SMART IRRIGATION AND FARM MONITORING SYSTEM USING IOT

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Abstract— Internet of Things (IoT) has great impact on Agriculture. It is transforming the agriculture industry by giving strength to the farmers to deal with major challenges they face in irrigation. IoT and Machine learning implementation in agriculture can address many challenges and increase the quality and cost-effectiveness of agricultural production. Agriculture has been a low profit and high risk industry till now. Unexpected environmental changes have been a most impacted problem on farmers. There is no precise solution for rain water conservation and future weather prediction at present. Smart irrigation is a key component of precision agriculture. It helps farmers to reuse the rain water and improve the quality of crop growth. This system uses a wireless communication system to control and monitor the Irrigation system. Internet of Things(IoT) Has great impact on Agriculture. It is transforming the agriculture industry by giving strength to the farmers to deal with major challenges they face in irrigation. IoT and Machine learning implementation in agriculture can address many challenges.

Keywords- cost effectiveness , Iot, Machine learning , precision agriculture , Smart Irrigation

1. INTRODUCTION

Smart Irrigation and Farm monitoring system uses android mobile and IoT for remote monitoring and controlling of irrigation system through wireless sensor network reducing an human intervention. The objective of this project is to save water and reduce human intervention in the agriculture field by continuously monitoring the status of sensors and provide signal for taking necessary action. The objectives of the project is to design a smart irrigation system to water plants with the use of devices like Arduino and NodeMcu microcontrollers. Zig-bee is used to control the system wirelessly and is used for automation purpose.

2. RELATED WORK

2.1 CHALLENGES

- The main motivation and overall structure of this irrigation system is to solve the problem of irrigation and every sector of agriculture .field by using latest technologies and to show correct values of sensors on android app.
- This system has given the opportunity to explore the world of agriculture practices.
- The main problems faced by farmers in irrigation are

✓ Animals and Birds are the main cause that destroy the crops.
✓ Excess water during the Rains is also main cause.
✓ Sudden cyclones is the another main reason due to which the crop gets destroyed.
✓ The farmer cannot go and switch on the motor whenever needed.

2.2 OBJECTIVE OF THE PROJECT

- The objective of this project is to save water and reduce human intervention in the agriculture field by continuously monitoring the status of sensors and provide signal for taking necessary action.
- The objectives of the project is to design a smart irrigation system to water plants with the use of devices like Arduino and NodeMcu microcontrollers. Zig-bee is used to control the system wirelessly and is used for automation purpose.
- This system also contributes an efficient and fairly cheap automation irrigation system. System once installed has no maintenance cost and is easy to use. Environment parameter monitoring system based on wireless communication technology has been developed to control remotely, which realizes

the measurement of rainfall, soil parameters. Monitoring system based on wireless communication technology has been developed to control remotely, which realizes the measurement of rainfall, soil parameters.

2.3EXISTING SYSTEM

After doing research in agriculture industry , many researchers found that agriculture is a High Risk and Low productivity industry. By using different technologies in agriculture industry, one can increase the production as well as reduce the Human Intervention.

"Automated Smart Irrigation System using raspberry pi which mainly deals with water sprinkler and makes an efficient use of water for the growth of plants and has additional feature of using Bluetooth for wireless communication.[1]

"Review paper based on Automatic Irrigation system using RF Module" It is based on RF module, this system is used to transmit or receive radio signal between two devices. It's design is difficult because of sensitive radio circuits and accuracy of the components.[2]

"Automated Irrigation and Water Level Management System using raspberry pi". This System will help farmers because irrigation is done when only needed and that will save water and energy.Uses Raspberry pi for programming. It will use ultrasonic sensor to monitor so that water will not overflow and adequate irrigation is maintained.[3]

Shamma Ali , Hamda Saif et al. proposed Photovoltaic Energy Conversion Smart Irrigation System" which controls the amount of water to be supplied tmo each and ensure if plant has enough water and to protect plants from dying by using a humidity sensor, temperature sensor, and timer using renewable energy Photo voltaic System.[4]

Chandan Kumar Sahu et al. proposed " A Low Cost Smart Irrigation System" which presents a prototype which is integrated with Arduino Uno micro controller and Raspberry pi is used for sending messages through internet to the micro controller process.[5]

Amogh jayaraj Rau et al. proposed " Iot based Smart Irrigation and Nutrient Detection with Disease Analysis" which uses MATLAB Based image processing for identifying the rice diseases and nutrient deficiencies.[6]

3. PROPOSED SYSTEM

BLOCK DIAGRAM:

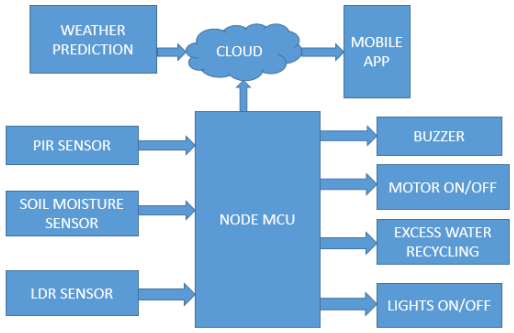


Fig. 1.BLOCK DIAGRAM

This project proposes and evaluates a wireless communication system to monitor and control a set of sensors and actuators to assess the plants water need.Automated irrigation system is essential for conservation of the water.This System Identifies the animals or birds entering in the Field Using Motion sensor and threatens animals by playing different sounds.During Heavy rains, The Excess water in the field are stored and reused for future This System performs weather forecasting based on previous data and warns the farmer if there is any cyclones nearby.As some plants can survive only under light, this system also provides light when the light intensity in the field is low.This System can supply water to the field whenever the moisture level is less than the required value.Farmer can monitor everything using his Mobile Phone.

