



# Smart Management of Food Storage and Waste Reduction

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**ABSTRACT:** In the era of technology advancement, everything requires monitoring and controlling. This project proposes an IoT background 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.

**KEYWORDS:** IOT, Food Monitoring, Transportation, Real Time Analysis.

Received 25 Apr, 2022; Revised 05 May, 2022; Accepted 07 May, 2022 © The author(s) 2022.

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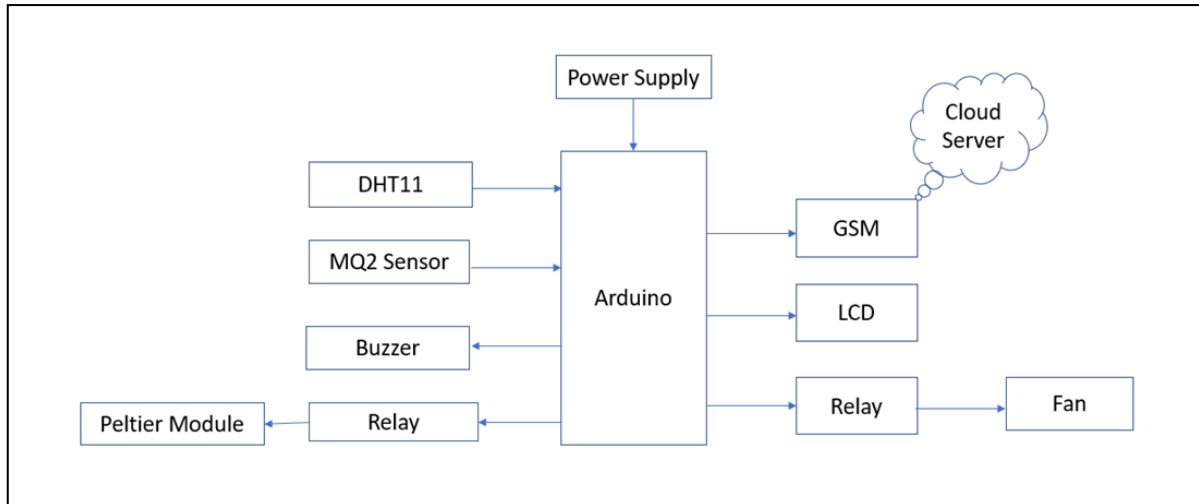
## I. INTRODUCTION

Human life is full of contradictions. While on one end, masses are still trapped by the evils of poverty and hunger. The world produces enough food to feed every one of us, yet almost one billion people live in hunger. Between one third and half of all food produced globally is wasted or lost along supply chains every year. That's enough to feed twice the number of hungry people in the world. Producing food that will be lost or wasted means wasting human labor, money, land, energy, and water. To put things in perspective, in order to produce food that is never consumed, a surface area larger than Canada and India combined is used, three times the water volume of Lake Geneva is squandered, and roughly 20% of total deforestation is caused. Stunningly, if food losses and waste were a country, it would be the third largest greenhouse gas emitter in the world, as well as a significant contributor to climate change.

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 anytime 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. 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, vacuum storage etc.,

