improved irrigation system in agricultural environments using sensors, GSM and water meter. In this module we can include the light intensity and humidity sensing, GSM, moisture sensor where used to control the motor pumps to automation process. In the implementation of automation is to using the improvement of farming and growth of yield. So, making this model is to sensing the soil moisture level and water levels are indicate to system for automatically switched ON/OFF the motor pumps. It is usage of the less time, electricity conception and involuntarily results in wastage of water. That is the same time to the indicator sending the message to the former for using GSM. The aim of our idea to likely work with forms easily to grow of farming.

INTRODUCTION

In agricultural activities irrigation transportation is most imperative and trivial ground water system, canals, tanks and rain water harvesting. So, the largest system in India was the ground water well-based system. That was a 160 million hectares of urbane lands are in India another 39 million hectare can irrigated by ground water wells and a 22 million hectares by irrigation canals. During 2010 India was constantly irrigated by 35% of agricultural land. Indias 2/3rd cultivated lands are dependent upon the monsoons. Last 50 years the development of irrigation system infrastructure was helped in improvement of food security, monsoons dependency was reduced, create rural job opportunities and agricultural yield was improved. In India we are consumed rice and sugar by forming used for more than 60% water available and two crops reside in 24% of cultivable area for the news report in 2019. Indians soil without caring more for replenish used for growing crops over 1000 years. In the overall world can be almost average amount of yield produced. This is over problem can be solved by using fertilizers and manures. So, irrigation is the most important in agriculture. That is the main think to developing our idea to improve our farming

Embedded Systems:

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result.

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player, DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement. The embedded software is also called "firm ware". The desktop/laptop computer is a general purpose computer. You can use it for a variety of applications such as playing games, *word* processing, accounting, software development and so on. In contrast, the software in the embedded systems is always fixed listed below:

Embedded systems do a very specific task they cannot be programmed to do different things. Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe-loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems operate through a battery, the power consumption has to be very low. Some embedded systems have to operate in extreme

RELATED WORK

If climatic condition is hot, dry, sunny, windy then there is need of high amount of water for crops and if these factors are like cold, humid, cloudy, little wind then we need less water for the crops. Earlier study model conceptualized a system that consist of six parts that are monitoring, management, planning, Information Distribution, decision support and control action. And above study model does data analysis for better decision support [1]. In [2], a GSM based smart farming system was proposed for doing automation of several farming tasks. Automation is proposed by smart irrigator that moves on mechanical bridge slider arrangement. The smart irrigator receives signal from smart farm sensing system through GSM module. Then sensed data is transfer towards central database from which all crop details are analysed and transferred to irrigator system to perform automatic actions. IoT based smart Agriculture [3] gives information about irrigation having facilities like smart control and making intelligent decision depending upon real time data from fields. All these operations will be controlled through any smart device placed remotely and the interfacing sensors are used to perform operations along with Wi-Fi , actuators and other hardware devices. The whole system was developed using infield sensors which collects data from farm and using GPS data is sent to the base station where necessary actions are determined to control irrigation according to database available with the system. Researcher's measure soil related parameters such as humidity and moisture important for the

growth of any crop. Auto mode and Manual mode are the two modes of operation of the system. System takes its own decisions and controls the installed devices and user can control the operations of system using android app or commands in auto and manual mode respectively. Internet of Things is proven to be a cost effective and reliable technology to implement smart systems [5].In smart village system advance rural connectivity is enabled through web service and measuring different environmental factors real time. System proposed in [6] suggests use of IoT in almost all phases like growing, harvesting, packaging, transportation. Real time data provided by sensors, RFID tags in all the above phases of cultivation of crop will help farmers and all the stake holders to have complete view of the product right from the production to sales. Automated farming system proposed in [7] turns on the motor on/off depending on the moisture values from the moisture sensor and turn the lights in the green house on or off based on the light sensors. Actuators are used to control the motor. Automated system definitely helps farmer in increasing the yield of crops Paper [8] produces a agricultural model in IoT environment which is human centric. It incorporates IoT and cloud computing ubiquitously to remove the inefficiency and lack of management, which are the root of problems in agriculture environmental conditions such as very high temperatures and humidity.