4. PROPOSEED SYSTEM

4.1 METHODOLOGY OF PROPOSED SYSTEM

In this system, Android app is interfaced with ESP8266 Node mcu which is the important micro controller used .The Wifi module in nodemcu is used to transfer the data to the cloud which is processed later. This cloud data is sent to the android app through which we can monitor the values. In this the sensors like Soil moisture sensor, PIR motion sensor, LDR sensor,Rain sensor are connected to the main controller. Soil moisture value in the soil is measured through soil moisture sensor and is sent to cloud and if the value is less than threshold value the motor will on through relay and if the value is greater than the threshold value the motor is turned off. This process can be done either manually or automatically. PIR

sensor which is placed in the field will detect if any motion is detected and make sounds to threaten the animals. LDR is used for controlling the light and light will be ON automatically if the intensity is low so

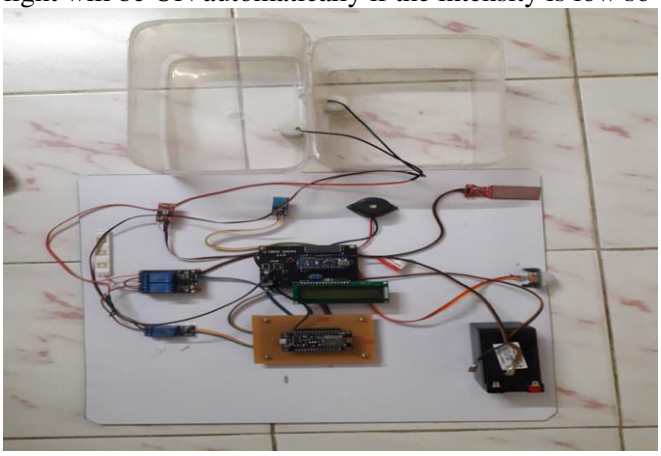


FIG.2. CIRCUIT DIAGRAM

that plants can survive under that light. During rains, the water will be overflooded in the field which can cause damage to the filed. So the excess water in the field can be stored and reused using this system. This System performs weather forecasting based on previous data and warns the farmer if there is any cyclones nearby. This can be done by using machine learning algorithm which does learning on previous weather dataset. All the sensors that are connected to system can be monitored and controlled through android app which collects data through cloud.

4.2 STEPS IN SYSTEM IMPLEMENTATION

There are different actions performed using this system.

1. Water supply implementation is done automatically or manually using android application.
2. Identification of birds or animals entering the field and threatening them.
3. Rain water recycling is done.
4. Provides light when the intensity is low.
5. Weather prediction is performed based on past data.

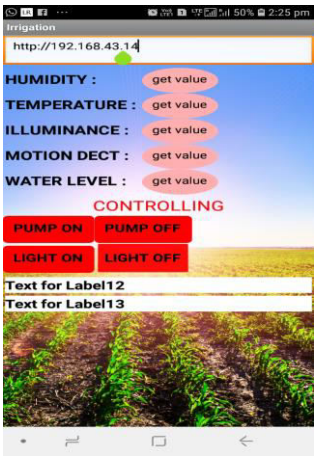
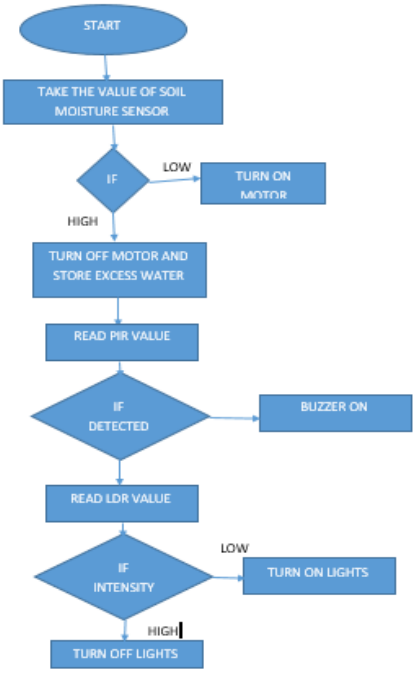


FIG.4. APP UI

4.3 WORK FLOW OF METHODOLOGY:



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4.4 PERFORMANCE MEASURE

The result of the whole system is shown on an android application which is made using MIT App Inventor. There will be buttons MOTOR ON and MOTOR OFF which are used to manually control the water supply to the Field based on soil moisture value which is also displayed on screen. In the similar way we have buttons LDR ON and LDR OFF which are used to control light in the field based light intensity value in the Field.

5. CONCLUSION

The major difficulties in monitoring a field crop towards its growth and harvesting can be resolved using internet of things technology. Smart Irrigation and Farm monitoring system using android phone and IoT for remote monitoring and controlling of various functionalities is through wireless sensor network reducing labour work is done. Cost of wiring between the sensor nodes and the central server of software which is used for communication is also reduced by using efficient wireless technology.The land is shrinking and pressure on the natural resources is increasing in todays world. Technology can help farmers to augment to produce for the best production and find the most effective farming practices and make plans.

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