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A Project Work Phase-I (18CSP78)
Report on

"A NEW IoT GATEWAY FOR SMART AGRICULTURE"

Project Report submitted in partial fulfilment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

Submitted by

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CERTIFICATE

Certified that the Project Work Phase-I (18CSP78) entitled **“A new IoT Gateway for smart agriculture”** is a bonafide work carried out by:

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in partial fulfilment for VII semester B.E., Project Work in the branch of Computer Science and Engineering prescribed by **Visvesvaraya Technological University, Belagavi** during the period of September 2021 to January 2022. It is certified that all the corrections and suggestions indicated for internal assessment have been incorporated. The Project Work Phase-I Report has been approved as it satisfies the academic requirements in report of project work prescribed for the Bachelor of Engineering degree.

………………………..	..…………….………	…..…..……………………
Signature of the Guide	**Signature of the HOD**	**Signature of the Principal & Director**
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DECLARATION

We, the undersigned students of 7th semester, Computer Science & Engineering, KSIT, declare that our Project Work Phase-I entitled "**A new IoT Gateway for smart agriculture**", is a bonafide work of ours. Our project is neither a copy nor by means a modification of any other engineering project.

We also declare that this project was not entitled for submission to any other university in the past and shall remain the only submission made and will not be submitted by us to any other university in the future.

Place:

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ABSTRACT

Agriculture is India's backbone, supplying a set amount of domestic produce to maintain food security. Farming plays an essential part in the development of the country because it accounts for a significant portion of the Indian economy. Our agricultural system is still based on the conventional method, despite the fact that others are adopting innovative ways on a daily basis. As a result, the goal of this project is to transform conventional agriculture into smart agriculture via the use of high technology and the Internet of Things (IoT). The Internet of Things (IoT) is used to integrate technological systems through virtual network connection and cloud data bases (IoT). The main goal of this project is to construct a robotic vehicle, which is an agricultural equipment with a lot of power and a lot of dirt clearing capability. Despite the availability of a large range of individual IoT systems for agriculture, no industry-wide standard combining several applications has been created. This paper proposes an artificial intelligence (AI) system that covers the whole farming value chain and is based on autonomous AI modules connected by a large cloud network.

This application creates a robotic vehicle that is a powerful agricultural machine with a large dirt clearing capability. This multifunctional system provides an advanced way of plough, farm levelling, seed planting, and harvesting with the least amount of manpower and effort, making it a cost-effective vehicle. An innovative IoT-based approach for monitoring soil conditions and the environment for effective crop development. The Node MCU monitors temperature, humidity, and soil moisture levels. Second, this project includes security features for a warehouse, such as temperature control, warehouse theft detection, and storeroom humidity control, as well as a soil moisture detector. Also, a message in the form of an SMS will be delivered to the farmer's phone through WiFi module on the field's environmental state. Depending on the crop, the robot will nurture the farm by considering specific rows and columns at a specified spacing. Formers use the android smart phone to control and gives the instruction to the robot. The entire process is calculated, processed, and monitored using motors and sensors connected to a microprocessor. All of these functions are managed by any internet-connected Android phone and carried out by the camera, which interfaces sensors and actuators with a microcontroller and a Raspberry Pi.

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Chapter 1

INTRODUCTION

1.1 Overview

This project includes developing a warehouse management system using various sensors, as well as designing a robot to perform all agriculture-related operations, scare animals that enter the field, provide irrigation by knowing the soil condition, and design a robot to perform all agriculture-related operations.

It is critical to mark-up our agriculture industry as technology evolves on a daily basis. In the agricultural industry, several studies are conducted. Many proposals call for the creation of a wireless sensor network that may give different atmospheric aspects by watching atmospheric aspects. However, simply studying atmospheric aspects will not boost agricultural production, there are a number of additional variables that might lower crop yield. The solution is to apply automation to boost production by lowering labour and improving work speed in the field by employing robots to execute tasks faster and sensors to safely store grown products.

This project aims to transform agriculture into smart agriculture via the use of IoT, and it will be distributed to our country's agriculturalists. The Internet of Things (IoT) is a network of technological systems that uses virtual network connection and cloud data bases to connect them. New technologies for monitoring, managing, and coordinating the value cycles of crop and life-cattle production are going to change the agricultural business thanks to IoT applications. In the agricultural industry, technology plays a critical role in lowering personnel and improving crop yield. Some of the work is done to help agriculturists expand by providing them with a system that employs technology to help them build their businesses. The Internet of Things (IoT) connects machines, gadgets, and their human operators through cable LAN, but it is increasingly adopting wireless technologies, such as 4G-LTE, 5G, Bluetooth, and WiFi. Data captured and delivered from IoT clients is forwarded to a data cloud and stored in a database that is accessible to all network members.

