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An Enhanced Design and Implementation of Smart Crop Yielding using IoT

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ABSTRACT

The essential influencing parameter of the Indian economy is Agriculture. Also,in agriculture,the crucial aspect is irrigation.Irrigation must be at the right time for a higher crop yield.It is pretty hard for farmers having a large-scale discipline to check the factors like soil moisture,temperature,humidity etc,each time on different parts of the field to facilitate the irrigation appropriately.So we use IOT smart crop yielding to overcome this problem.This undertaking includes many sensors like soil moisture sensor,humidity ensor,temperature sensor.Various sensor nodes are deployed at different locations in the farm to check the parameters automatically through sensors.This data is sent into the cloud, and the farmer can access the data at any time by logging in to web page connected to the cloud by giving this credentials.In this way,the farmer can keep track of all the essential parameters in their large scale farms and avoid water wastage in daily needs.

KEYWORDS: *smart crop, soil, agriculture, sensors,farmer*

1. INTRODUCTION

In India, agriculture is the people's primary source of income. There hasn't been any crop progress in the last ten years. Water waste, low soil fertility, fertilizer overuse, climate change, illnesses, and other factors may all be contributing to this. Agriculture consumes 85 percent of the world's freshwater resources. As the demand for water grows, there is a pressing need to develop water-use methods that are both sustainable and cost-effective. Because the world is moving toward modern technologies, agriculture must follow suit. Agricultural modernization can be aided by cutting-edge technology such as the Internet of Things and Cloud, as well as Wireless Sensor Networks. IoT may take advantage of the cloud's practically limitless capabilities and resources. For IoT service administration, the cloud can be a viable option. The Internet of Things (IoT) is a network of interconnected physical devices that can be accessed over the Internet. Sensors, communication infrastructure, and computational and processing units are all part of it. The things have particular distinguishing characteristics, are easily identified, and can be accessed over the Internet. The sensors send data to a cloud server, which acts as a computational and processing unit, over the Internet. The processing result is subsequently sent to the decision-making and action-invoking system, which determines which automated action should be taken. Through the use of the internet, the mobile application designed on Android helps you monitor the field from anywhere.

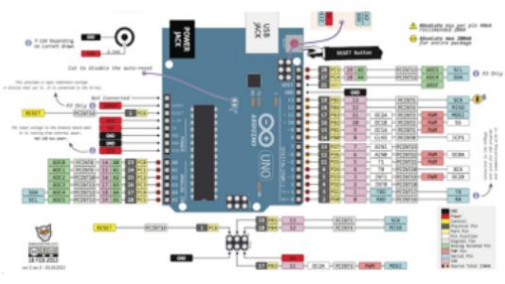
Agriculture is major source of income for the largest population in India and is major contributor to Indian economy. In past decade it is observed that there are not much crop development in agriculture sector. Food

prices are continuously increasing because crop rate declined. There are number of factor which is responsible for this it may be due to water waste, low soil fertility, Fertilizer abuse, climate change or diseases etc the mobile application designed on Android helps you monitor the field from anywhere. Agriculture is major source of income for the largest population in India and is major contributor to Indian economy. In past decade it is observed that there are not much crop development in agriculture sector. Food prices are continuously increasing because crop rate declined. There are number of factor which is responsible for this it may be due to water waste, low soil fertility, Fertilizer abuse, climate change or diseases etc. C.Nagarajan et al [1,5,8] has studied that it is very essential to make effective intervention in agriculture and the solution is IOT in integration with wireless sensor network. Internet of things (IOT) is a method of connecting everything to the internet- it is connecting object orthings(such as car, home, electronic devices, etc.) which are previously not connected with each other main purpose of IOT is ensuring delivery of right information to right people at right time. In agriculture irrigation is the important factor as the monsoon rain falls are unpredictable and uncertain. This project uses IOT technology in agriculture, gathering crops growth environmental parameters in a fixed place to help farmers find problems in time. Agriculture experts give guidelines with specific information to increase the farmer's income and help them in the prevention and control of crop diseases and pests. Through the custom development of mobile phone apps, it has been implemented with agriculture technology promotion and expert online FAQ. The system development composes three parts: The server, Android client and PC client to achieve scalability, high reliability, security, compatibility of technical requirement.

2. LITERATURE SURVEY

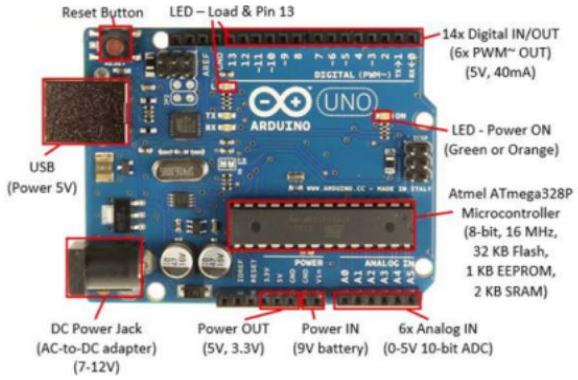
To maximise water utilisation for agricultural purposes, a wireless sensor-based automated irrigation system is presented. A distributed wireless sensor network of soil moisture and temperature sensors deployed in the crop field makes up the system. The system is utilised to handle sensor data., which is done using an algorithm with sensor threshold values provided to a microcontroller for irrigation. Only a single implementation of Arduino Uno and Raspberry Pi is required. Threshold values are determined through testing on various types of soil and at various temperatures.It uploads the log file to the server, allowing the user to see it from any remote location. Watering