Project Introduction

Aim: Design And Improvement Of Smart Farming System Using Sensors For Agriculture Task Automation

Existing System

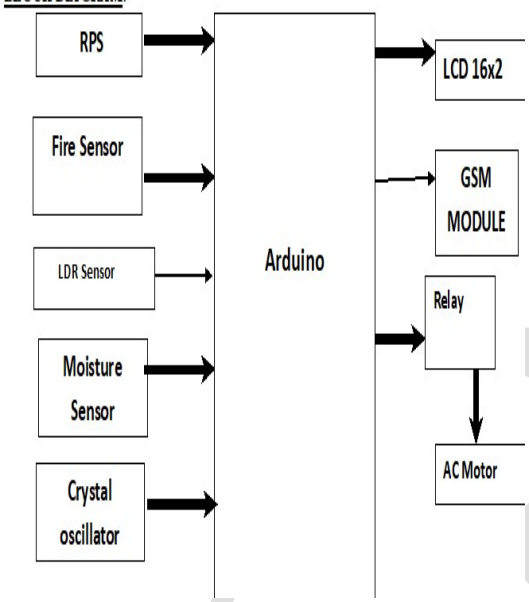
In older days agriculture monitoring is the farmers functioning in the farm lands are gradually needy on the rains and bore wells for irrigation of their territory. If they switch ON any of the motor circuit using man power. Automation of form actions can make over agricultural domain from being manual and still to intelligent and dynamic principal to superior production with lesser human management. The automated irrigation system which monitors and maintains the preferred soil moisture content by the use of automatic watering.

IV.PROPOSED SYSTEM

Proposed System deals with better production and cancelling out all factors leading to crop failure. The proposed system will give results based on the necessity of the crops, which will help to deal with the requirement and crisis faced during crop productivity. Measure temperature to deal with crops which cannot bear low soil moisture. Some crops fail due to low light intensity, so gauging light intensity is a necessity. The System to have longer lifespan and show accurate measurement. The System should be easy for upgradation so as to simplify integrating components with enhanced features. The proposed system should have the following aspects:

- Reliability: The system has longer lifespan and the measurements are accurate.
- Maintenance: The proposed system upgraded at ease by simple integrating components with enhanced features.
- Ease to use: The proposed system is easy to comprehend and grasp. The usage of the system doesn't require any prior knowledge

BLOCK DIAGRAM:



ARDUINO

Overview:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

The board has the following new features:

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Summary

Microcontroller	ATmega328
Operating Voltage	5V

InputVoltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

Schematic & Reference Design

Note: The Arduino reference design can use an Atmega8, 168, or 328, Current models use an ATmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors.

GSM

(GLOBAL SYSTEM FOR MOBILE COMMUNICATION)

GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION) is the most popular standard for mobile telephony systems in the world. The GSM Association, its promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80% of the global mobile market uses the standard. GSM is used by over 1.5 billion people across more than 212 countries and territories. This ubiquity means that subscribers can use their phones throughout the world, enabled by international roaming arrangements between mobile network operators. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system.

The GSM standard has been an advantage to both consumers, who may benefit from the ability to roam and switch carriers without replacing phones, and also to network operators, who can choose equipment from many GSM equipment vendors. GSM also pioneered low-cost implementation of the short message service (SMS), also called text messaging, which has since been supported on other mobile phone standards as well. The standard includes a worldwide emergency telephone number feature (112).