1.2 Purpose of the project

Through virtual network connectivity and cloud data storage, the Internet of Things (IoT) connects technological systems. The method creates a network of commercial system users, agricultural technology providers, and IT professionals, with the goal of improving agricultural efficiency and sustainability. We will be fabricating a multipurpose irrigation vehicle in this project that will be able to DIG the Earth, Sow the Seeds, and Cultivate the crop after the harvest is ready. We will be using an android smart phone application to control the vehicle to respond to the control signal. This type of vehicle should be useful for farmers as a low investment option instead of buying two or more machines to do this work done by a single machine of ours, the Robotic node. The warehouse node is the next node, which will monitor the warehouse's temperature and humidity, as well as any rats or rodents present, and communicate the data to a mobile phone. The next node is the Wireless NRF Transreceiver, which will measure the moisture content in the soil from the crop field. All of this information will be transferred to the cloud via IoT, and we will be able to access it through a mobile application to take the appropriate measures.

1.3 Scope of the project

This smart irrigation system allows plants to be watered for longer periods of time, allowing for optimal growth. It saves time and adjusts timer delays based on the environment, and it can also be tweaked and modified as the environment changes. The project's scope includes mobile phone operations, which require farmers to have an internet connection in order to operate, and the range between the phone and the field is limited.All the operations are controlled using mobile phone. Should have internet connection, range between mobile phone and field is limited.

1.4 Definition

1.4.1 BLYNK APPLICATION

Blynk is a web-based application. The digital dashboard was used to monitor and show real-time humidity data using the blynk mobile application. The humidity data was examined further and used to create a paddy storage system for the future. blynk libraries and sample sketches will get you online, connect to blynk Server, and link up with your smartphone, regardless of the type of connection you select - Ethernet, Wi-Fi, or maybe this new ESP8266 everyone is talking about.

1.4.2 CLOUD

Instant databases, on-demand computer infrastructure, and storage are all made possible by cloud services. The infrastructure, servers, and storage necessary for real-time processing and operations are included in this category. The services and standards required for connecting, managing, and protecting various IoT devices and applications are also included in an IoT cloud. It can collect data on all crops cultivated in the recent past, allowing farmers to make informed judgments on what to plant next. Weather data: The cloud can store weather data for specific regions as well as weather forecasts for certain time periods.

1.4.3 PYTHON

Python is a great choice for backend programming and device software development in the Internet of Things. Python can also operate on Linux devices, and Micro Python can be used to program microcontrollers. Python is an excellent tool for prototyping devices. It's simple and straightforward to learn, and it comes with a plethora of high-level data structures. Python is a programming language that is simple to learn but powerful and diverse, which makes it appealing for application development.

1.4.4 ROBOT

Robotics is the study of the design, building, and use of machines (robots) to do jobs that were previously performed by humans. Robots are commonly utilized in areas such as vehicle manufacturing to do basic repetitive jobs, as well as in businesses where workers must work in dangerous situations. Weed control, cloud seeding, seed planting, harvesting, environmental monitoring, and soil analysis are just a few of the new uses for robots or drones in agriculture.

Chapter 2

LITERATURE SURVEY

2.1 Internet of Things (IoT): A vision, architectural elements, and security issues

The Internet of Things is an emerging technology across the world, which helps to connect sensors, vehicles, hospitals, industries and consumers through internet connectivity. Architecture of IoT helps to build Smart Cities, home, agriculture and Smart World. Architecture of IoT is having the large number of devices hence the IoT Architecture is complex. Security is the most important parameter in IoT. This paper gives an overview of the architecture of IoT by taking the example of Smart World.

2.2 IoT solutions for crop protection against wild animal attacks

Technology plays a central role in our everyday life. There is more demand for IoT in many fields. In the agriculture sector, IoT helps in smart farming, precision making and much more. This study aimed to protect the crop against animals and birds that enter into the field. It is using the repeller system which makes use of PIR sensor to detect motion and it also has weather monitoring system which contains temperature and humidity sensor.PIR sensor activates the driver responsible for the ultrasound generation and as well as the networking communication only when an animal is detected. Weather monitoring system helps in the estimation of pest attack.

