IOT BASED SMART FOOD MONITORING SYSTEM

[1]Professor Rajesh Kumar Kaushal, [2]Harini. T, [3]Pavithra Lency.D, [4]Sandhya.T, [5]Soniya.P
[1]Dept of Electronics and Communication Engineering, Dr. T. Thimmaiah Institute of Technology, Visveswaraya Technological University, Belagavi, Karnataka, India
[2,3,4,5]Dept of Electronics and Communication Engineering, Dr. T. Thimmaiah Institute of Technology, Visveswaraya Technological University, Belagavi, Karnataka, India

Abstract

In the era of technology advancement, everything requires monitoring and controlling. This paper proposes an IoT framework for facilitating food monitoring for protection of the food, so that it would not get contaminated due to surrounding conditions during storage and transportation. In present scenario, the work done is in terms of the sensed value that have been recorded and a detailed analysis has been performed but automated controlled alternatives are not present. The proposed solution analyzes temperature, moisture, light as these parameters affect nutritional values of food items such as fruits and vegetables ,and makes the analysis results accessible to the user via a mobile application(sms).

A web server is used for storage of data values sensed in real time and also for analysis of results. User is alerted via messages along with locations of the shipment whenever an emergency occurs in this solutions, heterogeneous sensors for various domains are employed for sensing the condition of food.

Key words: Food monitoring, IoT, Sensor.

I. INTRODUCTION

Food is the main energy source for the living being; as such food quality and safety have been in the highest demand throughout the human history. Internet of things (IoT) is a technology vision to connect anything at any time and anywhere. Utilizing IoT in the food supply chain (FSC) enhances the quality of life by tracing and tracking the food condition and live sharing the obtained data with the consumers or the FSC supervisors. Currently, full application of IoT in the FSC is still in the developing stage and there is a
big gap for improvements. Food safety and hygiene is a major concern in order to prevent food wastage. The quality of food
needs to be monitored and it must be prevented from routing and decaying atmospheric factors like temperature, humidity and darkness Therefore, it is useful to deploy quality monitoring devices at food stores .These quality monitoring devices keep a watch on the environmental factors that cause or pace up decay of the food. Later, the environmental factors can be controlled like by refrigeration, vaccum storage etc.,

A food contamination can occur in the production process, but also a large part caused by the inefficient food handling because of inappropriate ambient conditions when the food is being transported and stored. 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. Today almost everybody is getting effected 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, moisture, oxygen content 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

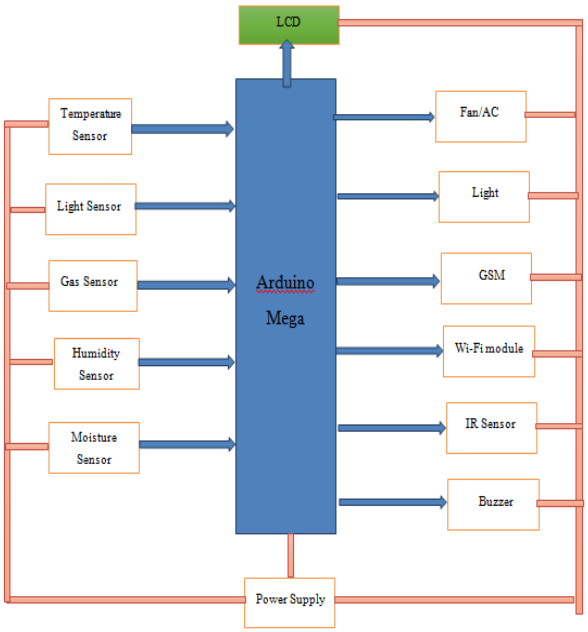
they forget that they are blindly risking their health by ignoring the environmental conditions to which these packets are subjected.

Every product making firm just want to attract more and more costumers towards them. Their main motive is to sell the product anyhow, like by adding more flavors, coloring chemicals and preservatives to increase the taste and appearance, but they forget that these money making tactics are actually affecting the consumer's health. 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. The performance and analysis of routine measurements, aimed at detecting changes in the nutritional or health status of the food doesn't guarantee. For the purposes of planning, policy analysis, program evaluation and trend forecasting. 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.

The job of a control and monitoring systems is to keep an eye on particular thing or activity and to make sure that it stays in the desired manner. Monitoring can be achieved using various electronic sensors. Further these recorded values can be used for the purpose of controlling. The data obtained from sensors can be compared to the desired values. If the sensor readings are found to be unequal to the desired values then the control circuit will come into action to manipulate the assigned activity to keep it in desired manner. We suggest use of this principle for building a system which can preserve raw foods. Smart food monitoring system is aimed to monitor and control food materials and prevent it from damages occurring due to atmospheric or climatic changes.

