International Journal of Research in Engineering, Science and Management
Volume-3, Issue-3, March-2020
www.ijresm.com | ISSN (Online): 2581-5792

Crop Loss Prediction Using IoT

D. C. Akshay[1], Bhagyashree[2], G. Deepika[3], R. Lekhana[4], S. G. Subramanya[5]
[1,2,3,4]*Student, Department of Computer Science and Engineering, Nagarjuna College of Engineering & Technology, Bangalore, India*
[5]*Assistant Professor, Department of Computer Science and Engineering, Nagarjuna College of Engineering & Technology, Bangalore, India*

***Abstract*: India ranks second world-wide in farm outputs. As per 2018, agriculture employed 50% of the Indian work force and contributed 17–18% to country's GDP. Due to climate conditions there is a loss of 13.6% every year. And security is also an issue not in terms of resources only but also agricultural products needs security and protection at very initial stage, like protection from attacks of rodents or insects, in fields or grain stores. Such challenges should also be taken into consideration. Since agriculture is an important occupation in our country, it's very important for us to build a system that can decrease the crop loss by detecting and analysing the features that are important for crop growth. The integration of traditional methodology with latest technologies as Internet of Things and Wireless Sensor Networks can lead to agricultural modernization. So that the farmer is aware of the crop before it is been affected by any weather calamites. Keeping this scenario in our mind we have designed, tested and analysed an 'Internet of Things' based device which is capable of analysing the sensed information and then transmitting it to the user. This scheme can be controlled and supervised from remote location and it can be employed in agricultural fields.**

***Keywords*: IoT.**

1. Introduction

In this century, Agriculture stands as one of the major sources of life for humans. It is also a strong pillar holding up the country's economy. The technology today has had a rapid growth in all sectors including Agriculture. Many extensive and more productive methods are in use today. But the old traditional methods are still in use to this day. The usage of traditional methods also results in crop loss or less yield. More manual work is involved in these methods. Hence there is a need to appliance the modern science and technology in the agriculture sector for cumulative the yield. Usage of Automation can help reduce the labour work required. In this project we have used the available Automation methods which makes the crop loss prediction and evidence collection easier.

Crop loss can occur in various forms. It can happen due to excess rainfall, scarcity of water, less moisture content etc. all these can be taken care of using the different automation technologies available today. We use different sensors like the Rain detection sensor, soil moisture sensor, Ultrasonic sensors which are directly connected to the Arduino and help controlling the entire system without any user intervention. All the data that is collected is stored onto the cloud and later analysed for better results. This is how collectively the system can be used to come up with better solutions to existing problems.

2. Related work

For project demo concern, we have developed a prototype module. Future work can be extended by adding sensors to ensure safety. To make this project as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system. We have referred various authors and their papers so that we get a clear picture of the problems and the solutions.

S. R. Nandurkar [1], et. al. have given "Design and development of precision agriculture system using wireless sensor network" and demonstrated crop farming in India is labour intensive and obsolete. Framing is still dependent on techniques that can be evolved hundreds of years ago and doesn't care of the conservation of resources. The newer scenario of decreasing water tables drying up of rivers and tanks, unpredictable environment presents an urgent need of proper utilization of water. We have the technology to bridge the gap between water usage and water wastage. Technology used in some developed countries is too expensive and complicated.

Joaquin Gutiérrez [2], et. al. have given "Automated irrigation system using sensors" and demonstrated that automated irrigation system was developed to optimize water use for agricultural crops. The system has a distributed wireless network of soil-moisture and temperature sensors placed in the root zone of the plants. In addition, a gateway unit handles sensor information triggers actuators, and transmits data to a web application. An algorithm was developed with threshold values of temperature and soil moisture that was programmed into a microcontroller-based.

Q. Wang [3] et.al. have given, "Soil measuring using wireless sensor network" and demonstrated that wireless sensors network for measuring soil parameters such as temperature and humidity. Specially, we designed sensor nodes that are places completely underground and are used to collect soil measurements.

Y. Kim, R. Evans and W. Iversen [4] have given "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network" demonstrated efficient water management is a major concern in many cropping systems in semiarid and arid areas. Distributed in-field sensor-based irrigation system offer a potential solution to support site-specific irrigation management that allows producers to maximize their productivity while saving water.

Arampatzis. T [5] et. al. have given "A survey of applications of wireless sensors and Wireless Sensor Networks" demonstrated Wireless sensors and wireless sensor networks have come to the forefront of the scientific community recently. This is the consequence of engineering increasingly smaller sized devices, which enable many applications. The use of these sensors and the possibility of organizing them into networks have revealed many research issues and have highlighted new ways to cope with certain problems.

