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IOT - Enabled Disaster Management Systems which Sends Alerts to the Authorities

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Abstract: ***Disastrous events are cordially related to the momentum of nature. These days it is bit difficult to estimate the changes in the parameters that harm the goods inside the warehouse and using IoT, each parameters related data can be sensed automatically by respective Sensor. This paper proposes a system that monitors the temperature, moisture, fire, earthquake automatically from the warehouses. The solution available is however, only senses the data and store; they do not analyze or alerts Authorities. The method given here which automatically sense the data, then send the data to the cloud and then the data is analyzed if any variations found with respect to standards of warehouse environment, then finally an alert or notification send to the respective authorities for further actions.***
Keywords: Arduino Uno, Internet of Things, warehouse.

I. INTRODUCTION

Over the last few years the Internet of Things (IoT) has gained significant attention from both industry and academia. Since the term was introduced in the late 1990s many solutions have been introduced. The Internet of Things (IoT) is a dynamic global information network consisting of Internet connected objects, such as radio frequency identifications, sensors and actuators, as well as other instruments and smart appliances that are becoming an integral component of the Internet. Disasters often take place in the vicinity of human livelihood. Most of the time, it is either natural (e.g., landslide, earthquake, tsunami, flood, forest-fire and lightning) or man-made (e.g., industrial explosion, leakage in an oil pipeline, leakage in gas production, and terrorist attacks). Regardless the cause of incident, disaster leads to huge destruction in terms of economic and human lives. With the development of logistics and supply chain, warehouse capacity and area tends to be increasingly larger and product categories have been increasing in warehouse. Storage environment requirements for products differ from one to another, and some products' quality is affected greatly by storage environment. Assurance of the security of warehouse and the quality of products is an important aspect of the management of warehouse. As a result, real-time monitoring of environmental parameters in warehouse and maintenance of suitable warehouse environment are critical in the daily management of warehouse. In the daily management of warehouse, temperature, humidity, the degree of light and other environmental parameters are important indicators for monitoring warehouse environment. These environmental parameters directly affect the quality and storage time of goods, lifetime and reliability of device in the warehouse. To ensure the effectiveness of warehouse management, it is important to pay attention to the monitoring of environmental parameters. The traditional method for controlling environmental parameters usually depends on manual operation. People use some kind of detection equipment like thermometer, hygrometer, etc. to collect environmental parameters, and then regulate the environment by open windows, turn on air conditioner to ventilate, cooling and drying. However, this manual approach of measuring is time-consuming and inefficient. The result may contain errors in the manual measuring process, and accuracy rate is affected. In addition, some special environment, like environment detrimental for human, is not suitable for manual operation. Therefore, there is an urgent requirement of a warehouse environment monitoring and control information system including the characteristics of low price, easy to use, precisely measurement, remote auto monitoring, etc. Currently, with the deep research in area of internet of things, the warehouse environment monitoring combined with the technology of internet of things has becoming a new research area. Central Warehousing Corporation (CWC) is into scientific storage and handling services for more than 400 commodities include Agricultural produce, Industrial raw-materials, finished goods and variety of hygroscopic and perishable items. Storage loss of food grains and perishables goods are being controlled through quality control practices including periodic chemical treatment , recording of moisture and other parameters, proper documentation , regular inspection , age analysis , sanitation , physical condition of warehouse. Further storage loss due to atmospheric moisture beyond threshold results in infestation etc and hence damages the food grains/perishables.

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II. RELATED WORK

The following system proposes a multi agent system that is explained below consists of solar micro grid.

A. Smart micro grid using Multi Agent System (MAS) Environment

This paper aims to establish a microcontroller and IOT based Multi Agent System (MAS) for progressive demand side response of a solar micro-grid. High penetration of renewable energy resources needs new coordination and control approaches to meet the stochastic nature of the environment and dynamic loadings this work basically presents an approach that makes it possible to integrate IoT devices to a MAS environment, for an upsurge in the level of integration and interoperability of a smart micro grid.

III. PROPOSED SYSTEM

The proposed system records and analyses the temperature and Moisture related information in a warehouse with very high precision and accuracy, involves two stages of operations:

A. Stage 1: First and foremost stage is that the sensor network which contain the all the sensors (i.e., moisture sensor HT22, fire detection sensor, earthquake sensor, The temperature sensor DS18B20)which are going deployed into the warehouse environment to sense/collect the real time data (i.e., temperature, moisture, fire and earthquake) from the warehouse using respective sensors then the collected data is transmitted to the cloud for the further mechanism and all of these sensor are controlled by the arduino uno board

B. Stage 2: the data which is received from the stage 1 is going to be stored in cloud, further the data stored is analyzed and compared with the standard values (i.e., which are stored as a threshold value) ,once the value compared as result if the sensed value is greater than the threshold value which leads to harm for the products stored inside the warehouse then a message is sent to the respective owner or authorities to deal with further actions.

