International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 7s
DOI: https://doi.org/10.17762/ijritcc.v11i7s.7006
***Article Received:** 02 April 2023 **Revised:** 22 May 2023 **Accepted:** 05 June 2023*

Security and Privacy in Smart Farming: Challenges and Opportunities

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Abstract—Agriculture is basic source of livelihood of people in india. It plays major role in economy of country. But now a days due to migration of people from rural to urban there is hindrance in agriculture.Monitoring the environmental factor is not the complete solution to increase the yield of crops.There are number of factors that decrease the productivity to a great extent. Hence automation must be implemented in agriculture to overcome these problems.An automation Irrigation system there by saving time ,money and power of farmer.The traditional farm land irrigation techniques require manual intervention.With the automated technology of irrigation,the human intervention can be minimized.Continuous sensing and monitoring of crops by convergence of sensors with Internet Of Things(IOT) and making farmers aware about crops growth,harvest time periodically and in turn making high productivity of crops and also ensuring correct delivery of products to end,consumers at right place and right time. So to overcome this problem we go for smart agriculture technique using IOT.This project includes sensors such as temperature,humidity,soil moisture for collection of field data and processed.These sensors are combined with well established web technology in the form of wireless sensor networks to remotely control and monitor data from the sensors.

Keywords-smart agriculture,API Key,thing Speak,Arduino.

I. INTRODUCTION

As we know most of us are depending on agriculture as food is our basic need. Recently we are adapting to the smart farming which is providing precision agriculture. Precision agriculture is becoming the crucial tool in farmers agricultural needs as it is used for the most useful technology for the farmers it can be useful for their business needs and the records of the data that is collected. Precision agriculture is management of crops which is based on the observing through the sensors and analyzing according to that data and storing of the data. These variables include numerous components that can be difficult to compute, thus technology has progressed to compensate for these issues. Precision agriculture often employs two sorts of technology: those that assure accuracy and those that are intended to improve agricultural operations. Farmers may develop a decision support system for a complete enterprise by integrating these two technologies, boosting revenues while limiting unnecessary resource consumption. Precision agriculture technology allows farmers to become better land stewards by implementing nutrient best management practices into their agricultural operations. Some farms harvest and evaluate all they find in a way that is called precision farming. Expertise is needed in the use of agriculture technology which relies on hardware and software. Farmers have more control over the work with more labor. Agriculture can be Precision farming and can be classified as ground, aerial, or satellite. The former is appropriate for manufacturing planning, mapping, scouting, and machine control. The latter two are important to greater global challenges, such as real-time yield status analyses from anywhere. It is advised to combine technologies in order to gain objective data. The benefits of the precision agriculture are as follows.

- mapping of irrigation systems, fields, and roads.

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- finding problem plant regions, soil testing in particular field areas, tractor operation with a parallel steering system
- VRA for precision seeding and fertilizer delivery are some of the other features.

The data gathering capacity of the actual technology is its greatest help in effectively using it. Real Time Monitoring and Analytic Systems help farmer to better regulate their operations by acquiring data. Agricultural machines can be fed with agronomic sensor to tell farmers Potential changes in weather and related soil, air and crop parameters is what smart agricultural Sensor sends to farmers, the quality of workmanship is of greater concern, notably the poor performance of harvesting instruments, as well as risks of errors in data. While both bad technology and cyberattacks are manageable, you can't tell the worst from the best when it comes to addressing your data. In this sector it is one worth keeping an eye on. fundamental rules listed below can help you manage cybersecurity concerns with smart agriculture technologies:

1. Do not neglect frequent software upgrades. Security issues are routinely addressed in the most recent software versions.
2. Examine the most recent technologies for protecting sensitive data. Blockchain technology, along with IoT technologies, is sweeping the globe. It can assist assure data integrity and reliability.
3. Limit the internet connectivity for IoT devices. When their role is no longer necessary, this increases the overall system security.

II. LITERATURE REVIEW

Lakshmi Sudha, 2011 et.al: Farmers using a method that recreates the way water flows through streams in the Agricultural field applies manual methods for checking soil features. The system developed is focused on developing Wireless sensor systems that show farmers when water level is poor or how much of a strain the area has. The crop controller decides if irrigation is needed based on this information.

Anu Shree M K, R Krishna et.al: Tools available for obtaining the feeling values are a part of the sensor system. A human interface governs a roof system that is operated using a blower, i.e., a control system. Two control boards and two chips are actually software for phones, tablets and computer monitors. It is done in python for controlling the system. Values from a certain sensor are displayed both on a wall mounted display and a monitor.

Gregory Epiphaniou and Carsten R. Maple Appl. Sci. 2021: To promote awareness and prepare the way for future study in this field, security-related problems must be addressed. We will mention the features of the PA in this study. The cyber assaults attacks that can compromise each of these is important to the way modern technological systems are used. The cyber- threats to SF are prioritized based on their relationships to the next phases of the CKC. The cyberthreat was chosen as Advanced persistent threats will investigate further. We focused entirely on the current research pertaining to riskneutral methods and were able to create a potential bicycle way map for more work. This work comes in two components; a categorization of the security concerns for SF settings and a subcategory of security risks inside the SF/PP sectors.