2.3 Implement smart farm with IoT technology

With the advent of Internet of Things (IoT) and industrialization, the development of Information Technology (IT) has led to various studies not only in industry but also in agriculture. This paper is implementing wireless communication for communicating between the nodes which are having sensors and the control device like mobile phone. The nodes collects the environmental and growth data from greenhouse and send it to user control device through LPWAN which enables MQTT communication based on IP from gateway to server. Then the user can take further action.All the information regarding environment should be provided to user using the control device without any data loss.

2.4 Precision agriculture using remote monitoring systems in Brazil

Fertility of soil plays a major role in agriculture. Loss of vegetation leads to soil erosion. Adding fertilizer increases the fertility of soil. Precision agriculture uses some techniques to monitor the health of soil and crops that includes images from satellites and airplanes. Recently there are some studies which uses drones for maintaining and monitoring the soil and crop in agriculture field. This paper uses internet of things (IoT) device to monitor and maintain the state of the soil and the environment.The monitoring nodes are installed at several places in the field with sensors to monitor both soil and the environment. ZigBee network is used for sending data to the central node. The central node will collect data from all monitoring node and it will be sent to cloud through internet. The local climatic condition is sent to the user using internet to support decisions on irrigation and other activities related to crop health. Future applications includes using IoT for detecting fire in crop and detection of elephants that enter into the sugarcane field.

2.5 IoT based Precision Agriculture using Agribot

The project has developed a robot called Agribot which is used for performing basic agriculture operations like spraying water and pesticide, sowing of seeds, ploughing and so on. Arduino is used to control various operations. L293D driver is for proper movement of wheels. Ploughing, seed sowing is done simultaneously as the robot moves forward. Solenoid valve helps in spraying pesticides periodically.The project helps to perform basic agriculture operations automatically without any manual work in the field.

2.6 Animal Identification Using Deep Learning on Raspberry Pi

Classifying animals are different in different fields like, Agriculture, highways, railways etc., One cannot monitor the place or field continuously and to classify the animal. An image classifier/identifier will helps in such situations where the process of identifying and classifying the animal is done automatically. The purpose of this project is to build a system that detects animals which enter into form or any household using convolutional neural network (CNN) and raspberry pi. Rapberry pi is like a small PC where all the codes are written using convolutional neural network (CNN) the classifier is trained. The project is using mobile net and single shot detector as base and detection network. Using application program interface user can identify the name of animal identified. This feature is applicable in the field of farming, household, railways, streets etc,

Chapter 3

PROBLEM IDENTIFICATION

3.1 Problem Statement

"Developing a warehouse management system utilizing different sensors and designing a robot to perform all agriculture-related operations, scare animals that enter the field, provide irrigation by knowing the soil condition, and design a robot to execute all agriculture-related operations."

Farmers are required to use traditional agriculture methods for crop production and management, which presents a challenge in the current application. And for each step, a separate robot is utilized, which increases the time and cost of the operation because only one function can be done at a time. Visually observing soil and weather is a more time-consuming and inaccurate activity. Then there's crop damage from animal assaults, which is one of the most serious hazards to crop production.

3.2 Project Scope

This smart irrigation system allows plants to be watered for longer periods of time, allowing for optimal growth. It saves time and adjusts timer delays based on the environment, and it can also be tweaked and modified as the environment changes. The project's scope includes mobile phone operations, which require farmers to have an internet connection in order to operate, and the range between the blynk application and the field is limited.

Chapter 4
GOALS AND OBJECTIVES

4.1 Project Goals

The purpose of this project is to create an integrated automated system that reduces the need for manual field monitoring. The use of communication networks to connect various systems results in a more efficient agricultural system known as "smart farming." It tries to incorporate advanced technologies with traditional agriculture in order for the producer to improve the agricultural field's sustainability, productivity, and irrigation capabilities while also increasing revenue.

4.2 Project Objectives

The major goal of IoT-enabled smart agriculture is to increase productivity and irrigation. To do this, we create a robot that can perform all agricultural tasks such as seed sifting, ploughing, water spraying, and scaring animals that invade the field. This project now includes security features like as temperature control and thief detection in the warehouse, in addition to crop protection. This multipurpose system provides a sophisticated way for sowing, ploughing, watering, and cutting crops with the least amount of personnel and work, making it a cost-effective vehicle. We present a design for a comprehensive artificial intelligence (AI) system that covers the entire farming value chain and is based on self-contained AI modules linked by a large cloud network. The method creates a network of commercial system users, agricultural technology providers, and IT professionals, and it promises to boost agricultural efficiency and sustainability. The suggested system will be able to measure key agricultural factors and relay the information to the field manager, allowing the data to be analyzed . The suggested system will be able to measure essential agricultural parameters and send the information to the field manager, who will be able to analyze the data and take the necessary actions to optimize his or her field's production.