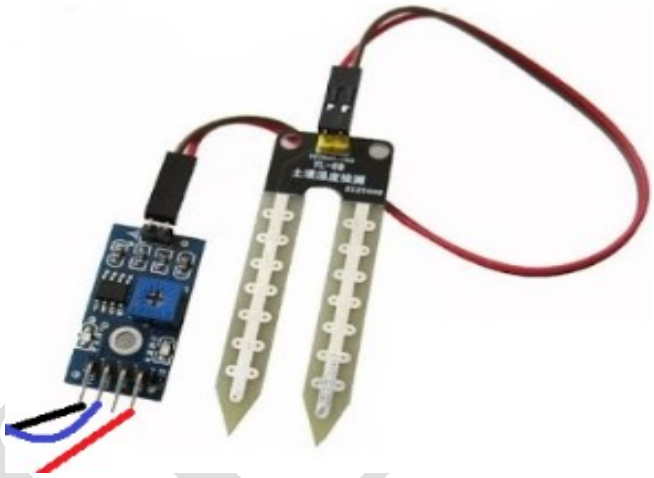
Newer versions of the standard were backward-compatible with the original GSM system. For example, Release '97 of the standard added packet data capabilities by means of General Packet Radio Service (GPRS). Release '99 introduced higher speed data transmission using Enhanced Data Rates for GSM Evolution (EDGE).

MAX232

In telecommunications, **RS-232** (Recommended Standard 232) is a standard for serial binary single-ended data and control signals connecting between a *DTE* (Data Terminal Equipment) and a *DCE* (Data Circuit-terminating Equipment). It is commonly used in computer serial ports. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pin out of connectors.

Hardware Requirements

SOIL MOISTURE SENSOR



Soil moisture sensors measure the volumetric water content in soil.[1] Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensingin hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

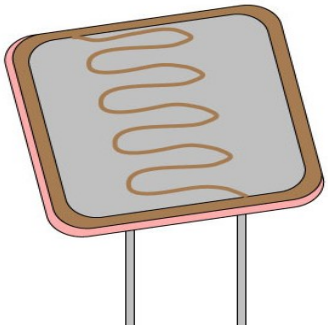
Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential; these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks.

LIGHT DEPENDENT RESISTOR

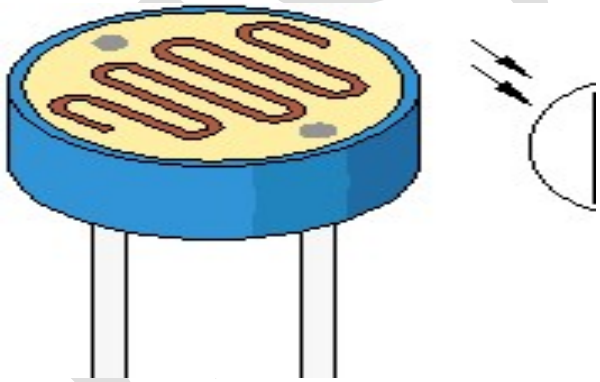
INTRODUCTION:

An LDR (Light dependent resistor), as its name suggests, offers resistance in response to the ambient light. The resistance decreases as the intensity of incident light increases, and vice versa. In the absence of light, LDR exhibits a resistance of the order of mega-ohms which decreases to few hundred ohms in the presence of light. It can act as a sensor, since a varying voltage drop can be obtained in accordance with the varying light. It is made up of cadmium sulphide (CdS).
An LDR has a zigzag cadmium sulphide track. It is a bilateral device, *i.e.*, conducts in both directions in same fashion.

Pin Diagram:



A **Light Dependent Resistor** (aka LDR, photoconductor, or photocell) is a device which has a resistance which varies according to the amount of light falling on its surface.

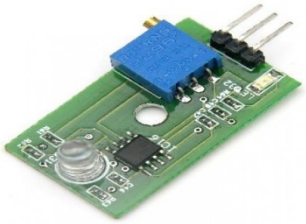


Crystal Oscillator:

It provide clock pulses of 11.0592 Mhz frequency. It can be used as UART clock (6×1.8432 MHz). It allows integer division to common baud rates (96×115200 baud or 96×96×1,200 baud). It is a common clock for Intel 8051 microprocessors It uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time, to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits incorporating them became known as crystal oscillators. The crystal oscillator circuit sustains oscillation by taking a voltage signal from the quartz resonator, amplifying it, and feeding it back to the resonator. The rate of expansion and contraction of the quartz is the resonant frequency, and is determined by the cut and size of the crystal. When the energy of the generated output frequencies matches the losses in the circuit, an

oscillation can be sustained. One of the most important traits of the crystal oscillator is that it exhibits very low phase noise. In the crystal oscillator, the crystal mostly vibrates in one axis, therefore only one phase is dominant. This property of low phase noise makes them particularly useful in telecommunications where stable signals are needed, and in scientific equipment where very precise time references are needed. The result is that a quartz crystal behaves like a circuit composed of an inductor, capacitor and resistor, with a precise resonant frequency

