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ARDUINO BASED AGRICULTURAL MONITORING SYSTEM IN MOBILE APPLICATION

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ABSTRACT - Indian agribusiness is assorted, extending from ruined ranch towns to created ranches using present day farming. Farming has extraordinary void for innovative propel, Agriculture field can be bolstered and upset utilizing bleeding edge web of things (IOT) innovation. Computerized water system in light of soil moister and temperature can accomplish by inserting Arduino improvement board with simple receptive soil sensors. To improve encourage advancement an Android based gadget App interface will be organized to use GSM sensor interface. The point is to make a remote telemetry framework to be utilized as a part of the field of horticulture. The ecological variables to be specific the dampness and soil dampness with the assistance of Arduino and their relating sensors. For this paper, the defenders did this utilizing an Arduino-Android interface. For instance of information incorporate moistness and soil dampness. Every one of these information send to the cell phone utilizing an Arduino GSM interface. This technique is not so much exorbitant but rather more effective contrasted with the first because of the way that the phone system is entrenched and available from anyplace in the nation.

INTRODUCTION

Water system is the simulated utilization of water to the land or soil. It is utilized to aid the developing of horticultural products, upkeep of scenes, and re vegetation of irritated soils in dry regions and amid times of lacking precipitation. At the point when a zone goes ahead, the water moves through the horizontal lines and at last winds up at the water system producer (dribble) or sprinkler heads.

The sprinklers are typically introduced with the highest point of the head flush with the ground surface. Producers are by and large laid on the dirt surface or covered a couple creeps to diminish dissipation misfortunes. A high relative dampness (over 80-85%) ought to be evaded in light of the fact that it can expand the frequency of infection and lessen plant transpiration.

Since the relative humidity alone does not tell us anything about the absolute water holding capacity of air, a different measurement is sometime used to describe the absolute moisture status of the soil. Pressure deficit measurement can tell us how easy it is for plants to transpire: higher values stimulate transpiration (but too high can cause wilting), and lower values inhibit transpiration and can lead to condensation on leaf and greenhouse surfaces.

PROBLEM STATEMENT

The ecological information is accumulated utilizing sensors and sent to an Android telephone for review. To quantify the dampness substance of the dirt a sensor was made utilizing copper wires and galvanic nails. These sensors are then associated with an Arduino chip by means of the simple info pins. The chip gives energy to the sensors and controls how frequently information is perused from the sensors.

A versatile Wi-Fi was utilized to send the information specifically from the Android telephone to the database, changes in the qualities can be seen particularly as far as soil dampness, scope and longitude because of the way that they are distinctive examples at various area.

It has a normal temperature of 32.55oC and a normal relative stickiness of 42.5%. The rate mistakes for the temperature and stickiness qualities are 3.93% and 4.65% individually. The low rate mistake and the way that the DHT-11 sensor has determination that expresses that it has a temperature exactness of ±2oC and a relative moistness precision of ±5%.

Wi-Fi or GPRS (3G) – by using this method, the data stored in the Android device will be sent to the server directly via Wi-Fi or GPRS. This method would be faster since there would be less routing of data. SMS to another Android device – this method reroutes the data from the Android device on the field to another Android device near Wi-Fi hotspots or the server via SMS. This method ensures that transmission of

data is possible in locations with no Wi-Fi or GPRS. This method is less costly and more efficient compared to the first one due to the fact that the telephone network is well established and accessible from almost anywhere in the country unlike 3G networks which are limited to some locations.

PROPOSED SYSTEM

The proposed system which contains two functional components. They are the moisture sensors and the motor/water pump. Thus the Arduino Board is programmed using the Arduino IDE software. The function of the moisture sensor is to sense the level of moisture in the soil. The sensors sent the data to the database for storing the values in it. Again the values, sent to the android phone through GSM port. This method is used to avoid the data lost while sending the sensor values from device to device. Also, the motor/water pump supplies water to the plants.