System for Plants in accordance with Soilmoisture conserves water while allowingwater to be received at a favoured area of the plant, enhancing crop output. Water from vegetation is uniformly spread in the soil by a servo motor, ensuring optimal absorption. As a result, there is very little water waste. The Arduino integrated developmentenvironment(IDE)isa ross-platform application written in the Java programming language that is provided by the Arduino project. It arose from the IDE for the Processing and Wiring programming languages. It comes with a code editor that enables text cutting and pasting, text finding and replacement,automated indenting, brace matching, and syntax highlighting, as well as one-click compiling and uploading to an Arduino board. A message box, a text terminal, a toolbar with common function buttons, and a hierarchy of operation menus are also included. A sketch is an Arduino program created with the Arduino IDE. On the development machine, sketches are saved as text files with the extension.ino.Pre-1.0 Arduino Software (IDE) saved sketches with the.pde extension. To support the languages C and C++, the Arduino IDE provides certain code structuring rules. The Wiring project is a software library that comes with the Arduino IDE and allows you to perform a variety of typical input and output tasks. The GNU toolchain, which is also included with the IDE release, requires only two basic functions to start the sketch and the main programme loop, which arecompiled and linked into an executable cyclic executive programme. The avrdude programme in the Arduino IDE converts executable code to a text file in hexadecimal encoding, which is subsequently loaded into the Arduino board's firmware via a loader programme.



borders around the outside of your figures. Applications: • Xoscillo, an open-source oscilloscope • The Arduinome is a MIDI controller that looks like the Monome. • OBDuino is a trip computer that works with most modern cars' on-board diagnostics interface. • Ardupilot, software and hardware for drones • Gameduino is an Arduino shield that allows you to make old-school 2D video games. • The ArduinoPhone is a DIY cellphone. 5 • Quality of water testing platform • Arduino and stepper motor-based automatic titration system • Low-cost data glove for virtual reality applications • Bovine milk adulteration is detected using an impedance sensor device. • Homofaciens' close loop control of a homemade CNC built using Arduino and DC motors • DC motor control using Arduino and H-Bridge

The (Arduino Software (IDE)) can be used to program the Arduino/Genuino Uno. From the Tools > Board menu, choose "Arduino/Genuino Uno" (according to the microcontroller on your board). See the reference and tutorials for more information. The bootloader on the ATmega328 on the Arduino/Genuino Uno comes preprogrammed, allowing you to upload fresh code to it without the necessity of an 6 external hardware programmer. It uses the original STK500 protocol to communicate (reference, C header files). You can alternatively use Arduino ISP or equivalent to bypass the bootloader and programme the microcontroller directly through the ICSP (In-Circuit Serial Programming) header; check these instructions for further information. The firmware source code for the ATmega16U2 (or 8U2 in the rev1 and rev2 boards) is available in the Arduino repository. The ATmega16U2/8U2 comes with a DFU bootloader that may be triggered using the following commands: • On Rev1 boards, reseating the 8U2 after connecting the solder jumper on the back of the board (near the map of Italy). • A resistor pulls the 8U2/16U2 HWB line to ground on Rev2 or later boards, making it easy to put into DFU mode. After that, you can load a fresh firmware using Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux). You can also utilise an external programmer with the ISP header (overwriting the DFU bootloader). For further details, see this user-contributed tutorial.



3. SYSTEM DESIGN

Arduino is a computer hardware and software startup, project, and user community that creates microcontroller kits for creating digital devices and interactive things that can sense and control real items. 3 The project's hardware and software are available as open-source hardware and software licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), allowing anybody to make Arduino boards and distribute software. Commercially available pre-assembled Arduino boards as well as DIY kits are available.

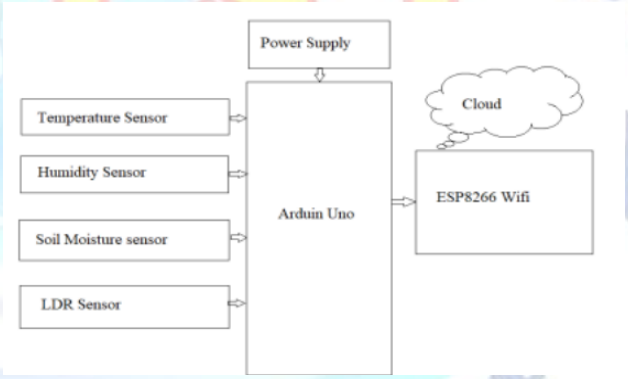


fig:1. Architecture of the system

A wide range of microprocessors and controllers are used in Arduino board designs. The boards provide digital and analogue input/output (I/O) pins that can be used to connect to various expansion boards (shields) and other circuits. Serial communications interfaces, including Universal Serial Bus (USB) on some models, are available on the boards and are used to load programmes from personal computers. Microcontrollers are often programmed using a dialect of C and C++ programming features. The Arduino project includes an integrated development environment (IDE) based on the Processing language project, in addition to standard compiler toolchains. The Arduino project began in 2005 as a student project at the Interaction Design Institute Ivrea in