Also improper storing of food materials can lead to wastage of food. Smart food monitoring system focuses on safe storage of foods by monitoring and controlling various parameters affecting food materials. This system makes use of storage units implanted with various electronic sensors which can read those parameters affecting food materials. Design of Control circuits so as to tackle the problem of undesirable condition of food storage is the important part of this idea. A control mechanism can be decided to manipulate each of the parameters whenever required. This project proposes an IoT framework for facilitating food monitoring for protection of the food, so that it would not get contaminated due to surrounding conditions during storage and transportation. In present scenario, the work done is in terms of the sensed values that have been recorded and a detailed analysis has been performed

II.BLOCK DIAGRAM



III.WORKING PRINCIPLE

We have wireless sensor unit to monitor the critical environmental parameters like temperature, humidity, light, moisture etc. we have DHT-11 sensor which will senses the humidity and temperature at shopping mall and give it to the Arduino. Arduino will convert this analog vale into digital value compared threshold value. If the parameter above or below the threshold value then actuators will turn on and control the temperature. Alarm will be on to turn on. We have gas sensor which will send message to owner. We have IR sensor

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unit, which is used to monitor the stock. If the stock is less it will sense and send information to the vendor.(Automatic ordering system). We have GSM to communicate with vendor and owner. We have EPS-8266(wi-fi)module which is used to upload all measured data into the cloud. We use Thing speak cloud, which is freely available for students. Which will collect the sent data and plot the graph. We can take daily /weekly/monthly report for data analysis. We have LCD display, which displays the status of each sensor.

IV. HARDWARE REQUIREMENT:

Arduino mega
ESP-8266 wi-fi module
GSM800
16*2 LCD
DHT-11 Sensor
Ch4 Sensor
Light Sensor
Light
Fan
Buzzer
Humidity sensor

V. SOFTWARE REQUIREMENT:

Embedded C
Arduino Sketch
Thingspeak

VI.ADVANTAGES:

1.Save fruits and vegetables for longer time.
2.Maintain hygiene and clean environment.
3. Save data into cloud for future analysis.
4. Reduce the commercial loss.
5 Increase commercial profit.

VII. APPLICATION:

1.Can use this system in fruits and vegetable shops.
2.Can use this system in agriculture farm.
3.Can use this system in flower shops.

VIII. IMPLEMENTATION

IoT device should be installed in a food store. Once it is properly installed and powered on, it connects with the internet via Wi-Fi modem and start reading data from the interfaced sensors-DHT-11 temperature and humidity sensor and LDR sensor. DHT11 temperature and humidity sensor is a digital sensor with inbuilt capactive humidity sensor and thermistor it realys a real-time temperature and humidity reading every 2 seconds. The sensors operators on 3.5 to 5.5 V supply and can read temperature between 0 degree C and 50 degree C and relative humidity between 20% and 95%.

Sensor cannot be directly interfaced to a digital pin of the board as it operates on 1-wire protocol which must be implemented only on the firmware. The first data pin is configured to input and a start signal is sent to it. The start signal comprises of a LOW for 18 milliseconds followed by a HIGH for 20 to 40 microseconds followed by a LOW again for 80 microseconds and a HIGH for 80 microseconds. After sending the start signal, the pin is configured to digital output and 40-bit data comprising of the temperature and humidity reading is latched out. Of the 5-byte data, the first two bytes are integer and decimal part of reading for relative humidity respectively, third and fourth bytes are integer and decimal part of reading for temperature and last one is checksum byte.

The LDR sensor is connected in a potential divider circuit and inputs a voltage at the analog input pin of the controller. The voltage is read and digitized using in-built ADC channel. The Arduino collects data from all the sensors and convert the values to the strings. The sensor data wrapped as proper strings are passed to the character LCD for display. The ESP8266 Wi-Fi module connected to the Arduino uploads the data to Cloud Server. For displaying and monitoring data uploaded to the Colud server, The analog output is passed to the analog pin of the Arduino which has inbuilt ADC that coverts the analog to digital value. Today’s smart devices peripherals are becoming more integrated and play an important part of our computing experience and also offers the convenience of wireless connectivity, selection the sensor typically depends on blancing high performance against design complexity and board space, blancing ease of use against design complexity and cost, blancing high functionality against low-power consumption, cost savings and low space requirements.

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IX CONCLUSION

The integrated IoT-based online monitoring approach using smart logistics can address the critical needs of reducing food waste, increasing transportation efficiency, and tracking food contamination. The emerging MI-based communications technology appears well suited for local communications in this environment; however, there are several challenges to making the technology work reliably in the highly dense and dynamic environment of real-world logistics operations. Further advances are needed to derive actionable intelligence from the collected data in real-world conditions, such as the presence of faulty modules or patchy cellular communications. Real-world logistics operations also have other complexities that make flexible distribution challenging, such as delivery contracts, party-specific distribution policies, and specific data- privacy needs. We hope this article will spur further research and result in solutions to many of these issues

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