Chapter 5

SYSTEM REQUIREMENT SPECIFICATION

5.1 Software Requirements Analysis

A software requirements is prerequisites that should be installed on computer for providing optimal functionality of the project. It should only specify the external behavior of the system and not concerned with system design. It is the solution for what services the system is expected to provide and the constraints under which it must operates. As this is IoT project it is using more hardware compounds.

Software Requirements

- Arduino IDE
- Mobile App
- Python
- Pycharm
- Open CV

5.2 Hardware Requirements Analysis

Hardware is the requirements defined by any operating system. Hardware requirements list is always presented with the hardware compatibility list (HCL).Hardware Requirement analysis is analyzing the compatibility of hardware

Hardware Requirements

- Node MCU
- Raspberry Pi
- Pi Camera
- Arduino
- PIR Sensor
- Relay
- Buzzer

- Battery
- Light
- Fan
- Heater
- Water Pump
- DC Motor
- L293D Motor Driver
- DHT11 Sensor
- Soil moisture Sensor
- Wireless NRF module

Chapter 6

METHODOLOGY

6.1 Working-Flow of Application

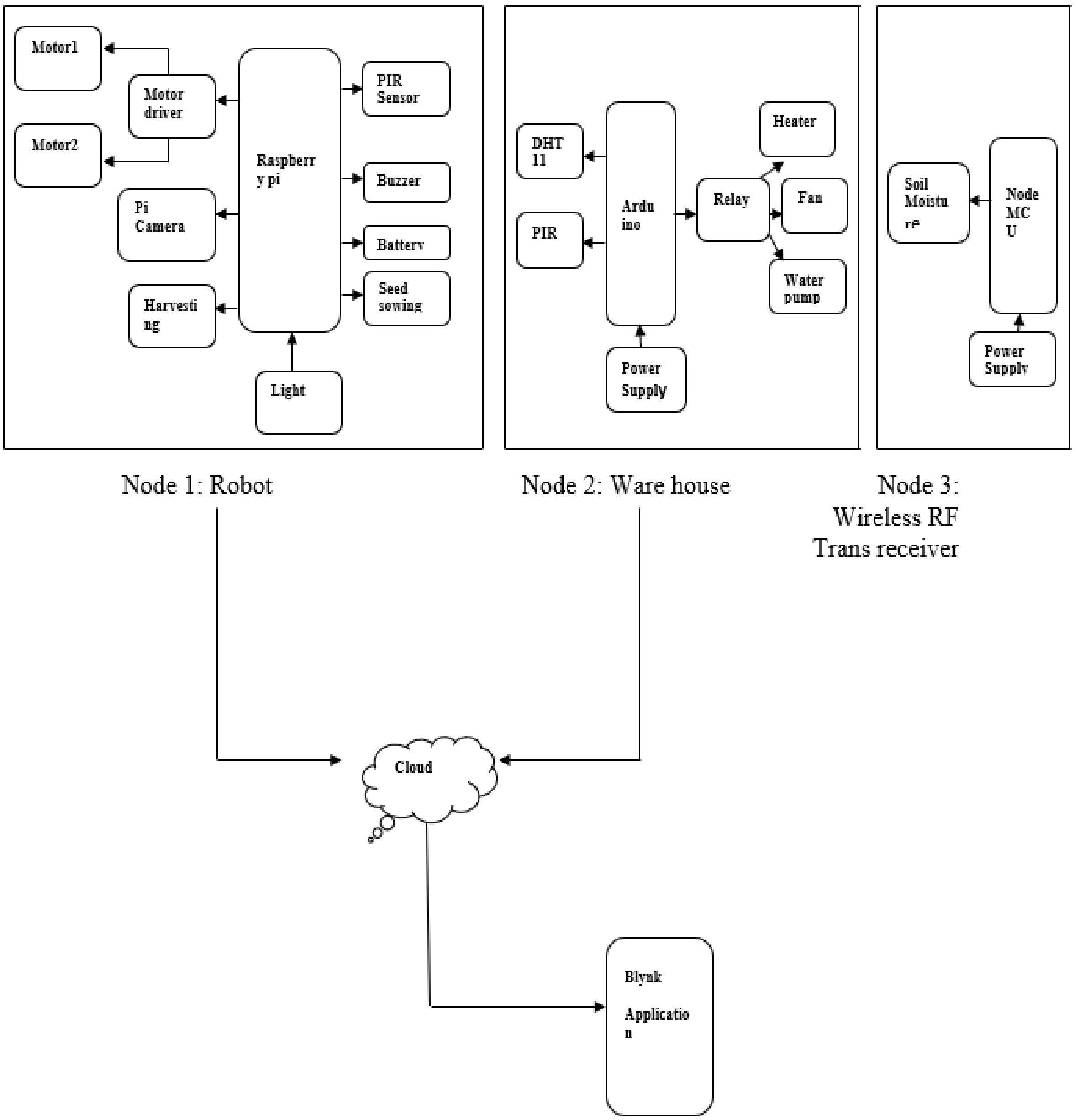

Fig 6.1 Flow chart of the application

This project consists of three nodes, the first of which is a robot that can conduct basic agriculture tasks such as ploughing, seed sowing, water spraying, harvesting, and scaring animals and birds who invade the field. The second node is warehouse management, which involves storing and maintaining grown crops using temperature and humidity sensors, heaters, and coolers. Using a motion detector, it may also detect rats or thieves who enter the warehouse. The third node is the irrigation node, which incorporates a soil moisture sensor that allows the user to turn on the motor pump if the soil is dry. All tasks will be controlled using blynk application.

6.2 Working

Raspberri Pi, WIFI module, PIR sensor, Pi camera, buzzer, motors, and other components make up the majority of the robot. Raspberri Pi is a little computer on which all the instructions are written. L298N motor driver is connected to DC motor for regulating the speed and direction of two DC motors. Using these motors, cutters, and other materials, the robot may execute tasks such as ploughing, seed sowing, harvesting, and so on. Robot need to be controlled by blynk application. If any animal enter into the field the PIR sensor will detect motion then the image will be captured from the pi camera and it will be given to raspberry pi then raspberry pi will perform image processing using Open CV library then the resulted image is fed into machine learning algorithm where it creates a training model, the main features from the captured images are extracted then given to the trained model where it can detect the animal and the buzzer sound will be turned on.

Warehouse Management contains PIR sensor that detects the motion when it is in active mode if it detects motion it sends alert message to the user, It also contains DHT11 sensor which is a temperature and humidity detector if any entity crosses its path then heater and cooler will be turned on using mobile phone. Relay acts as switch for on/off of heater, fan and water pump.