Keerthana, B., Nivetha, P. et.al: Smart Agriculture refers to a clever method of automating the farming process. It is feasible to reduce crop risks by assuming an automated system and decreasing human interaction. The emphasis will be on creating a suitable environment for plants. These farming robots. Systems will aid in the management and maintenance of a safe environment, particularly in agricultural regions. Real-time monitoring of the environment is critical in smart farming. Graphical User Interface (GUI)based software will be supplied to operate the hardware system, and the system will be completely self-contained. Isolated habitat with sensors such as a temperature sensor and a humidity sensor. The supervisors will be administered by a master station that communicates with human interactive software. The technology will supply farmers with a sophisticated interface.

III. METHODOLOGY

A recent research endeavor in Bangladesh builds on past work by developing an open-source smart farming model. This model heavily relies on Arduino components, sets out a complete environmental monitoring system, provides data analysis methodologies, and opens avenues for automated farm input management. While the major emphasis of the test system was field production, the basic design is expected to be adapted to greenhouses, animal production, and other agricultural applications in the future. This project, which used the Arduino Mega 2560 to power all monitoring equipment, was based on a mesh of "monitoring nodes" scattered throughout an agricultural field, with a single "central node" gathering all data, activating automatic events, and sending data to the cloud.

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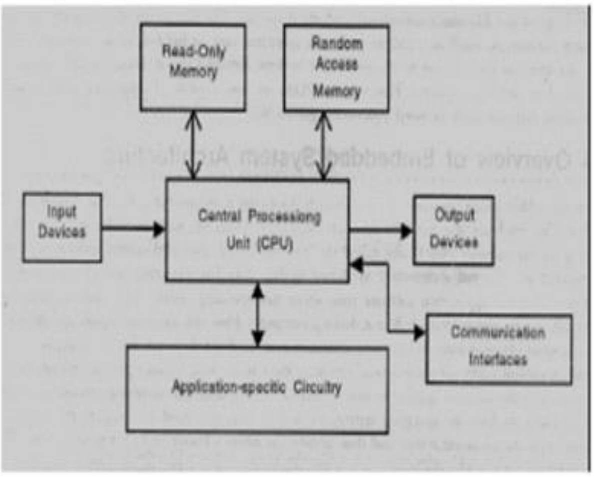

Fig 1 Block diagram of the hardware embedded system

Without the special connection to the major server, edge computing will help farm or greenhouse function as usual, without dependency on machinery to process all the data. With such benefits, it can show the process are sustainable and help to save money and resources in the years to come. There are 3 areas where edge computing provides a connection for the wind, humidity, soil, and edge gateway. You can gather, display, and analyze live data clouds that is delivered through the internet. One possible way you could get data to Thing speak is with online services, which can include such popular ones as Twitter® or Twilio®), and will allow you to quickly generate a live data visualization. A type of Embedded system edge device they connect at the point of attachment through which the sensor should be connected into the embedded system where the edge gateway is established. which goes to the Thing speak server. By using Thing speak server we can analyze by seeing the line charts in the website as it stores the past data in cloud.

IV. SYSTEM MODEL

Arduino is an open- beginning tackle and operating system guest, design, and exact society that designs and manufactures alone- board microcontrollers and microcontroller accoutrements for building mathematical bias. Its tackle output is authorized under a CC in- SA license, while spreadsheet is confirmed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), consenting the produce of Arduino boards and spreadsheet dispersion by one. Arduino boards are feasible commercially from the authorized site or through approved distributors.

There are different chip combinations in the same architecture for when crafting the8266 board. The boards are covered in legs that work with digital and analogue signals and can be linked to other circuits. Some of the board architectures are also used for software loading with some of them providing the Universal serial bus interface. The C and C programming languages exist and can be used to program ASSPs. These languages are inspired and used in a reworked version of the processing language. The puppet design uses Go software and is able to provide the toolchains that developers can use to modify and build other devices such as toothbrushes, straws, and scales to market goods and services.

Fig 2 Arduino SMD R3

The LCD, or Liquid Crystal Display, is very useful for A user interface and DEBUG certificates are written with in mind. People want characters, from which major companies like Hitachi have most common character-based Liquid Crystallin circuits, or other devices that are HD46 80 or HD45 80 compatible. On the market today, most of the time a 3 Line, 4 Line type of reticulum uses only one controller until the maximum is reached at 80 characters, then they use two HD4592 controllers.

