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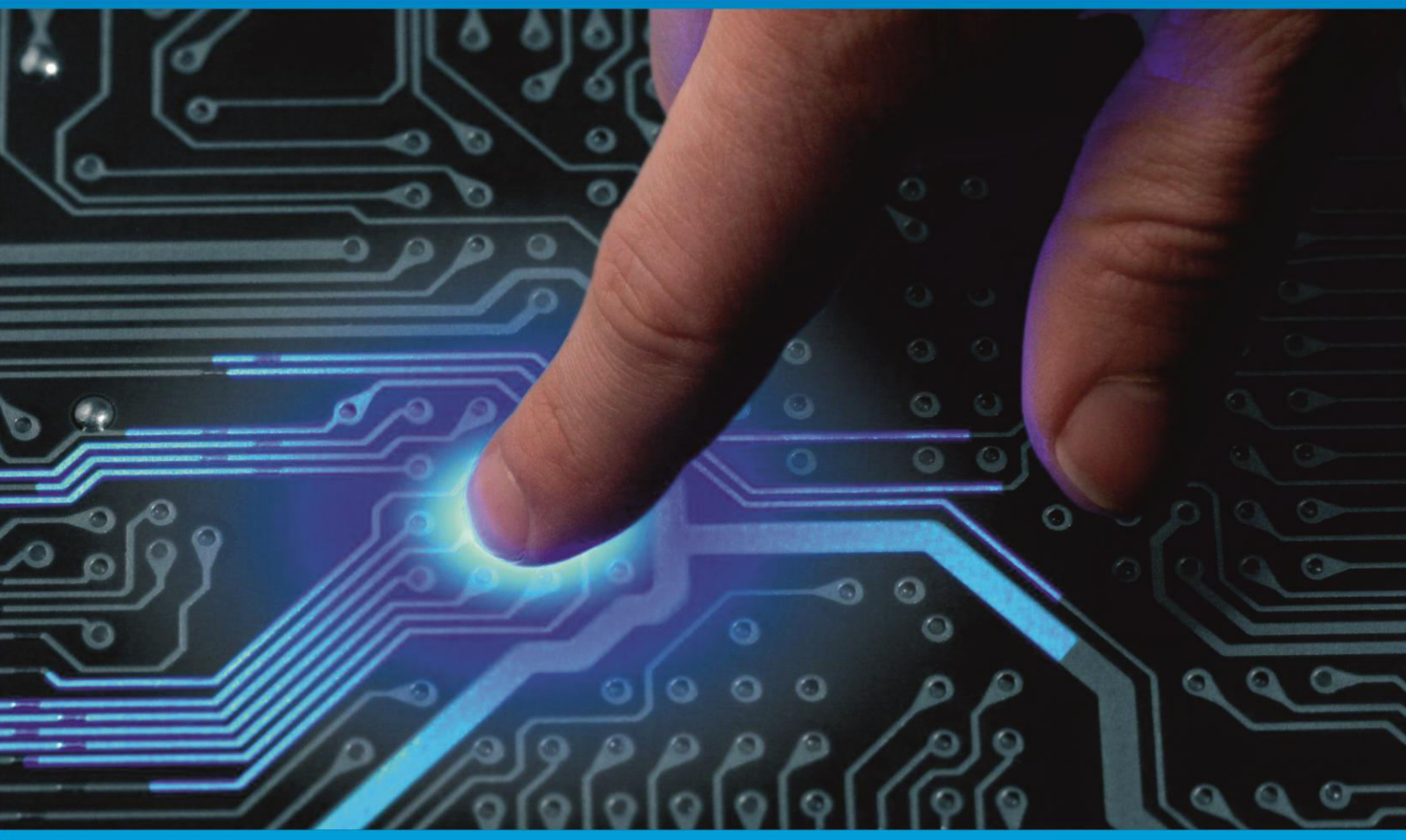

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IoT Based Agricultural System

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ABSTRACT: Major challenge in Agriculture is to cultivate produce in the farm and deliver it to the end consumers with the best possible price and best possible quality. Currently all over the world, it is found that around 50 percent for the farm produce never reach the end consumer due to wastage and suboptimal prices. Now-a-days, the natural irrigation system is under pressure due to the growing water shortages, which are mainly caused by population growth and climate change. Therefore, the control of water resources to increase the allocation of retained water is very important.The various parameters such as temperature, turbidity, pH., moisture have been collected by using Internet of Things (IoT) platform, equipped with related sensors an0d wireless communication systems. Since agriculture is Indian economy's backbone we intend to help the farmers.