Irrigation node helps in finding the soil moisture content using soil moisture sensor if the field is too dry then the motor is turned on by user using mobile phone.

All these 3 nodes are connected using wireless NRF Trasreceiver helps in the communication with blynk application, all the values from sensors are stored in cloud using IoT and it can be accessed using blynk application.

Chapter 7

APPLICATIONS

The basic approach in this project is to increase the crop production without taking much time for performing agriculture task. The project helps in crop management, This is the element of precision farming, precision farming is the most famous application of IoT in Agriculture. Precision farming helps in analyzing soil conditions and other related parameters it also helps in detecting the real time working conditions of the connected device to detect water level. New sensor and geomapping technologies are allowing farmers to get a much higher level of data from the warehouse. It helps in harvesting, harvesting by farmer takes more time but using robot one can reduce the time and labour, Autonomous precision seeding will help in placing the seed at the right palace without any seed loss.

Chapter 8

CONTRIBUTION TO SOCIETY AND ENVIRONMENT

As Agriculture is Indian's backbone, this project is having major contribution to the society. Normally, Agriculture products will take more time, as the project is using robot supply and demand gap will be less Manpower and labour charge will be reduced. Traditionally, people use fence around the field for avoiding the animals that enter into the field. Human-Wild conflict such as crop detraction, grazing, injury and death of humans, damage to the infrastructure can be reduced as the project is using pi camera for detecting animals. Water overflow issue can be reduced, Warehouse management helps in terms of quality maintenance and theft detection can prevent loss.

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A NEW IoT GATEWAY FOR SMART AGRICULTURE

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Abstract: Agriculture is India's backbone, supplying a set of domestic product to maintain food security. Farming plays an essential part in the development of the country because it accounts for significant portion of the Indian economy. The project aim is to convert the traditional agriculture methods to smart agriculture by using modern technology and Internet of things (IoT). The major part in the system is the robotic vehicle, it is a powerful agricultural machine with a large soil-clearing capacity. This multifunctional system provides an advanced way for tilling, farm levelling, seed planting and harvesting with minimum amount of manpower and labour, making it an efficient vehicle and most important thing is scaring of birds and animals that enter into the field. Second, this project includes security features for a warehouse, such as temperature control, warehouse theft detection, and storeroom humidity control, as well as a soil moisture detector. Also, the condition of the form is updated to user in the form of SMS through Wi-Fi module on the environmental state of field. All of these functions are managed by any internet-connected Android phone.