IV. METHODOLOGY

The proposed hardware of this system includes temperature, Moisture, Fire, Piezoelectric sensor (For earthquake detection) and an Arduino Uno board.

A. The System Works In The Following Steps

1) The sensors auto captures the moisture and temperature inside the warehouse. All the sensors are controlled by an arduino board.

2) The captured data is stored in the cloud. Based on the temperature and moisture data so captured, the software should do appropriate data analytics.

3) If Captured value of temperature and humidity is crosses the threshold value then the system should send timely alerts to concerned officials or owner to take appropriate actions.

The proposed system will sense the parameters with the help of sensors. The sensors are controlled by the arduino and the data will be sent to cloud. The data within the cloud will be compared with the standard values if any variation found the alert messages will be sent to the related authority.

B. Architecture and Working

The key part of the system is Arduino Uno Board which consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE, Sensors (i.e., moisture sensor HT22, fire detection sensor, earthquake sensor, The temperature sensor DS18B20), Wifi Module for sending data the cloud, Buzzer which alerts from disaster

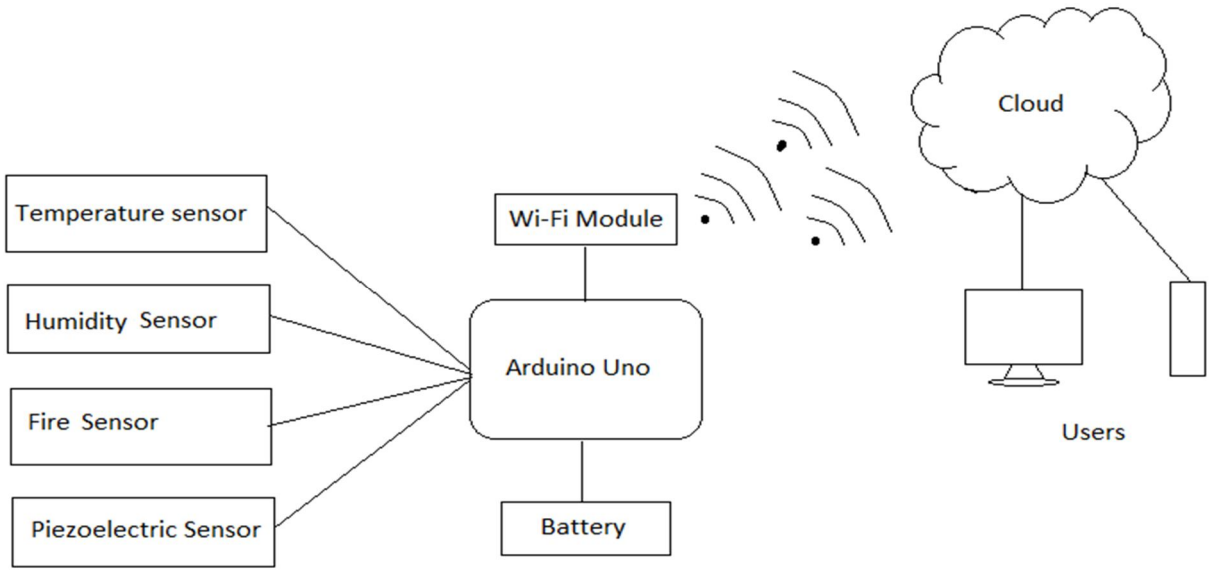

Fig1. System Architecture

C. The Architecture Contains

1) *Sensor Module :* Mainly sensor module contains wireless sensor network which is having all the sensors which are connected to arduino board the sensors. The sensors collect the real time data of temperature, moisture, fire and earthquake related information.

2) *Controlling Module:* This contains an arduino Uno board, Wifi Module and Battery. The arduino board controls all the sensors which are connected to it and a wifi module which connected to the arduino board used for transferring the collected data to the Cloud. Battery is used to give power supply to sensors and arduino board.

3) *Analyzing Module :* This the Main part where the collected data is going to be Properly analyzed and the data is compared to standard value(i.e., threshold value) and if variation found send alerts to respective authorities.

D. The steps involved are

1) The sensors auto captures the moisture and temperature inside the warehouse. All the sensors are controlled by arduino board.

2) The captured data sent to cloud to the using Wifi module is stored Based on the temperature and moisture data so captured, the software should do appropriate data analytics.

3) If any variations found inside the warehouse which will harm the products then the software should send timely alerts to concerned official or owner to take appropriate actions.

4) Additionally, the fire and vibration sensors detect the fire and earthquake disasters.