## II. PROPOSED SYSTEM

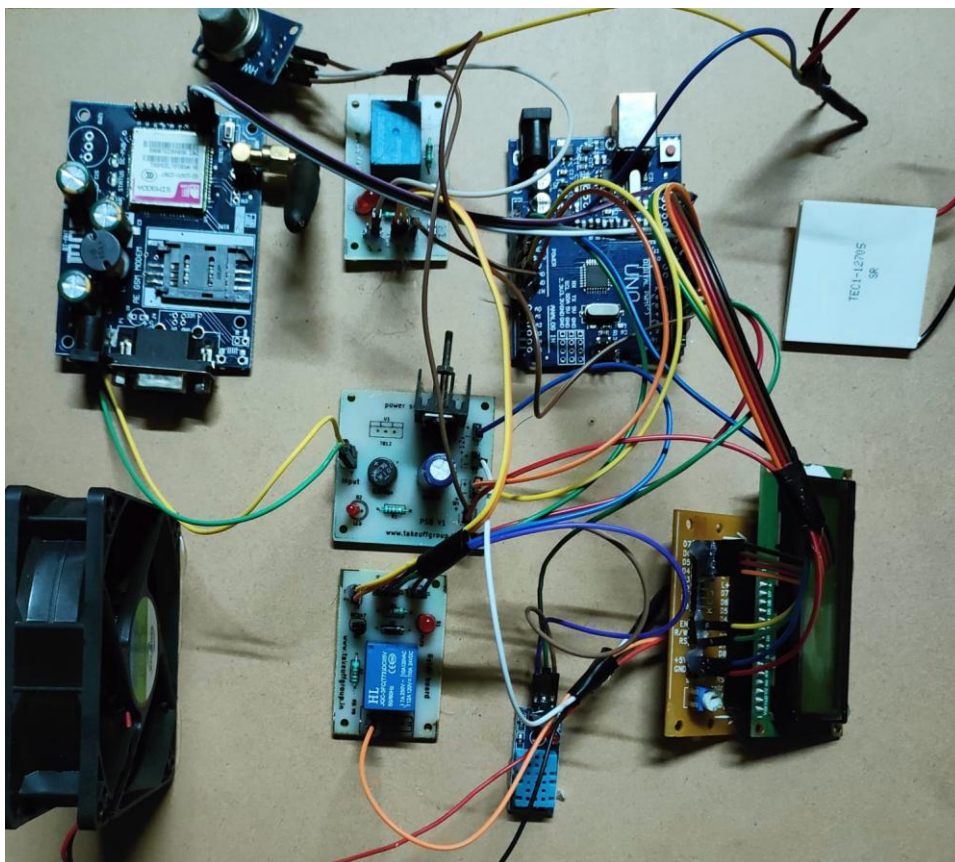
The proposed design aims to implement a smart food monitoring and waste reduction system, which is easy to use and economical for the user. It is capable of notifying the owner about their activities going on via wireless system on the mobile phone. The Internet of things-based systems where they will be able to see the condition of the food kept inside. The whole system is governed by the Arduino where sensors act as an input of microcontroller and GSM transmits all information to the wireless sensors by using IoT.



Block Diagram 1

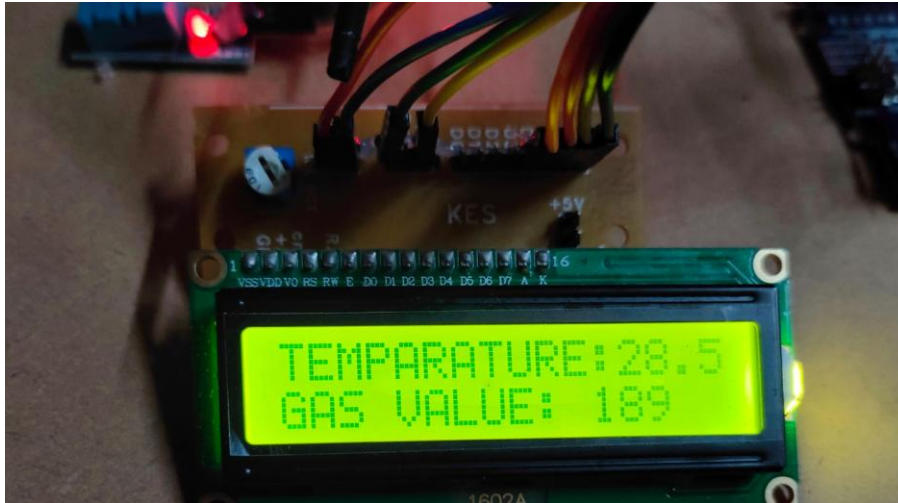
### III. RESULT

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 if it crosses the threshold alarm will be given and fan will ON and message will send message to owner.