Fig 3 lcd screen to display result

The temperature detector uses temperature signal to make signal. Attaching to this IC we used Mount Mearns to detect temperature. Being perfectly balanced to the Celsius temperature is the main merit of the technologically perfect parts in the 3-meter tall LM35 Sensors are all about smart and precise temperature determinatives. The LM35 does not need an external estimate due to its internal capacity to affect what is said

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The LM35 needs no external estimate or trouncing to provide typical rigor of 14 °C at room temperature plus 34 °C throughout a heating rate of 55 to 150 °C. In particular, interface to readout or control circuitry is made simple by the LM35's low affair impedance, direct affair, and exact vital estimate. It works with single power inventories as well as plus and negative stocks. It has extremely low tone-heating since it draws just 60 From the a its force. Lower than 0.1 °C in still air. The sensor will be like as shown in the fig 4.

Fig 4 temperature and humidity sensor to collect data from the farm land

The water levels in the soil can be measured. A collection of soil moisture monitors is what a soil probe is. A soil humidity sensor is a common type of commercial soil sensor. Another sensor works on water's light-in scruple and device properties with the help of the pulsar moisture gauge. The sensors based on two counts are generally cheaper for home use. Two

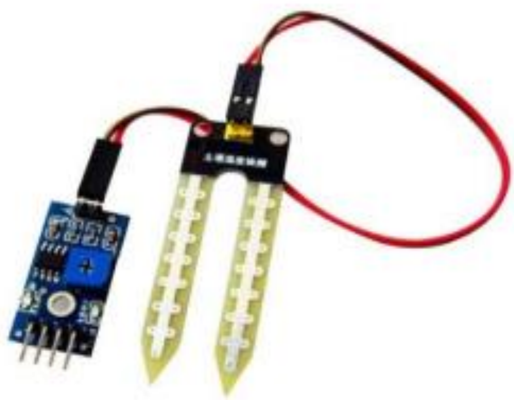

Fig 5 Soil moisture sensor

bare wires are it as simple as you'd suppose, except that there are wires embedded in gypsum. The soil helps to tell the difference of humidity and atmospheric particulate matter. The fig 6 shows how the sensor stays on the board after touching it to the eggbound, it is then connected with the Wi- fi module.

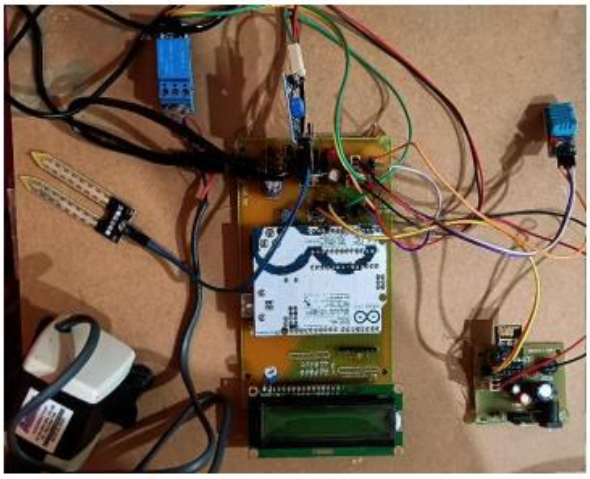

Fig 6

V. RESULTS AND DISSCUSSION

As we run the CPP programmed through the Arduino IDE compiler. After compiling the program, as in the program, we attach the API key of our Thing speak server in the code and compile it, then the results that were processed and analyzed are sent to the Thing speak server, which stores the data and analyses the data with the line graph as shown in fig 7 (public view) and fig 8 (private view).

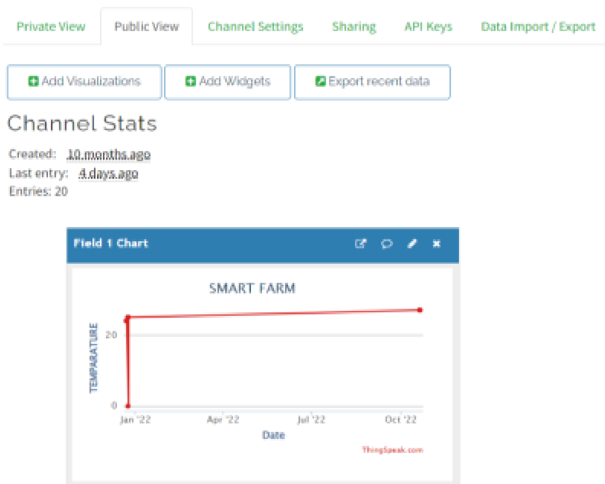

Fig 7 Public view of the data gathered from the Arduino sensors and the collected data which is appeared in the form of line graph

Fig 8 Private view of the data gathered from the Arduino sensors and the collected data which is appeared in the form of line graph

VI. CONCLUSION

This paper details computerized watering system utilizing IOT which on based upon the cloud calculation which makes an arrangement that controls the smart farming by sub decisioning it subsequently. This will sense all the environmental limit the customer resources by using the cloud technology .user will take ruling operation in accordance with that this will be finished by using the actuator. This is the advantage that admits peasant to upgrade the help in a way the crops need. It leads to get better crop yield than the traditional cropping, with better feature and less use of protective chemical compound

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