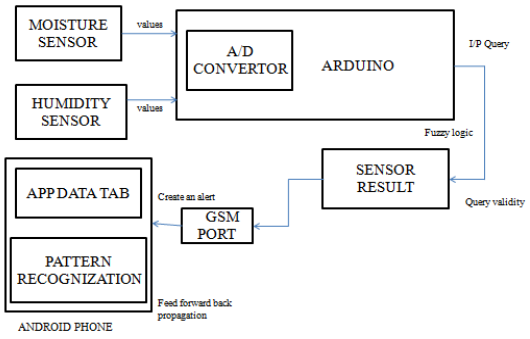

Fig 1: Block Diagram

The Arduino Board is programmed using the Arduino IDE software. The moisture sensor measures the level of moisture in the soil and sends the signal to the Arduino if watering is required. The motor/water pump supplies water to the plants until the desired moisture level is reached.

MODULE DESCRIPTION

A module description provides detailed information about the module and its supported component, which is accessible in this system.

LIST OF MODULES

- Sensor interface
- Serial port data networking
- GSM SIM interface
- Android Camera Interface
- Android image processing
- Soil Pattern Recognizition

MODULE DESCRIPTION

Sensor Interface

Analogread() Reads the value from the specified analog pin. The Arduino board contains a 6 channel (8 channels on the Mini and Nano, 16 on the Mega), 10-bit analog to digital converter. This means that it will map input voltages between 0 and 5 volts into integer values between 0 and 1023. This yields a resolution between readings of: 5 volts / 1024 units or, .0049 volts (4.9 mV) per unit. The input range and resolution can be changed using analogReference().It takes about 100 microseconds (0.0001 s) to read an analog input, so the maximum reading rate is about 10,000 times a second.

Serial Port Data Networking

Prints information to the serial port as intelligible ASCII content. This summon can take many structures. Numbers are printed utilizing an ASCII character for every digit. Buoys are also printed as ASCII digits, defaulting to two decimal spots. Bytes are sent as a solitary character. For coasting point numbers, this parameter indicates the quantity of decimal spots to utilize.

GSM SIM Interface

The AT command +CMGF (command name in text: Message Format) is used to select the operating mode of the GSM/GPRS modem or mobile phone. It takes one parameter. The value of the parameter can either be 0 or 1. The values 0 and 1 refer to SMS PDU mode and SMS text mode respectively. SMS PDU mode is the default mode if it is implemented on the mobile device. To change the operating mode of a GSM/GPRS modem or mobile phone, perform a set operation with the +CMGF AT command. If the operating mode specified is not supported by the GSM/GPRS modem or mobile phone, the final result code "ERROR" will be returned. To find out the operating mode currently used by a GSM/GPRS modem or mobile phone, perform a read operation with the +CMGF AT command. The response above indicates the GSM/GPRS modem or mobile phone is using SMS PDU mode.

Android Camera Interface

Incorporating camera should be possible in two ways. One is to utilize android inbuilt camera application which is simple process. This strategy won't give you much control over camera as everything is taken care by inbuilt camera

application. Along these lines will be suitable when your application require only a photo or video from camera.

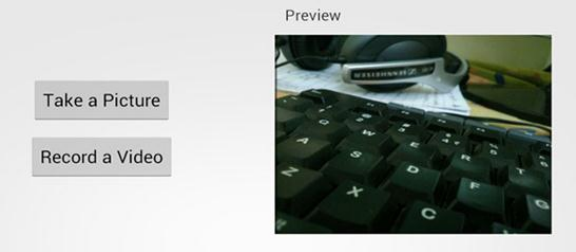

Fig 2: Captured image in mobile app

Android Image Processing

Android picture preparing is the utilization of PC calculations to perform picture handling on computerized pictures. As a subcategory or field of computerized flag handling, advanced picture preparing has many points of interest over simple picture preparing. It permits a significantly more extensive scope of calculations to be connected to the information and can maintain a strategic distance from issues, for example, the development of commotion and flag mutilation amid preparing. Since pictures are characterized more than two measurements (maybe more) computerized picture preparing might be demonstrated as multidimensional frameworks.