FIRE SENSOR



There are several types of flame detector. The optical **flame detector** is a detector that uses optical sensors to detect flames. There are also ionization flame detectors, which use current flow in the flame to detect flame presence, and thermocouple flame detectors.

Infrared Flame Detector

Infrared (IR) flame detectors work within the infrared spectral band. Hot gases emit a specific spectral pattern in the infrared region, which can be sensed with a thermal imaging camera (TIC) a type of thermo graphic. False alarms can be caused by other hot surfaces and background thermal radiation in the area as well as blinding from water and solar energy. A typical frequency where single frequency IR flame detector is sensitive is in the 4.4 micrometer range. Typical response time is 3-5 seconds.

RELAY:

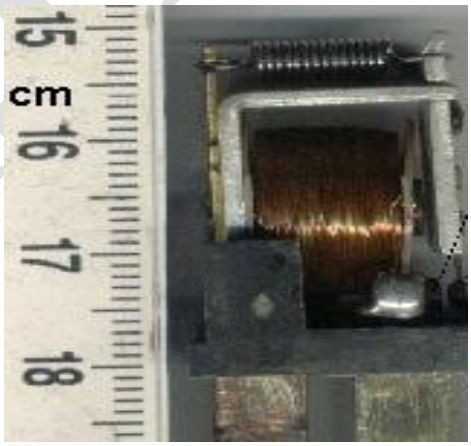


Fig 3.7: Automotive-style miniature relay, dust cover is taken off

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used

where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays were used extensively in telephone exchanges and early computers to perform logical operations.A type of relay that can handle the high power required to directly drive an electric motor is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overloadfaults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

AC MOTOR

A **submersible pump** (or **sub pump, electric submersible pump** (**ESP**)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitation, a problem associated with a high elevation difference between pump and the fluid surface. Submersible pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersibles are more efficient than jet pumps.

WORKING PRINCIPAL

Electric submersible pumps are multistage centrifugal pumps operating in a vertical position. Liquids, accelerated by the impeller, lose their kinetic energy in the diffuser where a conversion of kinetic to pressure energy takes place. This is the main operational mechanism of radial and mixed flow pumps.
The pump shaft is connected to the gas separator or the protector by a mechanical coupling at the bottom of the pump. Fluids enter the pump through an intake screen and are lifted by the pump stages. Other parts include the radial bearings (bushings) distributed along the length of the shaft providing radial support to the pump shaft. An optional thrust bearing takes up part of the axial forces arising in the pump but most of those forces are absorbed by the protector's thrust bearing.

SOFTWARE
Arduino software

The Arduino Uno can be programmed with the Arduino software. Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board).For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preburned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).We can also bypass the boot loader and programs the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with

a DFU boot loader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, an .information file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes aWire library to simplify use of the I2C bus.

ADVANTAGES & DISADVANTAGES

ADVANTAGES:

1. Ease of maintenance
2. Accessing the data from any remote place.
3. Less power consumption
4. Very faster communication

APPLICATIONS:

1. Industrial Automation
2. Weather stations
3. Home Automation

Conclusion

The project "**Modernization of agriculture"** has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

FUTURE SCOPE

The usage of self-autonomous agriculture system is highly recommended and very effective when look the log term goals like good production, automation. When the self autonomous system is used the data collected in the process is highly efficient and helps in improvement of the field and can save many farmers from financial crisis and many suicides can be reduced. It increases the quantity and quality of agricultural products. Due the automatic nature of system the labour cost and the human intervention will be less and saved. By measuring variations

within a field and adapting the strategy accordingly, farmers can greatly increase the effectiveness of pesticides and fertilizer sand use them more selectively.

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