Ivrea, Italy, with the goal of providing a low-cost and simple means for novices and professionals to design devices that interact with their surroundings utilising sensors and actuators. Simple robots, thermostats, and motion detectors are common examples of such gadgets aimed at beginning enthusiasts. Arduino is named after a pub in Ivrea, Italy, where some of the project's founders used to meet. The bar was named after Arduin of Ivrea, who reigned as King of Italy from 1002 to 1014 as the margrave of the March of Ivrea

4. RESULTS

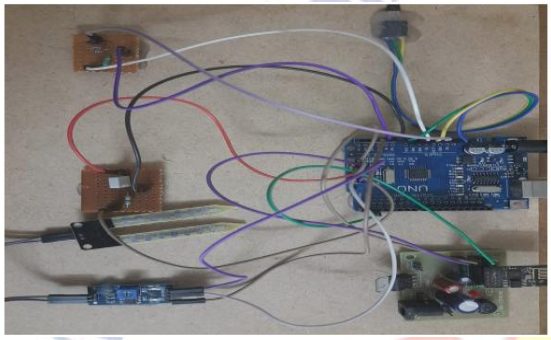


fig 2: Experimental implementation of the project

The experimental configuration of our smart agriculture monitoring system is shown in Figure 4.1. The system includes an ESP8266 microcontroller and sensors such as soil moisture, temperature, humidity, and an LDR sensor. This provides a foundation for live streaming of temperature, humidity, and soil moisture and delivering sensor data to the server using the ESP8266 WiFi module, as well as transferring data from these sensors to a cloud server. The sensors are connected to the microcontroller and supplied with power. The esp8266 microcontroller reads the values from the sensors and sends them to the cloud server.

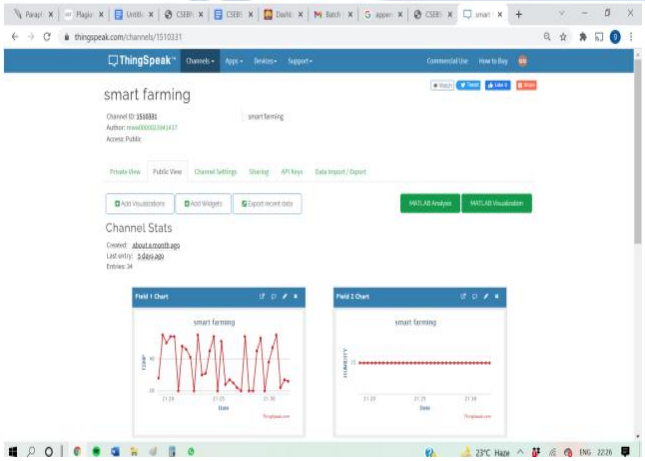


fig 3: Temparature graph

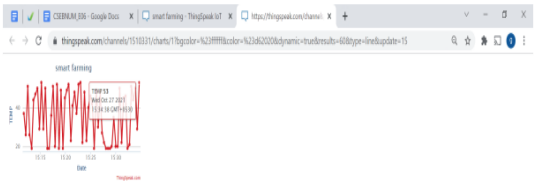


fig 4: humidity graph

fig 5: LDR Graph

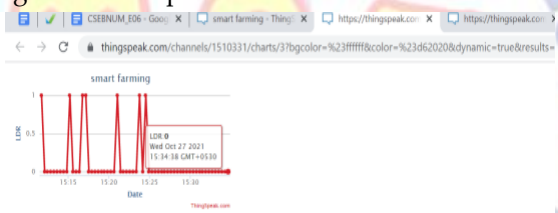
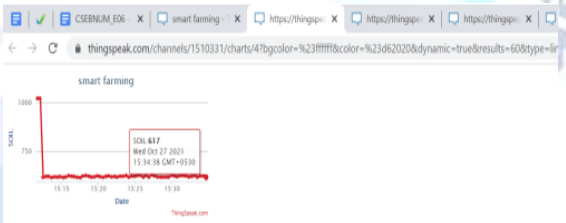


Fig 6: soil moisture graph



5. CONCLUSION AND FUTURE ENHANCEMENTS

The complete system provides agricultural field automation, making farmer's labour easier. It aids in increasing agricultural production while saving the farmer time and money. Rooftop is ideal for smaller farms because it is less expensive to set up. Graphs are used to evaluate current situations and plan for the future. The Android application can be improved to

provide easy access to all field elements and to manipulate the field. Temperature and humidity values can be utilized to perform statistical analysis on historical weather conditions and forecast future circumstances.

This project's future scope could include soil sensors, humidity sensors, temperature sensors, and ldr sensors that gather and store data on cloud servers. This would improve the accuracy of the forecasting and analysis operations. It also entails adapting various data mining methods for agricultural data analysis.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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