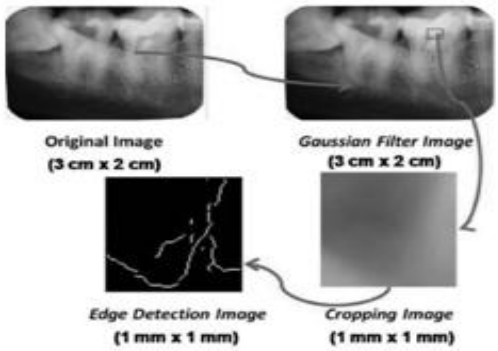

Fig 3: Detecting image in Android

Soil Pattern Recoganization

Pattern recognization algorithm for the most part plan to give a sensible response to every single conceivable information and to perform "doubtlessly" coordinating of the sources of info, considering their factual variety. This is against example coordinating calculations, which search for correct matches in the contribution with previous examples. A typical case of an example coordinating calculation is consistent expression coordinating, which searches for examples of a given sort in literary information and is incorporated into the pursuit capacities of numerous content managers and word processors. Rather than example acknowledgment, design coordinating is for the most part not considered a kind of machine learning, in spite of the fact that example coordinating calculations (particularly with genuinely broad, precisely custom-made examples) can in some cases prevail with regards to giving comparable quality yield of the sort given by example acknowledgment calculations.

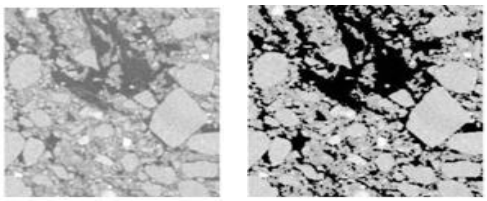

Fig 4: Pattern Recognization using CBIR

WORKING PRINCIPLE

Components Required

- Arduino UNO
- Moisture Sensor
- Temperature Sensor
- GPRS module
- Smart Phone

Moisture Sensor

Soil moisture sensors measure the water content in soil. A soil moisture probe is made up of multiple soil moisture sensors. Technologies commonly used in soil moisture sensors include:

- Frequency domain sensor such as a capacitance sensor.
- Neutron moisture gauges, utilize the moderator properties of water for neutrons.
- Electrical resistance of the soil

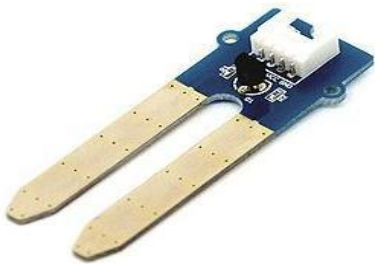

Fig 5: Moisture Sensor

Soil electrical conductivity is simply measured using two metal conductors spaced apart in the soil except that dissolved salts greatly alter the water conductivity and can confound the measurements. The water absorbed by the block is correlated with soil water potential over the range -60 to -600 kPa providing a tertiary indicator for use in medium to heavy soils. Non-dissolving granular matrix sensors are now available with a more exacting specification for the range 0 to -200 kPa and use internal calibration methods to offset variations due to solutes and temperature.

Investigate review instruments commonly have research facility measured exactness more awful than +/ - 4% when depending on processing plant settings or on a par with +/ - 1% when aligned for the particular soil. Along these lines, by utilizing the dampness sensors, the superseding component will be dependable, financially savvy sensors and electronic frameworks for getting to and translating the information.

ARDUINO CONTROLLER

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip.

- **External Interrupts: 2 and 3.** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.
- **PWM: 3, 5, 6, 9, 10, and 11.** Provide 8-bit PWM output with the analogWrite() function.
- **SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).** These pins support SPI communication using the SPI library.
- **LED: 13.** There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

- **I^2C: analog input pins A4 (SDA) and A5 (SCL).** Support I^2C (TWI) communication using the Wire library.
- **AREF.** Reference voltage for the analog inputs. Used with analogReference().

