IoT Based Monitoring And Control For Vegetables And Fruits Storage

S.A.Khumkar[1], A.S.Bhujbale[2], S.B.Khandar[3], S.P.Deshmukh[4], Dr.M.A.Pund[5]

[1] *UG Student, Department of Computer Science & Engg., PRMIT&R Badnera, MS, India*
[2] *UG Student, Department of Computer Science & Engg., PRMIT&R Badnera, MS, India*
[3] *UG Student, Department of Computer Science & Engg., PRMIT&R Badnera, MS, India*
[4] *UG Student, Department of Computer Science & Engg., PRMIT&R Badnera, MS, India*
[5]*Professor, Department of Computer Science & Engg, PRMIT&R Badnera, MS, India*

ABSTRACT

The Internet of things(IoT) aims at connecting different objects, things using internet. The rapid development of the Internet of Things motivate use to apply for the food preservation domain such as maintain the quality of fruits and vegetable. In this project a system has been proposed to analyze the ambient conditions under which the food item is being stored. The proposed solution senses the temperature, moisture, light parameters of surrounding environment as these parameters affect nutritional values of food items.

In this project we have designed and implemented Raspberry Pi which works as a sensor node for the fruit and vegetable storage house as well as central base station is connected to cloud where MySQL open source database server to support data storage functionalities. The sensor values are stored in the cloud and sent to the base station by connecting to database using its IP address. Then a data fusion model is experimented which takes multiple sensed data as input and produces single fused information or action to be taken as the output. Thus aggregated several input as temperature, humidity and averages it to produce single consolidated output based on which the future decisions could be made. Finally this project is integrating the android mobile application which is used to facilitate user interaction and connect through IoT based system that is station/gateway and the internet.

Keyword - *Internet of Things, goods safety, Sensing environments, Automation, Remotely monitoring*

1. INTRODUCTION

The Internet of Things (IoT) is emerging technology and is now completely transforming the ways in which industries operate. Forbes calls the Internet of Things a giant network of connected things, with relationships between people a people, people and things and things. The Internet of Things defined as "the infrastructure of the information society". 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 system.

Quality of fruits and vegetables has huge impact of surrounding during storage, we can only maintained the quality of fruits and vegetables after harvesting; therefore it is important to store it in proper ecosystem. Quality is a complex perception of many attributes that are simultaneously evaluated by the consumer either objectively or subjectively. Fruits and vegetable are highly perishable due to variation in temperature while they are stored. Effective observing of temperature, humidity and other ecological conditions inside a distribution center has turned out to be one of the vital field in innovative work in many creating countries over the world.

2. LITERATURE REVIEW

This work deals with different sensors and sensor cloud that can be used to monitor the status of cold storages. Raspberry pi and hardware designs to connect with the internet. We have used messaging for notification purpose. [1].

This work deals with monitoring and controlling of food storages using Android app. we concluded that using Android app is more efficient when compared with Desktop application.[2]

This works deals with the implementation of IoT-OSMS, and ensured the occupational health and safety and improves working performance in cold storages. Fuzzy Logic and Real-Time positioning are integrated to achieve their goal. They used Bluetooth Low Energy (BLE), a kind of RFID solution to locate and collect accurate information of the workers who are working in cold storages. D. SulmanFarrukh, Muhammad Shahzad, Usman Khan, TalhaChughtai, and Ali Nawaz Khan (2013).[3]

They proposed an economic solution for cold storage management. Sensors are connected and at different levels as the temperature vary at different levels. This leads to the dumping of very accurate and reliable data from the sensors which in turn makes the whole system reliable and robust. E. Mira Trebar (2015)[4]

This work deals with the logistic management in cold storages where radio frequency identification (RFID) technology is used. Temperature has been monitored by using prototype UHF RFID data logger, semi passive RFID tag. This tag helps to log the sensor values using the respective time-stamp. The work also includes some features like data protection, automatic sensors signal acquisition, smart power supply. The data is stored using innovative analogue nanotechnology architectures. F. Zhao Xiaorong, Fan Honghui, Zhu Hongjin, Fu Zhongjun, Fu Hanyu (2015)[5]

In this paper, a novel IoT architecture based on object named service (ONS) which captures and stores the information in the web has been introduced. High volume products can be tracked using RFID tracks and low volume products can be tracked using bar codes. The data from the sensors, bar codes and RFID tags have been analyzed to obtain the shelf life and product quality. G. Yanan Li, YulinPeng, Lei Zhang, Jiefeng Wei, Dan Li (2015)[6]

This work adopts wireless sensor network and research the performance and integrate mode of the technologies. It is designed to achieve a larger and longer communication distance transmission network. Easy access of product information is done which helps to enhance the product quality and safety.[7]

3. PROPOSED SYSTEM
3.1 Overview
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This project develops a new approach towards IoT based system which can track a various sensor data and give report analysis data.

It is design and analysis a data from various devices and gives time to time delivery.

It is develop wireless system of monitoring system using wireless protocol.