Keywords: Raspberry pi, Farming, IoT

I.INTRODUCTION

This project includes developing a warehouse management system using various sensors, as well as designing a robot to perform all agriculture-related operations, scare animals that enter the field, provide irrigation by knowing the soil condition, and design a robot to perform all agriculture-related operations. It is critical to mark-up our agriculture industry as technology evolves on a daily basis. In the agricultural industry, several studies are conducted. Many proposals call for the creation of a wireless sensor network that may give different atmospheric aspects by watching atmospheric condition. However, simply studying atmospheric aspects will not boost agricultural production, there are a number of additional variables that might lower crop yield. The solution is to apply automation to boost production by lowering labour and improving work speed in the field by employing robots to execute tasks faster and sensors to safely store grown products. This project aims to transform agriculture into smart agriculture via the use of IoT, and it will be distributed to our country's agriculturalist. Uses virtual network connection and cloud data bases to connect them.

New technologies for monitoring, managing, and coordinating the value cycles of crop and life-cattle production are going to change the agricultural business so thanks to IoT applications. In the agricultural industry, technology plays a critical role in lowering personnel and improving crop yield. Some of the activity is aimed at assisting agriculturists in expanding their business by offering them with a technology-based framework. The Internet of Things (IoT) connects machines, gadgets, and their human operators through cable LAN, but it is increasingly adopting wireless technologies, such as 4G-LTE, 5G, Bluetooth, and Wi-Fi. Data captured and delivered from IoT clients is forwarded to a data cloud and stored in a database that is accessible to all network members.

II.SYSTEM OVERVIEW AND DESIGN

The project is divided into three parts: node1, node2, and node3, as well as an Android phone application to control the system. Each node in this project is connected to a variety of sensors and all this information send to the cloud through IoT and from the cloud we can access the information from the mobile application so that the necessary actions will be taken. The method of operating a system is manual method. The operator of the system will manage these duties conducted by the system with the help of a mobile application in the manual approach, while some employ the automatic technique.

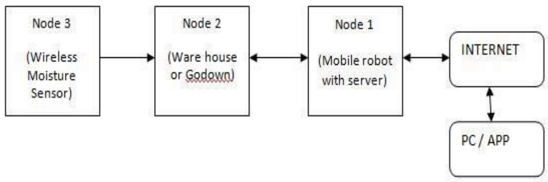
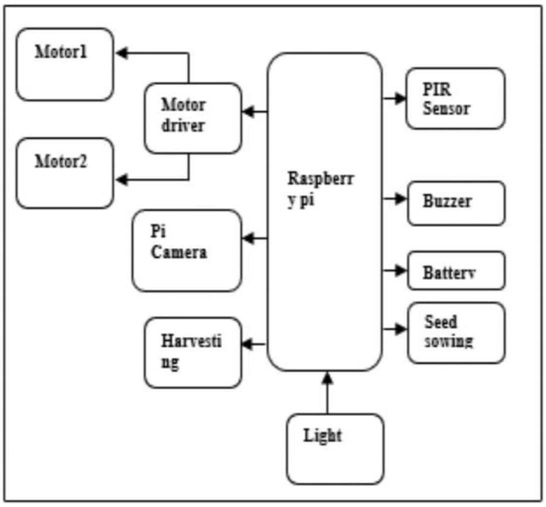


Fig. 1. FRAMEWORK

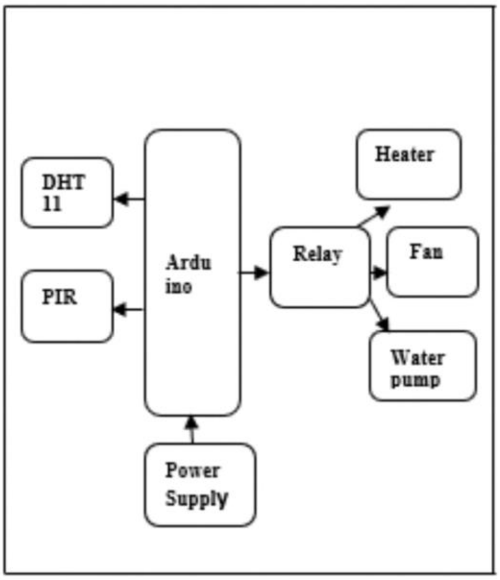
III.ARCHITECTURE

Node 1: Node 1 is a smartphone-controlled mobile robot that has been programmed to wander autonomously within the farm's range based on the user's instructions. Animal and bird scaring, ploughing, seed cutting, harvesting, and water spraying are among the duties performed by the application-controlled robot, which contains several sensors and appliances, including a pi camera and motors.