Our project focuses on providing smart system using IOT for soil monitoring and irrigation to reduce the manual monitoring of the field and get the information via Ubidots. We help the farmers get automated reports of soil temperature and humidity including organic matter in the soil. Our project also provides water supply to plants automatically. It also detects fire and alters the farmer along with detecting and preventing animal intrusion. The system also provides light for the plants during night time.

I.INTRODUCTION

One of the largest livelihood providers in India is Agriculture. Agriculture plays an essential role in supporting human life. The rise in population is proportional to the increase in agriculture production. Basically, Agriculture production depends upon the seasonal situations which do not have enough water sources. To get beneficial results in agriculture and to overcome the problems, IoT based smart agriculture system is employed. In the current scenario, a major problem that world is facing is undergoing groundwater table and water is needed in large quantity in agriculture. Nowadays farmers are facing huge losses by agriculture without the proper technology in farming. The farmers are still following the same traditional method for growing all crops. So, there is a need of a sustainable system. At present, everywhere irrigation is performed manually. The enhancement in the science sector as removed lots of things that previously looked impossible. In today's world, the advancement of mobiles, laptops, automobiles, "smart" science and technology has expanded the market and has set up new standards. This technology Internet of things provides power to the specific interrelationship among several entities, materials, and features based on the net and this technology will help the peoples to perform their work easily and smartly. A smart agricultural aid system works automatically and uses different sensors along with soil moisture sensor to timely water the crops without human interference and also protects the crop from herbivorous and wild animals using animal detection IR sensor. The main motive is to design a accurate system for more and effective production of crop.

II.RELATED WORK

Dr.N.Ananthi's paper IoT based Smart Soil Monitoring System for Agricultural Production, soil test reports will generally provide you with appropriate fertilizer application recommendations for nitrogen, phosphorous, potassium and limestone. Soil testing also allows for determining the micronutrient requirements of your crop. If you apply too little fertilizer, your crop yields and returns will be lower. Too much fertilizer will waste time and money and risk environmental damage due to nutrient runoff. Consequently, soil testing provides a farm management tool with a potential benefit to the farmer of increased yields, reduced operating costs and superior environmental risk management. Additional benefits include; improved crop maturity and quality, higher tolerance to disease and pest damage, and increased growth. [1].

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Smart Farming – IoT in Agriculture states IoT is a revolutionary technology that represents the future of communication computing. These days IoT is used in every field like smart homes, smart traffic control smart cities etc. The area of implementation of IoT is vast and can be implemented in every field. This paper is about the implementation of IoT in Agriculture. IoT helps in better crop management , better resource management, cost efficient agriculture, improved quality and quantity , crop monitoring and field monitoring etc. can be done.Farming can be made more efficient accurate with the implementation of IoT device. IoT can be used in different domains of agriculture. Electricity and water are the main domains and their cost can improve or break the agriculture profession. We can control water wastage then we are automatically controlling electricity wastage also.Water volume can be measured by using a smart device with pump and duration of flow can also be measured.[2]

Fire Detection and Prevention in Agriculture Field Using IoT by Anish Lal, the IOT system can successfully detect the fire each time from the origin with the help of the Fire Detection System (FDS) and Fire Prevention System (FPS) sand store the sensors data in Firebase for processing. After the fire is detected servo motor turns the pump towards the detected location and sprinkles the water in a very effective manner as set in Fire Prevention System (FPS) algorithm. The android application notifies the user/farmer on the regular status of the field and alarms notification when a fire is detected. The mobile application also has an option for the user/farmer to activate the water sprinkle system. The prototype systems give accurate fire detection and prevention mechanism and notification is sent from the system to the user successfully[3].