3. Proposed system

The proposed system aims at making agriculture smart using automation and IOT technologies. We are making our system fully automated which can have controlled and monitored from remote location. There are different types of sensors such as temperature sensor, IR sensor which is used to detect if any theft has happened, rain sensor, which senses and analyses the constrains such as temperature, soil moisture, plant growth, the highlighting features of this project include controlling of water pump with/without internet through GPRS/GSM and status notification of the water pump. It also detects dry run condition of water pump and send alert to the farmer. It helps farmer to produce evidence or make insurance for crops.

The different sensors that are used in the system produce different results, which collectively gives the desired result in our system. If there is an increase/decrease in the temperature, a message is sent to the Farmer/User and also the values are updated onto the Thinkspeak Server. Similarly, all the values including the Moisture sensor, Rainfall sensor and the Ultrasonic sensors are updated on to the cloud. This data that is stored in the server is long lasting and can act as a source of information when any loss occurs.

The moisture sensor and the working of the motor is interlinked. We make use of the relay for this purpose. When the moisture sensor shows a low moisture level, a signal is sent using the Arduino to switch on the motor. For switching on the motor we make use of the relay. Thereby, increasing the water and the moisture level. After the motor is switched on, if there is no water flowing from it, it is considered to be a dry run. The dry run sensor detects this. A message is sent to the Farmer/user notifying him of the dry run.

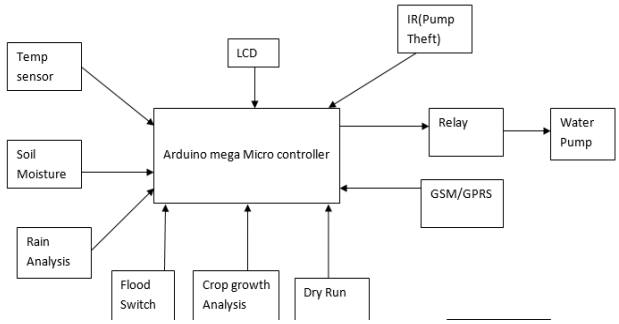
We make use of the GSM module to send alerts/sms to the user. The GSM Module has a SIM card inserted using which we can send the alerts to the user. This process of sending the messages is done collaborating the GSM and Arduino module. We use AT Commands for this communication process. In case, there is no network found in the sim, an emergency alert is displayed on the LCD screen. This is how our Proposed system functions.

Advantages of the Proposed System:

- It saves time.
- Evidence Collection.
- Manual operation has been reduced to major extent.
- Less man power required.
- Easy to use.
- Efficient and reliable.
- Vendor or Suppliers materials will be verified in better method.
- Quick Results

To make this project as user friendly and robust, we need to make it dense and cost effective.

4. Methodology



Many Systems have Functionalities and designs according to the functions they have to perform. Our system has different integral parts with the central focus on the Arduino Microcontroller.

Some of the Integral Devices are:

- *Sensors:*
  - Temperature Sensor
  - Soil Moisture Sensor
  - IR Sensor
  - Ultrasonic Sensor
  - Rain Sensor
- *Relay:* Used to control Motor from the commands issued by the Arduino Microcontroller.
- *GSM Module:* Used to send alerts to the Mobile of the Farmer. We have the SIM using which we can send alerts.

Each Sensor has different, specified operations.

All of the collected data is uploaded onto the server. We are using Think speak server for all the data storage operations.

5. Results

The data that is collected from the Sensors are stored onto the Cloud. This collected data acts as an evidence for the Farmers in case of any loss or problems.

Date	Moisture Sensor	Theft Sensor	Ultrasonic Sensor
13/02/2020	Low	No	0mm
15/02/2020	High	No	1mm

Advantages:

- It saves time.
- Manual operation has been condensed to main extent.
- A reduced amount of man power required.
- Easy to use.
- Proficient and reliable.
- Receiving all types of government profits will be easy.
- Vendor or Suppliers materials will be verified in better way.

Disadvantages:

- System failure may occur due to tampering.
- System failure may also take place in the absence of power.

6. Conclusion

The project is designed using structured modelling and is able to provide the desired results. It can be successfully implemented as a Real Time system with certain modifications. Science is discovering or creating major breakthrough in various fields, and hence technology keeps changing from time to time. Going further, most of the units can be fabricated on a single along with microprocessor thus making the system compact thereby making the existing system more effective. To make the system applicable for real time purposes components with greater range needs to be implemented.

Acknowledgement

This Survey was finished by the gathering of four individuals Akshay D.C, Bhagyashree, Deepika G and Lekhana R under the direction of our guide Prof. Subramanya S.G. We want to thank our loved ones for supporting us all through this study.

References

[1] S. R. Nandurkar, V. R. Thool, R. C. Thool, "Design and Development of Precision Agriculture System Using Wireless Sensor Network", IEEE International Conference on Automation, Control, Energy and Systems (ACES), 2014.

[2] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE transactions on instrumentation and measurement, 2013.

[3] Q. Wang, A. Terzis and A. Szalay, "A Novel Soil Measuring Wireless Sensor Network", IEEE Transactions on Instrumentation and Measurement, pp. 412–415, 2010.