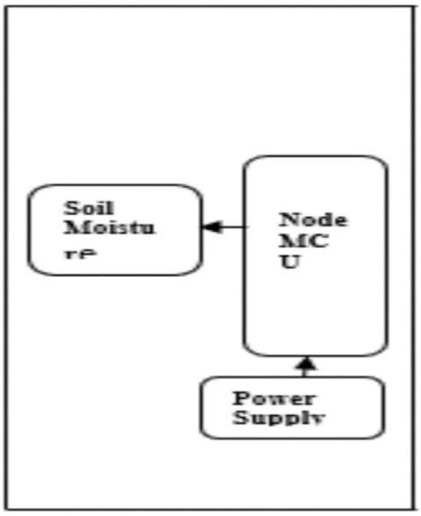
Node 1: Robot

Node 2: Node 2 is a warehouse/gowdon management facility that stores agriculturists' collected crops. A temperature sensor, a motion sensor, a water pump sensor, a heater, a fan, and a humidity sensor are all connected to an Arduino microcontroller in Node 2. The motion detector will be placed in the store to detect motion once the safety motion has been enabled. It will send an alert alarm to the user via Rasperry pi if it detects motion in the room, allowing the user to identify theft and rat detection. Both temperature and humidity sensors work at the same time crosses their path (for example, millets have a maximum temperature of 26-29 degrees and a minimum temperature of 8-10 degrees), The user will be able to turn on and off the heater and cooler using a mobile application.



Node 2:Ware house

Node 3: Node 3 is an irrigation node that includes a soil moisture detector that measures the soil moisture content in the field and turns on the motor if it is dry. The wireless NRF Trans receiver is used to connect all three nodes. All sensor data is hosted in the cloud via IoT and can be accessed using a mobile app.



Node 3:Irrigation

A. Equipment's Used

Various types of sensors and microcontrollers are employed in this enterprise to assist in the conversion of agricultural to smart agriculture. The following is a list of sensors and the program that was used in this venture:-

1. **Raspberry Pi:-** It's a little portable computer that's used for small tasks and networking. The Raspberry Pi is a critical component in the IoT market. It grants access to the wireless network, making it possible to connect to an automated system that manages the device from remote locations. A different version of the Raspberry Pi software is available.

2. **PIR SENSOR:** Function of PIR within 10 metres of the sensor, a PIR sensor detects a human or an animal moving about. The actual detection range is between 5 and 12 metres, thus this figure is an average. PIRs are made up of a pyroelectric sensor that can detect amounts of infrared radiation. For a number of vital tasks or things where knowing when someone has left or entered the area is required. PIR sensors are great because they provide flat control with little effort, have a wide lens range, and are easy to operate.

3. **DHT11 SENSOR:** Temperature corrected over the entire range Measurement of relative humidity and temperature a digital signal that has been calibrated, Long-term stability that is exceptional, Extra components are not permitted**.** Long transmission distance is required, as is low power usage.

4. **SOIL MOISTURE SENSOR:** The soil moisture sensor module is used to keep track of soil moisture. After detecting the volumetric content of water inside the soil, it outputs the moisture level. On the module, there are digital and analogue outputs as well as a potentiometer for altering the threshold level. Microcontrollers, as well as ordinary Digital/Analog ICs, are straightforward to use. It's small, cheap, and easy to get to.

5. **PI CAMERA:** It's a custom-designed image sensor add-on board for Raspberry Pi that recognises animals and birds entering the field in this project.

IV. LITRATURE REVIEW

In this section we will discuss research papers studying smart agriculture system.

In the paper [1] written by Shivangi Vashi, Jyotsnamayee Ram, Janit Modi. The Internet of Things (IoT) is a new technology that uses internet connectivity to connect sensors, vehicles, hospitals, companies, and consumers all around the world. IoT architecture aids in the creation of Smart Cities, Smart Homes, Smart Agriculture, and a Smart World. Because the Internet of Things has a huge number of devices, its architecture is complicated. In the Internet of Things, the most critical parameter is security. Using the example of Smart World, this paper provides an overview of IoT architecture.