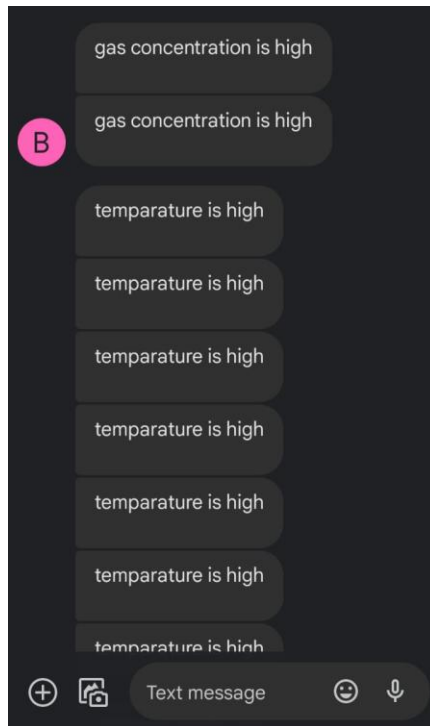


We have GSM/GPRS module which is used to upload all measured data into the cloud and send messages. We use Thing speak cloud, which is freely available for students. Which will collect the sent data and

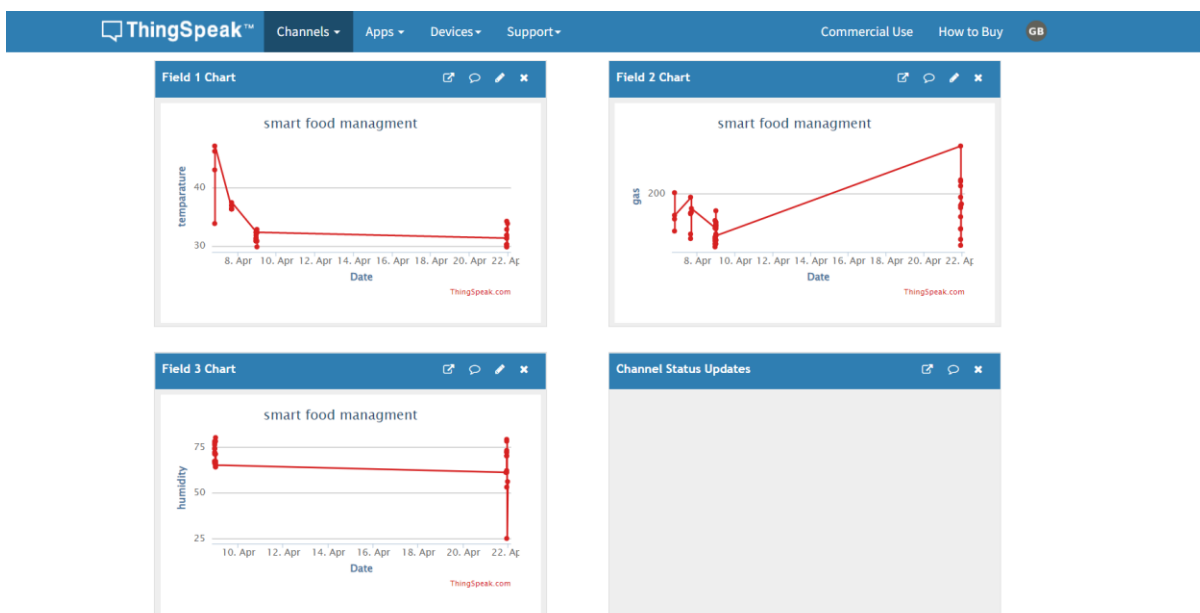
plot the graph. We can take daily /weekly/monthly report for data analysis. We have LCD display, which displays the status of each sensor.



**Result Image 2**



**Result Image 3**



Parameter Statistics

#### IV. CONCLUSION

Food wastage is one of the crucial crises in the world. One of the main reasons of food wastage is improper warehouse management and this is a solvable problem to an extent with the current technological advancement. Over referring to different researches and solutions to this problem, we have come to a realization that the field of IoT can provide a very efficient solution to this problem. Therefore, we have discussed a food quality monitoring system based on IoT that will control different environmental factors such as gas, humidity and temperature that are necessary to be maintained at a threshold value to prevent the food from spoilage. It also provides a user interface through a web server where they can monitor the sensor parameters and at the same time get alerts when the food is spoiled.