5) When these disaster occurs, this system will sends the alert notifications will be sent to respective authorities like fire stations, police besides alerting CWC official for mitigation

V. RESULTS

The warehouse should be monitored frequently and the moisture temperature should be noted by the system. If any variations found with respect to the standard warehouse conditions like moisture, temperature etc. The system should send alerts to the owner. If any disasters like fire or earthquake, it has to send notifications to the nearest fire stations.

VI. CONCLUSION AND FUTURE SCOPE

For the development of an early warning system to control the storage loss of food grains through the quality control practices by monitoring the recording of moisture, fire and temperature and send timely alert to concern officials. It can also capture fire, earthquake and can alert the respective nearest authority like Fire Station, Hospital, and Police besides alerting CWC officials for mitigation. Among all these risks, we are going to develop a prototype to avoid these by using the arduino based IoT technology. Further in future the system can implement more features like system can also sense different pollutant gases and we can also have automatic Equipment control using IoT technology.

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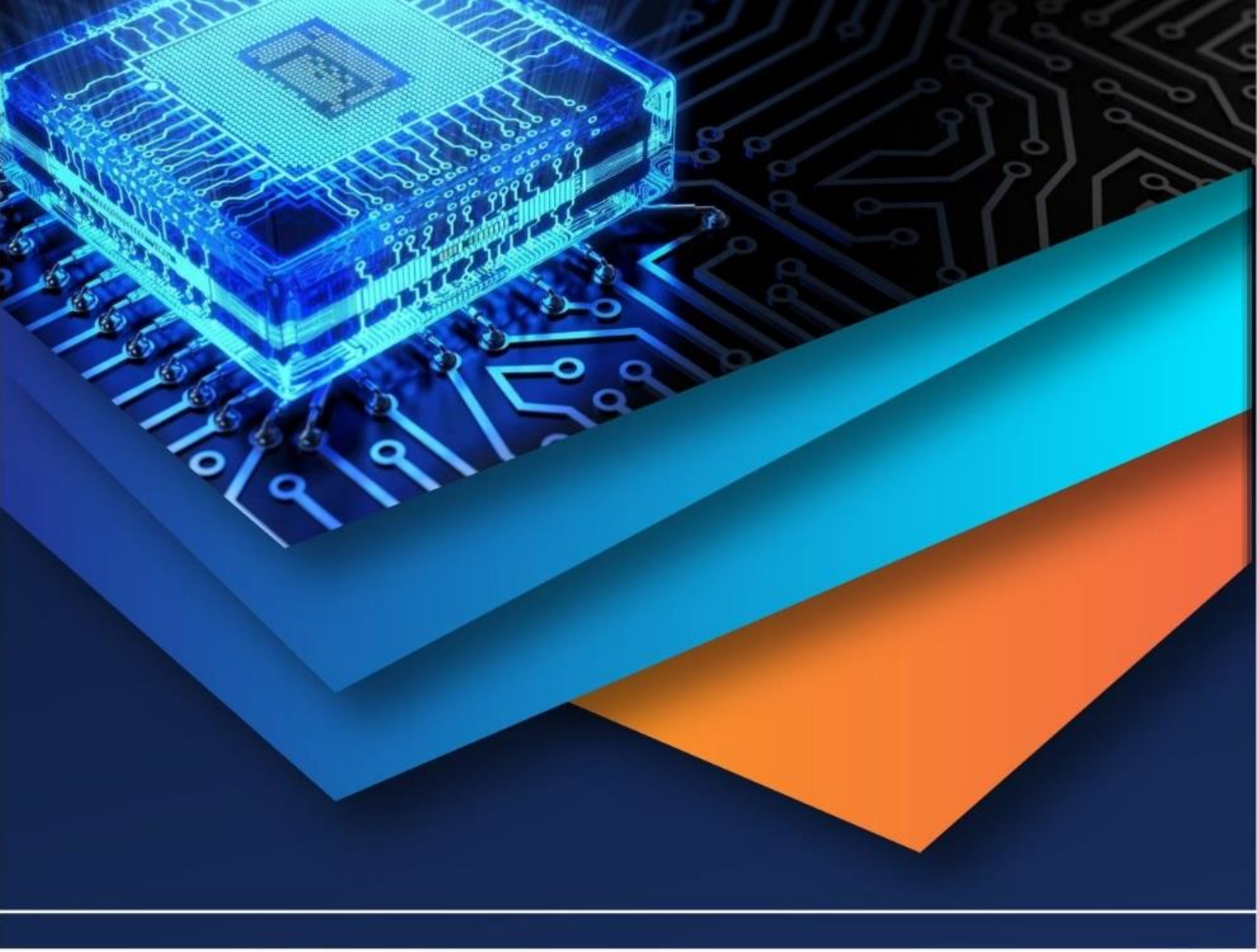

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