SMART COLD STORAGE MONITORING FOR FOOD INDUSTRY

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Abstract—In the era of technology advancement, everything requires monitoring and controlling.This paper proposes an IoT framework for facilitating food monitoring to preserve food, so that it would not lose its nutritional values. Food spoilage can be defined as a disagreeable change in a food's normal state. Such changes can be detected by smell, taste, touch, or sight. These changes are due to a number of reasons – air and oxygen, moisture, light, microbial growth, and temperature.The proposed solution analyzes temperature,which affects nutritional values of food items and makes the analysis results accessible to the user via Android application.A web server is used for storage of data values sensed in real time and also for analysis results. User is alerted via voice alert whenever temperature exceeds a threshold value assigned to a particular food item.

I. INTRODUCTION

A food contamination can occur in the production process, but also a large part caused by the inefficient food handling because of inappropriate ambient temperature conditions when the food is being transported and stored [1]. There are many factors leading to food poisoning, typically changes in temperature and humidity are important factors. So the monitoring system capable of measuring temperature and humidity variability during transport and storage is of prime importance [2]. Today almost everybody is getting affected by the food they consume, it's not only about the junk food, but all the packed foods, vegetables, products consumed and used in daily life, as all of them do not offer quality since their temperature vary from time to time. Majority of consumers only pay attention to the information provided on the packaging, i.e. the amount of ingredients used and their nutritional value but they forget that they are blindly risking their health by ignoring the environmental conditions to which these packets are subjected.
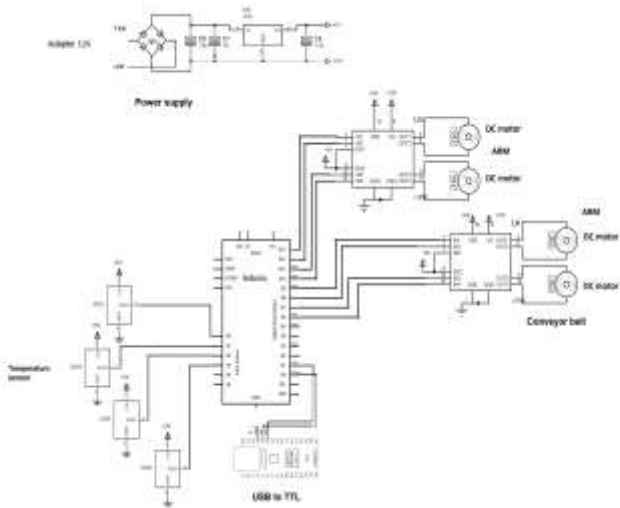
II. PROBLEM DEFINITION

To ensure food safety it should be monitored at every stage of supply chain. It serves the purpose of preventive consumer health protection by maintaining the required standard ambient conditions needed to preserve the quality of food. Estimates of food and nutrient intakes defines the proper standard of values that has been fixed by the food health organization so as to identify potential nutritional inadequacies and inappropriate food consumption patterns. This includes issues specific to the warehouse or cold storage where it has to be properly monitored at every step. Food and nutrition monitoring and surveillance involves continuous description of the number of food items present in the inventory and also the continuous track of temperature. Information collected through monitoring and surveillance must be analyzed and transmitted to decision-makers in an appropriate format and in a timely fashion if it is to be of real value. Dissemination of information must be an interactive process[3],[26]. Thus, Integration of the sensors with remote web server for data logging and an android application which allows distribution of data log as well alert messages is the need of the hour. Real time user notification mechanism is also required to ensure immediate preventive action.

III. PROPOSED SOLUTION

The proposed system provides the following features:

- Android App comprising of Login for Employee and Manager.
- Employee scans the food item using Barcode scanner present in the android application.
- After scanning the barcode, the food item is identified by the system.
- The Administrator will tell the robotic arm to automatically store the food item.
- Manager and Employee gets the real time data on their android applications which includes Temperature and Count of the food item.
- Temperature of each section is monitored and an alert is triggered when temperature is above threshold.
- Alert voice notifications of this temperature rise will be given to the manager and employee.
- Manager can give order to the employees through the android application to remove the food item.

IV. SYSTEM ARCHITECTURE

1) Hardware:-

• Arduino UNO
• Temperature sensor -LM35
• Motor driver IC - L293D
• DC motors
• USB to TTL

2) Software:-

• Arduino IDE
• B4A- Basics for android- Android app programming
• Visual Basic 6.0

V. COMPONENT DETAILS

1) Arduino UNO:-

• BLOCK: Microcontroller
• TYPE: ATMEGA328
• ANALOG/DIGITAL: Digital
• PINS FOR INTERFACE: 20 Pins

2) Motor Driver:-

• BLOCK: Output
• ANALOG/DIGITAL: Digital
• PINS FOR INTERFACE: 4Pins
• MODULE NO.: L293D
• RATING: VOLTAGE- 4.5-36 V

3) DC Motor:-

• BLOCK: Output
• ANALOG/DIGITAL: Digital

4) Temperature Sensor:-

• BLOCK: Input
• TYPE: LM35
• ANALOG/DIGITAL: Analog
• PINS FOR INTERFACE: 3Pins
• RANGE: 55C to 150C
• RATING:VOLTAGE- 4 to 30 volts

REFERENCES

[1] Ki-hwan Eom, Chang Won Lee, Nghia Truong Van, Kyung Kwon Jung, Joo Woong Kim and Woo Seung Choi. "Food poisoning prevention Monitoring system based on the smart RFID Tag System" In International Journal of multimedia and Ubiquitous Engineering Vol.8, No.5(2013), Pp.213-222.

[2] Kong Xiangsheng, "Design and Implementation of Food Monitoring System Based on Wsn," Xinxiang University, Xinxiang, China.

[3] Amar Bhegade "Mobile Based Anti-Phishing Authentication System Using Two levels Secure QR code" International Journal Of Engineering Science and Computing, May 2016.

[4] Zhibo Pang, Jun Chen, Zhi Zhang, Qiang Chen, Lirong Zheng "Global Fresh Food tracking service enabled by Wide Area Wireless Sensor Network"

5) USB to TTL:-

- BLOCK: Communication
- ANALOG/DIGITAL: Digital
- PINS FOR INTERFACE: 2pins
- MODULE NO.: USBMOD3
- RATING: VOLTAGE- 4.4- 5.25 V

VI. APPLICATIONS

- Quality control:- Quality is the overarching concern for both food producers and consumers. When processing and packaging are automated, defects can be noticed and isolated more easily. This helps to ensure faulty products do not enter the marketplace and underlying manufacturing faults are corrected. Since the temperature of the cold storage is monitored, the quality of food items is preserved.

- Improved safety:- Automation and machine vision can work together to provide a more granular view of every step in food processing. Leaders can adapt more quickly to changes in safety standards because a change in one process will not introduce unexpected consequences in other areas.

- End to End Traceability:- Traceability is a growing concern in many industries. When products are traceable, companies can capture better quality, safety, and profitability at once. By streamlining traceability, food producers can cut down on regulatory compliance costs and continuously improve key processes. The food items are traced in real time by the employee and the manager on their android application.

- Reduced Manpower:- The food items are stored in their allotted locations automatically. The food items are picked and dropped by the robotic arm, thereby reducing the need of human labor inside cold storage.

VII. CONCLUSION

The proposed systems in this project mainly focus on preserving the cold food item by applying various techniques and analysis which includes monitoring and safety. Giving a unique QR code to each food items helps in tracking the product and maintaining the all information about the product in datalog. Android application results in real time monitoring and fast responses.