III.PROPOSED PROJECT

METHODOLOGY

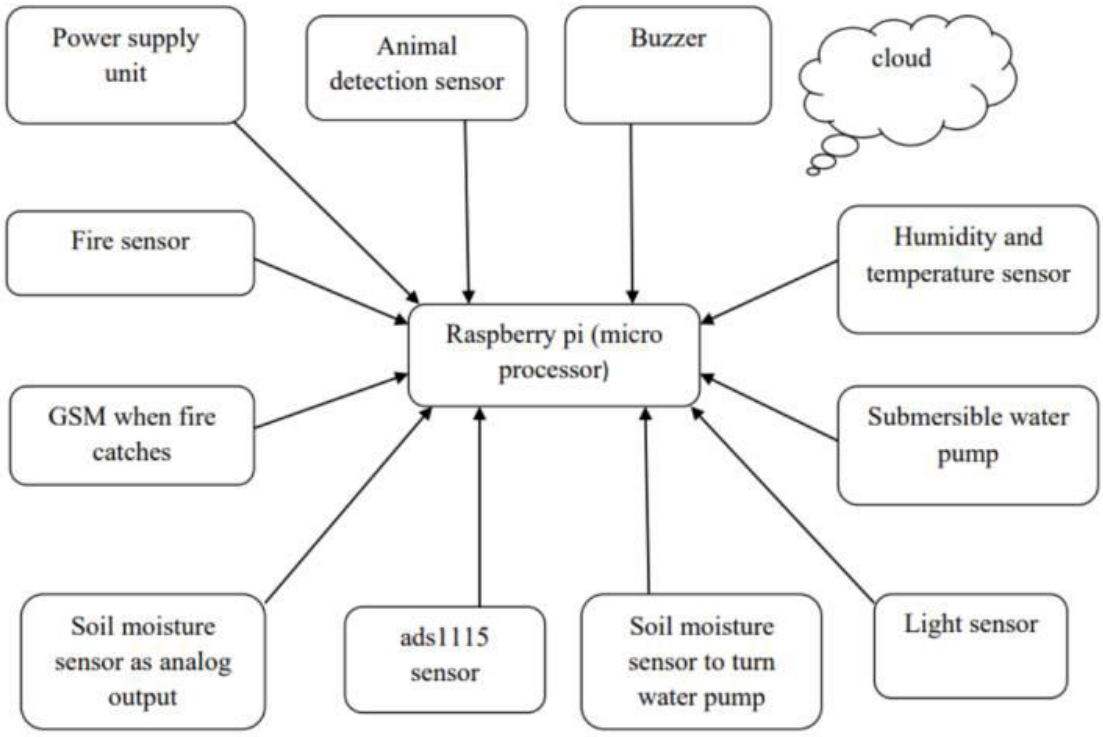

Figure1: System Design of IoT Based Agriculture System

Fig.1 shows the system architecture for the proposed method.We are designing an IOT based Smart Agricultural Aid System which is based on Raspberry Pi that operate automatically by sensing the moisture content and humidity of the soil. It will also study the rainfall pattern in the particular region by using the Rain Sensor and will switch ON/OFF the pump using relay without human intervention and hence saving of water. Raspberry pi (microprocessor) Cloud Buzzer, Power supply unit,GSM, Humidity and temperature sensor (DHT11), Fire senor, Soil moisture sensor for water level, Analog soil moisture sensor, Light sensor(LDR),Relay, Submersible motor, Animal detection sensor(IR), ADS1115

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sensor. A Capacitive- Soil Moisture Sensor is required to measure moisture content present throughout the soil. A Humidity Temperature Sensor to measure Air Temperature and Humidity respectively.
A Power relay of 5V will control the pump. So, whenever a low amount of moisture is detected in the soil, the motor automatically starts working, and hence the irrigation is completed automatically. When the soil attains required moisture level, automatically motor turns off. When the animal is detected in surrounded area by animal detection IR sensor, the buzzer will automatically turn on for making harsh sound to send the animal out.Infrared (IR) cameras can be used to detect heat and with particular algorithms can detect hot-spots within a scene as well as flames for both detection and prevention of fire 5 and risks of fire. These all process can be monitored remotely through Ubidots Server online.