- **Reset.** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Power

The board can work on an outer supply of 6 to 20 volts. On the off chance that provided with under 7V, in any case, the 5V stick may supply under five volts and the board might be precarious. In the event that utilizing more than 12V, the voltage controller may overheat and harm the board. The prescribed range is 7 to 12 volts.

GSM Module

- **GSM –**SIM 900 module is used here.
- **GSM** (Global System for Mobile communication) is a digital mobile telephony system that is widely used in many parts of the world.
- **GSM** uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, **GSM**, and CDMA).

GSM Module Interface

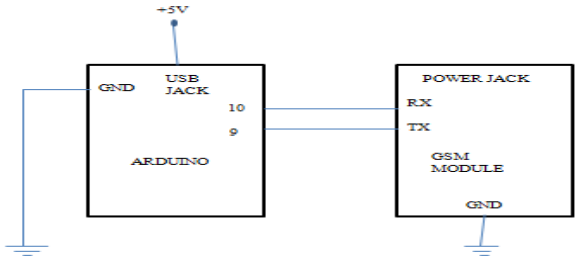

Fig 6 : Connection between Arduino and GSM Module

Configuring GSM:

- As the command *AT+CMGS* and serial number of message are entered, SMS is sent to the particular SIM.
- For example,
  AT+CMGS=1
  OK

ALGORITHM

"Content-based" implies that the pursuit dissects the substance of the picture as opposed to the metadata, for example, watchwords, labels, or portrayals related with the picture. The expression "content" in this setting may allude to hues, shapes, surfaces, or whatever other data that can be gotten from the picture itself. CBIR is alluring in light of the fact that hunts that depend absolutely on metadata are subject to explanation quality and culmination. Having people physically comment on pictures by entering watchwords or metadata in a huge database can be tedious and may not catch the catchphrases craved to portray the picture. The assessment of the viability of watchword picture

pursuit is subjective and has not been very much characterized. In a similar respect, CBIR frameworks have comparative difficulties in characterizing achievement.

CONCLUSION

The Arduino based agricultural system which helps to know about the complete detail about the soil features through mobile application. This system allows cultivation in places with water resources thereby improving sustainability. The sensor is sensing and proves that the moisture of soil can be sent to the smart phone via messages. The use of mobile application could take the photograph of the soil through the device camera and gave the soil type as a result in the box. This type of agricultural products those are geographically isolated, where the investment in smart approaches would be less expensive.

This framework can be changed in accordance with an assortment of particular soil needs and requires least upkeep. The GSM controlled duplex correspondence framework gives an intense basic leadership gadget idea for adjustment to a few development situations. Moreover, the GSM interface permits the supervision through versatile media transmission gadgets, for example, a PDA. Other than the money related investment funds in soil utilize, the significance of the safeguarding of this regular asset legitimize the utilization of this sort of agribusiness frameworks.

FUTURE ENHANCEMENT

Precision agriculture requires acquisition and management of data on soil and crop properties. It is known that soil survey experts evaluate soil texture in–situ using visual inspection and the "hand–feel" methods based on many years of experience. Our approach using image processing was motivated by this visual inspection and "hand–feel" method, taking surface imagery of soil samples, and calculating size distribution or roughness of soil particles.

Image processing has been utilized as a part of an assortment of agrarian applications, for example, estimation of properties identified with soil and harvest, as well as nature of farming items for sorting and reviewing (e.g., organic products) licensed an in situ magnifying lens imaging framework for analyzing subsurface situations manufactured in a dirt entering tube, however have not utilized the framework for soil order. Soils with various sand, sediment, and earth parts may have diverse hues because of connections with other soil properties (e.g., oxidation and lessening), and distinctive sorts and measures of rock–forming minerals+, and these qualities could be utilized for soil arrangement factors.

As a piece of general research we are attempting to build up the examination to check the creepy crawlies of the on a leaf and furthermore plots the influenced zone that are making by the bugs. Programming will create by PC division utilizing a mix of picture handling schedules and real nature improvement to number creepy crawlies on a leaf. It will saw by the scanners in straightforwardness mode with larger amount.

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