

Development of IoT based Smart Security and Monitoring Devices for Agriculture

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Abstract—Agriculture sector being the backbone of the Indian economy deserves security. Security 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. Security systems which are being used now a days are not smart enough to provide real time notification after sensing the problem. The integration of traditional methodology with latest technologies as Internet of Things and Wireless Sensor Networks can lead to agricultural modernization. Keeping this scenario in our mind we have designed, tested and analyzed an 'Internet of Things' based device which is capable of analyzing the sensed information and then transmitting it to the user. This device can be controlled and monitored from remote location and it can be implemented in agricultural fields, grain stores and cold stores for security purpose. This paper is oriented to accentuate the methods to solve such problems like identification of rodents, threats to crops and delivering real time notification based on information analysis and processing without human intervention. In this device, mentioned sensors and electronic devices are integrated.

Keywords—Internet of Things (IoT); Agriculture; Security; Raspberry Pi; Sensors;

I.INTRODUCTION

Over the past years information and communication technologies have been introduced in agriculture, improving food production and transportation. However the integration of these technologies are not yet used for security purposes. The significant challenge facing the security in agriculture is the interaction between security devices and to provide them intelligence to control other electronic devices such as cameras, repellents etc. to enhance security in various fields. So, the natural conclusion is that the security and monitoring systems must be responsible for transmitting data over network, analyzing the information and notify the user with real time information of surroundings.

This lack of information transmission and data analyzing has been solved by integration of internet of

things with currently available security devices in order to achieve efficient food preservation and productivity.

II.LITERATURE REVIEW

For developing an intelligent security device based on IoT, M2M framework, sensor network and database management are the foundations. The fields like data analytics and pattern matching also influences security devices. Researchers have been developing various IoT based security devices but a little work is done in agricultural area.

According to previous research in crop's security, developing countries, which are using traditional storage facilities for staple food crops, can't protect them, leading to 2030% loss of agricultural products such as rice, corn etc. Rodents damaging agricultural products is a problem to be managed by promotion of intensive smart agricultural systems and support systems for farmers that derives by monitoring data should also be developed for rodents.

Based on smart agriculture, by using information and communication technologies, internet of thing can provide us with a security system for private fields and farm products, thus improves the monitoring and security of pre-harvest and postharvest grain. Distribution of resource, delegate control of devices and balance of loads to improve efficiency of resource devices are using, is achieved by integration of hardware resources into clusters using vitalization technology. To obtain large amount

of data, by using various information sensing techniques of IoT using RFID, wireless communication etc. are integrated with agricultural based information cloud to form smart agricultural device.

Data collection is also a major part in security devices. Here, data i.e. sensory information using various sensors. Information generated from sensors are transmitted to server or platform (IoT based M2M platform) over networks so that it can be accessible through remote location for further processing and monitoring. Once the data is transmitted

to the server, client machine is used to access it, process it and notify user based upon filtered information.

Internet of Things is used with IoT frameworks in order to easily view, handle and interact with data and information. Within the system, users can register their sensors, create streams of data, and process them. In addition, the system has searching capabilities, helping the user with a full-text query language and phrase suggestions, allowing a user to use APIs to perform operations based on data points, streams and triggers.

III.EXISTING SYSTEM

The significant challenge facing in agriculture is the security to the agricultural products at very initial stages. It includes protection and security from the attacks of insects or rodents, in the fields or grain stores. At present there are no proper systems which can provide security. A manual process exists for security where person watch the fields and grain stores. Due to manual labor and charges, this is not an efficient one. Some farmers may install cameras but the interaction between security devices and to provide them intelligence to control other electronic devices such as cameras, repellents etc. to enhance security in various fields is not possible.

For example, a basic CCTV camera installed in a grain store cannot be of use until recorded media is accessed and it also cannot process the information about what is happening at particular location. In implementation and adoption of information and communication technologies, cost is also a major factor. It is not easy to achieve exchange of information among devices and upgrading their functionality while keeping their cost to a reasonable level.

Some of the other areas in agriculture that use IoT are:

- Water quality monitoring
- Monitor soil constituent, soil humidity
- Intelligent greenhouses
- Water irrigation
- Scientific disease and pest monitoring

IV.PROPOSEDSYSTEM

Theproposedsystem will provide overall security for the agricultural storage area. The system detects fire, alerts the user and also resolves the problem without human intervention. It also detects the movement of intruders, notifies this to the owner and executes an action for this event. The data collected by the sensors is sent to a cloud through the Raspberry Pi which is then fetched by the end user.

V.METHODOLOGY

In the proposed scenario, the research problem is to develop intelligent security systems with ability to analyze data and transmit information over network to the remote location. Literature survey gives the notion

about present work done in field of agriculture security and IoT. This can be enhanced by integrating few new technologies with present scheme. Current IP based CCTV security cameras require network connectivity for monitoring from remote location. It doesn't has ability to notify user by analyzing data. In the device, basic sensors and electronic devices are used. The sensory information are analyzed in order to activate electronic devices and raspberry pi is used as a server to analyze data and transmit information to user. Components used are :

- 1) Raspberry Pi 2 Model B+
- 2) PIR Sensor
- 3) Ultrasonic Ranging Device
- 4) Web Camera
- 5) Ultrasonic Sound Repeller

VI.TECHNOLOGIESUSED

Platform and Language Used :

- 1) IoT platform for M2M Services
- 2) Raspbian Java
- 3) Linux based RaspbianOS(Jessey Debian)

VII.APPLICATIONS

As discussed in the earlier section there is loss of food resources in the initial stages before it reaches the end user. By implementing the proposed system, these losses can be minimized.Italsovalidatestheuseratthetimeoflogin.Theadmin canusethe database to know about the previous events.

This system can also be used in many other situations with the required manipulations respectively.

CONCLUSION

Thispaperproposesasystemthatcanbeused to detect and alert the user to avoid the accidents caused due to fire breakdown, movement of intruders.Thehighrateoflosses incurred at the initial stages can be avoided.High speed data processing and lack of analyzing the information and notifying the user with real time information of surroundings distinguishestheproposedsystemfromtheexisting system.

The development and improvement of this system can save a huge losses and the economy of the country.

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