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WAREHOUSE MANAGEMENT USING IOT

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Abstract— *The Internet of Things is the concept of connecting any device to the Internet and to other connected devices. The IoT is a giant network of connected things and people all of which collect and share data about the way they are used and about the environment around them. That includes an extraordinary number of objects of all shapes and sizes from smart microwaves, which automatically cook your food for the right length of time, to self-driving cars, whose complex sensors detect objects in their path, to wearable fitness devices that measure your heart rate and the number of steps you've taken that day, then use that information to suggest exercise plans tailored to you. In Agricultural field, the warehouse for storing the agricultural products has to be maintained manually. The manual work involves the detecting of the temperature and moisture constantly which a normal human being finds it difficult to measure for a longer period of time. Also in the case of emergency situations like earthquake and fire, someone has to alert the police station, fire station, hospital etc. IoT implementation in agriculatural field helps in various ways. Instead of manually measuring the environmental factors, a specialized sensors are used to monitor them continuously. Also the alerts are sent to the safety and emergency departments automatically by the IoT device. Thus the overall process is improved to a vast extent with the help of IoT systems.*

***Keywords*— IoT (Internet of Things), sensors, warehouse.**

Introduction:

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. Experts estimate that the IoT will consist of about 30 billion objects by 2020. It is also estimated that the global market value of IoT will reach $7.1 trillion by 2020. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities.

The Internet of Things (IoT) has the capability to transform the world we live in; more-efficient industries, connected cars, and smarter cities are all components of the IoT equation. However, the application of technology like IoT in agriculture could have the greatest impact. The global population is set to touch 9.6 billion by 2050. So, to feed this much population, the farming industry must embrace IoT. Against the challenges such as extreme weather conditions and rising climate change, and environmental impact resulting from intensive farming practices, the demand for more food has to be met. Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made. So, what is smart farming? Smart farming is a capital-intensive and hi-tech system of growing food cleanly and sustainable for the masses. It is the application of modern ICT (Information and Communication Technologies) into agriculture. In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. IoT-based smart farming is highly efficient when compared with the conventional approach. The applications of IoT-based smart farming not only target conventional, large farming operations, but could also be new levers to uplift other growing or common trends in agricultural like organic farming, family farming (complex or small spaces, particular cattle and/or cultures, preservation of particular or high quality varieties etc.), and enhance highly transparent farming. In terms of environmental issues, IoT-based smart farming can provide great benefits including more efficient water usage, or optimization of inputs and treatments. Now, let's discuss the major applications of IoT-based smart farming that are revolutionizing agriculture.

Related work:

Partha Pratim Ray, Mithun Mukherjee and Lei Shu [1] presented a survey of Internet of Things for Disaster Management: State-of-the-Art and Prospects This article summarizes the available IoT-based technologies for disaster management and their suitability to apply into the disastrous situations. Also, this survey presents some of the open research challenges and fundamental design principles for

IoT-based disaster management systems. In summary, the aim of this study is to provide fundamentals about IoT-based disaster management systems that help us to understand past research contributions and future research direction to solve different challenges disaster management systems. Prasenjit Maiti, Bibhudatta Sahoo, Ashok Kumar Turuk, Suchismita Satpathy [2] This paper defines a data collection architecture supporting the physical dimension of sensors to the storage of data in a cloud-based service. Alessio Carullo,Simone Corbellini, Marco Parvis [3] This paper deals with a wireless sensor network that was specifically designed to monitor temperature-sensitive products during their distribution with the aim of conforming to the cold-chain assurance requirements. Emilio Sardini and Mauro Serpelloni [4] This paper outlines a self-powered sensor that, without any battery, autonomously performs the measuring functions and transmits data to an external receiving unit. A.Kumar, K.Kamal, M.O.Arshad, S.Mathavan, T.Vadamala [5] The Paper presents a smart system that uses a low cost soil moisture sensor to control water supply in water deficient areas.