It is develop data monitoring system using integration between base station/gateway and the internet.
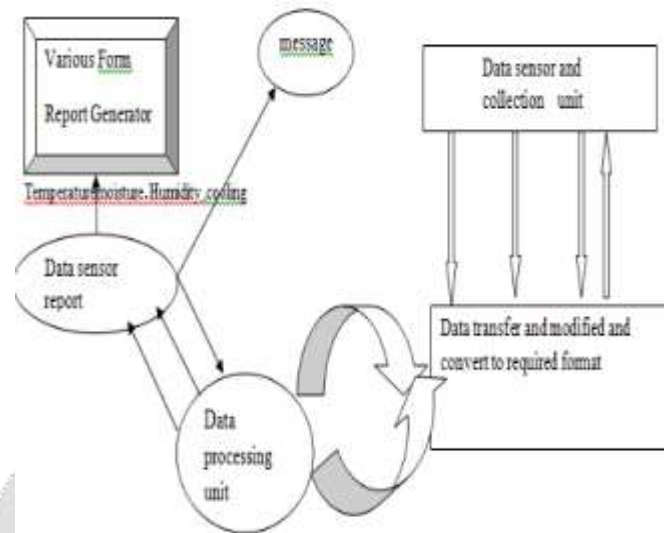
Fig -2. IoT based System architecture

3.2 System Component

Hardware Components
  1. Raspberry Pi
  2. Sensors
     2.1 Temperature and Humidity sensor
     2.2 IR sensors

Raspberry Pi: Raspberry Pi is a low-cost, basic computer that was originally intended to help spur interest in computing among school-aged children. The Raspberry Pi is contained on a single circuit board and features ports for HDMI, USB 2.0, Power, Internet and SD Card

Temperature and Humidity sensor: DHT11 is a 4 pin sensor which can measure temperatures ranging from 0-50°C & relative humidity ranging from 20-95%. The sensor uses its own proprietary 1-wire protocol to communicate with Raspberry Pi and runs from 3.3V-5V. The timings must be precise and according to the datasheet of the sensor.

IR sensors : IR sensors (Infrared sensor) are modules which detect the presence of objects before them. If the object is present it give 3.3V as output and if it is not present it gives 0 volt. This is made possible by using a pair of **IR pair** (transmitter and receiver), the **transmitter (IR LED)** will emit an IR ray which will get reflected if there is a object present before it.

  A. Software Requirements
     • Raspberry Pi Software
     • Android App
     • MySQL database

Raspberry Pi Software: To get started with Raspberry Pi, you need an operating system. NOOBS (New Out Of Box Software) is an easy operating system install manager for the Raspberry Pi.

Android App: By using android app administrators get real time data on mobile phone application.

MySQL database: Storing sensors extracted data to MySQL database which is present at cloud and performing operation on this data.
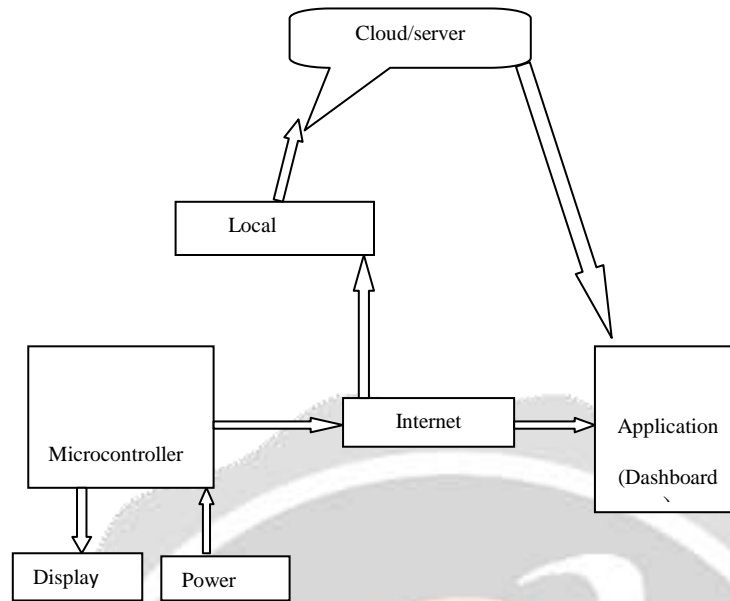
Fig 2: Overall System Structure

Most of the systems have different designs based on its functionalities. In this project the design includes a single microcontroller, temperature sensor, humidity sensor, internet and a cell phone or laptop. Apart from the server entire unit is placed within warehouse or cold storage. Microcontroller located at the center of the block diagram is the control unit for each node. Program is being embedded within a microcontroller which helps to take action based on inputs provided by output of the sensors. Temperature and humidity sensors checks if there is any change in temperature and humidity within the warehouse or cold storage facility. It generates an output voltage with change in their surrounding environment. These output voltages are fed to pins of ADC unit of microcontroller. This microcontroller processes the incoming voltages from the sensor depending on the program embedded within it. Output is passed to android app where the user is able to view and control settings. A android application is being created which receives all data from hardware and is being displayed.

4. CONCLUSION

This project is designed for monitoring conditions of storage houses. Which on result maintain the items stored in the warehouse. The safety and quality of frozen products is to be emphasized only when high quality raw materials will be used, good manufacturing practices to be employed in the preservation process, and the products kept in accordance with specified temperatures. In our project we have developed a system by installing Raspberry Pi, in which various sensors are embedded to form the smart food storage. The temperature sensor is used to sense the change in temperature and the gathered data inferences control signals are generated in the form of message. This SMS is sent through the server to the mobile and the mobile user can switch on/off the fan present in the warehouse. This incorporates the cloud and IoT technology and using android app manager creates user friendly environment which in result shows the effective utilization of current computer aided engineering and technology

5. ACKNOWLEDGEMENT

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