DATAFLOW

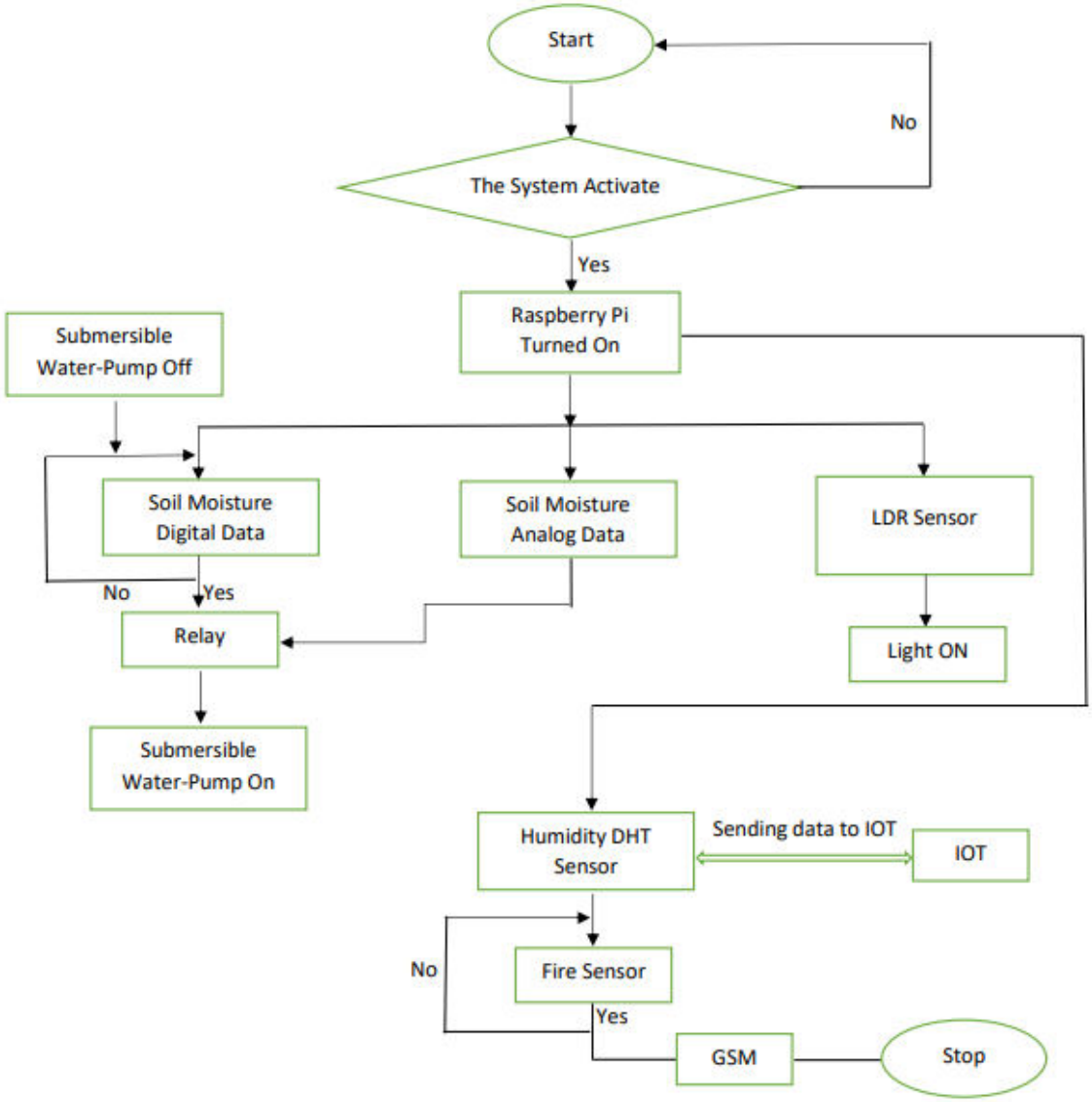

Figure 2: Dataflow Diagram of IoT Based Agriculture System

Fig.2 shows the dataflow for the proposed method. Once starting the system activation, Raspberry Pi is turned on which provides soil moisture digital data and soil moisture analog data which is connected to relay for handling different circuits with one connection by which submersible pump is turned on if not the submersible water-pump is

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turned off and through LDR sensor light is turned on and through humidity DHT sensor, fire sensor will be triggered which activates GSM and then the working of the system will be stopped.

IMPLEMENTATION

The implementation of Iot Based Agricultural System is carried out using Python language. The process of implementation is as follows:

- It is a real world application because it takes the input data from the external environment by sensors and actuators and process the data and controls the output.
- When the moisture content is less in the cultivated land, then the moisture sensor senses the reading and automatically turns on the water pump.
- When the moisture content in the soil reaches the required amount of water, then it automatically turns off the water pump.
- When the animal is detected by IR sensor, then it will turn on the buzzer and send away the animals in the cultivating farm.
- During at the night some crops needs light, so it will automatically turn on light by sensing the light of the Sun.
- All the above activity can also be controlled manually and viewed from anywhere in the World by cloud based system.
- All the things required for farming can be controlled using this project.

IV.CONCLUSION AND FUTURE WORK

After building the smart agricultural aid system hardware and analyzing and researching the network hierarchy features, functionality and the corresponding software architecture of precision irrigation systems and detecting soil nature, applying the internet of things to agricultural production as a great impact on making the efficient use of water resources which are available and also ensuring the efficiency as well as accuracy with stability of agricultural production. The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The IoT based smart farming System being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99. The future scope is

- Prediction of future crops is possible by recording all critical conditions and requirement for particular crop.
- The soil quality and nutrients in the soil can be monitored by adding more chemical detecting sensor in the soil to put required fertilizers.
- The soil pH can be monitored by adding pH sensor to it.
- A camera can be added to this system to exactly detect the animal.

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