PROPOSED SYSTEM:

The proposed system uses a (DHT11,FLAME DETECTOR and ADXL335) sensors to measure the temperature , moisture ,fire and earthquake inside the warehouse and dynamically updates the collected data to the database. Also some sensors are used to detect the earthquake vibrations and fire. GSM technology is used to send alerts through SMS. The system sends alert messages as soon as the disaster happens, so the recovery process is initiated soon. This system will save the Warehouse commodities from loss of commodities. It greatly saves the man time by maintaining everything automatically by itself. The environmental factors are measured and monitored constantly thus the accuracy is highly maintained. It also benefits in sending alerts as soon as the disaster happens so the preventive measures can be taken earlier.

SYSTEM DESIGN:

The Overall System design includes the workflow of the whole process. Arduino Controller, GSM module, Temperature and Humidity sensors. The system is low cost & low power consuming so that anybody can afford it. The data monitored is collected at the mobile phone. The system should be designed in such a way that even illiterate villagers can operate it.

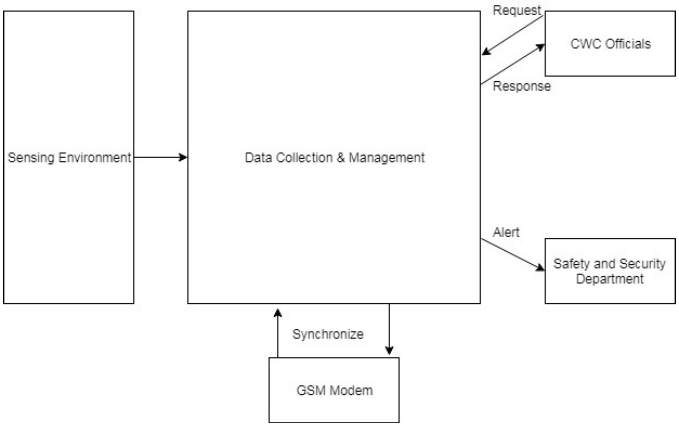

Fig-1:Proposed system design

The fig-1 represents a overall proposed design of the system. Initially the respective sensors gather the required data from the warehouse environment by sensing for temperature, humidity, flame and earthquake. The sensors are integrated into the Arduino UNO R3 and the data is stored in the database. In order to continuously monitor the warehouse environment, the database is essential so the warehouse officials could take a look at the status of the warehouse with the help of the monitoring system. A GSM module is used to send alerts directly to the mobile phones in case of emergency to the warehouse officials, police station, fire station and hospital.

Module implementation:

The implementation and activities of the modules of the system are illustrated and explained below.

(A)Sensing environment:

The sensing environment involves the sensing of temperature & humidity and detection of flame & earthquake.

For measuring the temperature & humidity, DHT11 sensor is used. It consists of a humidity sensing component, a NTC temperature sensor (or thermistor) and an IC on the back side of the sensor. For measuring humidity they use the humidity sensing component which has two electrodes with moisture holding substrate between them. So as the humidity changes, the conductivity of the substrate changes or the resistance between these electrodes changes. This change in resistance is measured and processed by the IC which makes it ready to be read by a microcontroller. On the other hand, for measuring temperature these sensors use a NTC temperature sensor or a thermistor. The fire and earthquake is detected by using the IR flame detection sensor and ADXL335 accelerometer respectively. The flame sensor is very sensitive to IR wavelength at 760 nm ~ 1100 nm light. ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs.

The product measures acceleration with a minimum full-scale range of ±3 g.

(B)Data collection and management:

The data is collected and managed by Arduino UNO R3, microcontroller. The gathered data from the sensing environment is synchronized to the database server and monitored. The data can be viewed through the monitoring system that has access to the same database. A GSM modem is used to send alerts through SMS in case of emergency. The Arduino board is configured in such a way that the alerts are sent as soon as the disaster happens (i.e., The alert message is sent from Arduino board by using the GSM modem which doesn't a database to synchronize).

CONCLUSION:

The system with the help of (DHT11,FLAME DETECTOR and ADXL335) Sensors and IOT technology detects the causes for the problem and preventive measures are taken. Also the constant monitoring of the warehouse is made possible, so the warehouse officials can be completely aware of things happening inside the warehouse. Also the emergency alerts are sent in a very fast manner so the preventive measures can be taken at next moment after the incident is happened.

FUTURE ENHANCEMENTS:

At present the system can sense environment only by use of individual sensors for specific conditions. But in the future it will get improved to level that all the environmental factors can be detected by single sensor and also the preventive measures can be taken without man power.

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