#### V. FUTURE SCOPE

The smart food storage is cost effective, economical & user friendly. Going further, most of the units can be embedded within the controller such as android application, with change in technology thereby improving the detection system. The factors identified may further be empirically tested and validated on the F&V supply chain of different states. A similar empirical study may further be carried out for the supply chain of various related sector like food processing unit, beverages industry, cold chain industry. In future we can use different sensors such as moisture sensor, chemical sensor which can be helpful to preserve the food. In future the information can be received through various means like email. The future smart IoT smart food storage can use the gas sensor to check the freshness of food item and also use the CCTV camera for visualization of all activities inside the warehouse and display it to the user in real time.

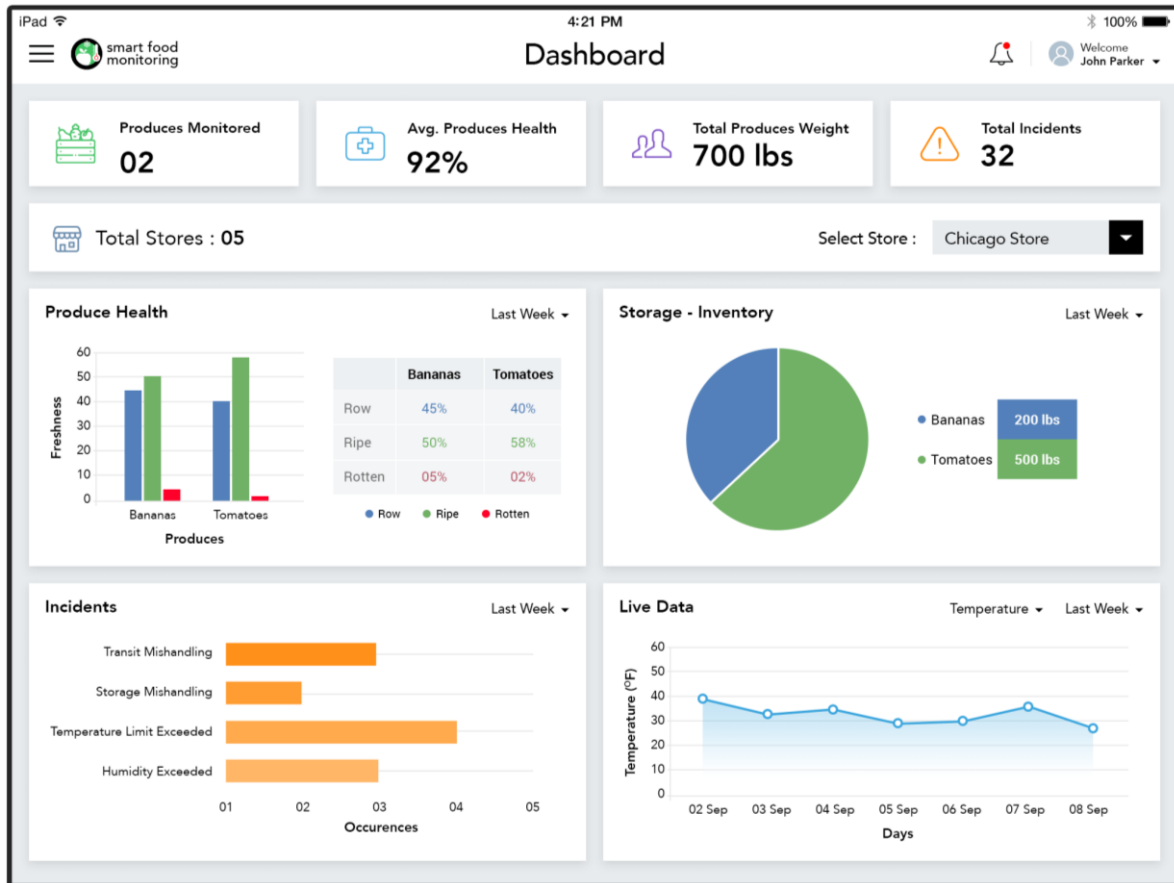


Image 1

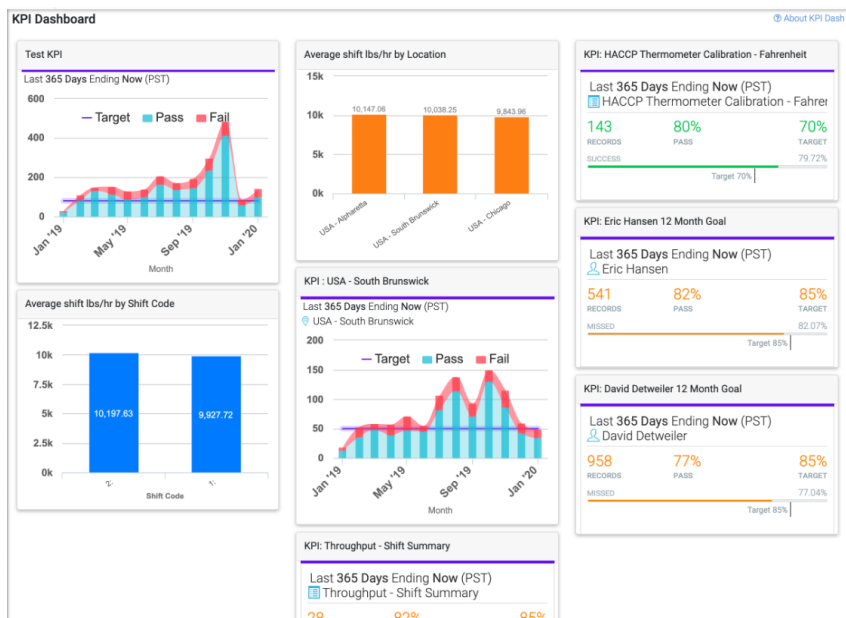


Image 2

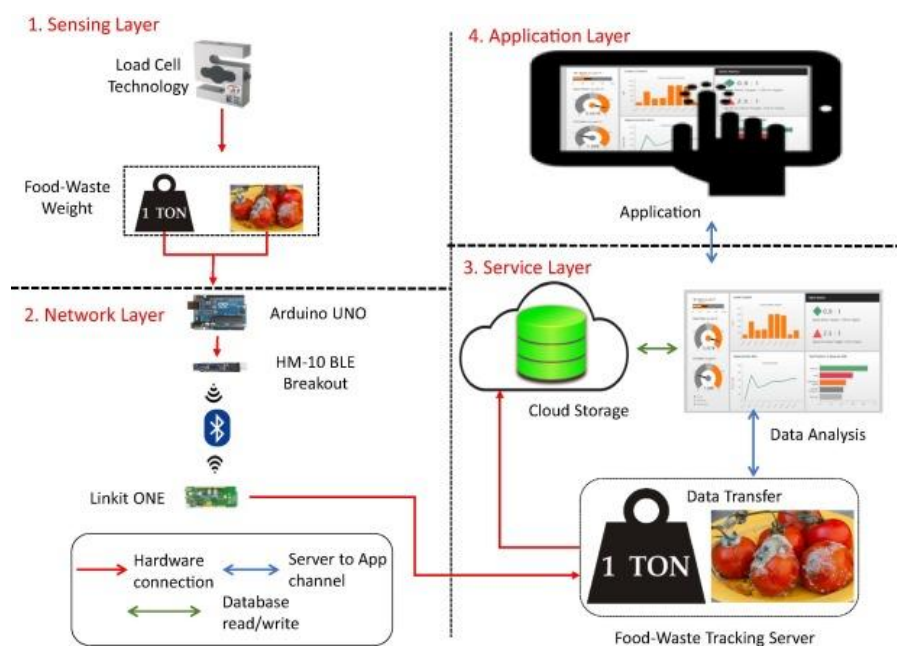


Image 3

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