In the paper [2] written by Stefano Giordano, Ilias Seitanidis, Mike Ojo,Davide Adami**.** In our daily lives, technology plays a critical role. There is more demand for IoT in many fields. In the agriculture sector, IoT helps in smart farming, precision making and much more .This study aimed to protect the crop against animals and birds that enter into the field. It is using the repeller system which makes use of PIR sensor to detect motion and it also has weather monitoring system which contains temperature and humidity sensor. When an animal is identified, The PIR sensor turns on the driver that controls ultrasonic generation and networking connectivity. Weather monitoring system helps in the estimation of pest attack.

In the paper [3] written by Chiyurl Yoon, Miyoung Huh, Shin-Gak Kang, Juyoung Parkpresents, The rise of With the introduction of the Internet of Things (IoT) and industrialization, information technology (IT) has led to several studies not only in industry but also in agriculture.. This work implements wireless communication to communicate between sensor-equipped nodes and control devices such as mobile phones. The nodes collect environmental and growth data from the greenhouse and transmit it to the user control device through LPWAN, which allows MQTT communication over IP from the gateway to the server. The user can then go to the next step. All environmental information should be delivered to the user via the control device without any data loss.

In the paper [4] written by Rodrigo Filev Maia, Ibrahim Netto, Anh Lan Ho TranIn this paper, fertility of soil plays a major role in agriculture. Loss of vegetation leads to soil erosion. The soil fertility can be increased by adding fertilizers to the soil. Precision agriculture employs a variety of tools to monitor the health of soil and crops, including satellite and aerial imagery. Drones have recently been used in several studies to manage and monitor soil and crop in agriculture fields. The state of the soil and the environment is monitored and maintained in this article using internet of things (IoT) devices. The monitoring nodes, which are equipped with sensors to monitor both soil and the environment, are placed across the field. Data is sent to the central node via the ZigBee network. The data from all monitoring nodes will be collected by the central node and delivered to the cloud over the internet. The user receives information about the local meteorological conditions over the internet, which helps them make decisions about irrigation and other crop-related tasks. Future uses include using the Internet of Things to detect crop fires and elephants entering sugarcane fields.

In paper [5] written by Mr. V. Gowrishanker and Dr. K. Venkatachalam. This paper describes, that project has developed a robot called Agribot which is used for performing basic agriculture operations like spraying water and pesticide, sowing of seeds, ploughing and so on. Arduino is used to control various operations. L293D driver is for proper movement of wheels. Ploughing, seed sowing is done simultaneously as the robot moves forward. Solenoid valve helps in spraying pesticides periodically. The project helps to perform basic agriculture operations automatically without any manual work in the field.

In paper [6] written by Utsav Dihingia, P. Amar, M. Megha Shyam, Vaibhav Thomas. This paper tells, classifying animals are different in different fields like Agriculture, highways, railways etc., One cannot monitor the place or field continuously and to classify the animal . An image classifier/identifier will helps in such situations where the process of identifying and classifying the animal is done automatically. The purpose of this project is to build a system that detects animals which enter into form or any household using convolutional neural network (CNN) and Raspberry pi. trained. The project is using mobile net and single shot detector as base and detection network. Using application program interface user can identify the name of animal identified. This feature is applicable in the field of farming, household, railways, streets etc.,

V. OVERALL SURVEY

This survey aids in the development of a smart agriculture model utilizing robots and various sensors. While not all of the papers cited will be fully implemented, some of the characteristics may be improved. The major goal of this project is to create an integrated automated system that reduces manual field monitoring and provides an advanced approach to seed, plough, water, and cut crops with the least amount of manpower and effort, resulting in an efficient vehicle. To provide a concept for a comprehensive Internet of Things system that spans the full farming value chain and is based on self-contained IoT modules connected by a huge cloud network. The method creates a network of commercial system users, agricultural technology providers, and IT professionals, with the goal of improving agricultural efficiency and sustainability. The suggested system will be able to measure essential agricultural parameters and send the information to the field manager, who will be able to analyze the data and take the required steps to improve his or her field's crop.

VI.CONCLUSION

With the goal of improving agricultural efficiency and sustainability, the method establishes a network of commercial system users, agricultural technology providers, and IT professionals. The proposed system will be able to measure critical agricultural parameters and send the data to the field manager, who will be able to analyze the data and take the necessary steps to improve the crop in his or her field.

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[3] Chiyurl Yoon, Miyoung Huh, Shin-Gak Kang, Juyoung Park and Changkyu Lee, "Implement smart farm with IoT technology," 2018 20th International Conference on Advanced Communication Technology (ICACT), Chuncheon-siGangwon-do, Korea (South), 2018, pp. 1-2.

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A new IoT gateway for smart agriculture

by Pojashree K

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