

Food Quality Monitoring System

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Abstract: *Hygiene practices and food safety are among the key concerns in an effort to stop the wastage of food. However, for lack of technology and ignorance about the effects of humidity, temperature, being in the light and alcohol content on foods, food safety is not maintained well enough in Kenya. This has led to massive losses in many food stores resulting from food decay. Currently, majority of food stores and warehouses still rely on manual monitoring of the atmospheric elements related to food quality. These conventional food inspection technologies are limited to weight, volume, color and aspect inspection and consequently do not provide a lot of information needed on quality of food. It is necessary to keep an eye on the food's quality and guard against rotting and deteriorating due to environmental elements including humidity, temperature, and darkness.*

Keywords: Food waste reduction, Microbial Analysis, Food safety, Food monitoring

I. INTRODUCTION

Nowadays, nearly everyone is impacted by the food they eat. This goes beyond junk food; it also includes all packaged meals, veggies, and everyday items that are consumed and utilized because they are all of low quality due to fluctuations in temperature, moisture content, and oxygen content. The majority of people simply focus on the information on the package, such as the quantity of components used and their nutritional worth, and they forget that they are putting their health at danger by heedlessly disregarding the environmental conditions these packets are exposed to. Every company that produces goods wants to draw in as many customers as possible, and their primary goal is to make money by using artificial coloring and flavoring agents and adding more flavors to the product.

The main objectives of our experiment includes, read temperature additionally, the relative humidity in the food store. Feel the light's intensity in the food store, Detect the release of gasses similar to ethanol.

Collect data information from every sensor and pass to LCD stands for liquid crystal display. Visually track the sensor data online.

Food systems for monitoring quality are necessary for several reasons, each contributing to the broader goals of ensuring public health, reducing waste, enhancing food safety, and improving consumer trust. Here are the key motivations, Ensuring the safety of food goods for ingestion is a primary motivation. Contaminated or spoiled food could result in foodborne illnesses, this may pose a major health risk consequences. Monitoring systems can detect pathogens, toxins, and spoilage indicators to prevent such issues.

II. RELATED WORKS

These are a few notable studies on food quality monitoring systems, along with a brief explanation of each: 1. Internet of Things in Food Safety: Literature Review and Bibliometric Analysis by Gupta and Rakesh (2018) - This study reviews the application of IoT in monitoring food adulteration. The system proposed utilized by various stakeholders like farmers, consumers, and authorities to detect contaminants within the chain of distribution of food effectively. 2. Smart IoT-based food monitoring system with Machine Learning" by various authors (2021) - This paper discusses a smart monitoring system utilizing machine learning and the Internet of Things technologies, incorporating sensors for temperature, humidity, and gas concentration to ensure real-time food quality inspection. 3. An Artificial Intelligence method for Food Spoilage Analysis and Detection by Zhou F, Wang P (2020) - This research explores the application of AI to predict and detect food becoming bad. It involves assessment models and smart contracts to improve the accuracy and efficiency of systems for assessing food quality. 4. Using Machine Learning Techniques to Detect Food

Quality Approaches for Food Quality Detection by Megalingam et al. (2019) – The writers make use of convolutional neural networks and k-means clustering to detect food spoilage. This method improves the accuracy and speed of identifying deteriorating food products. 5. Survey on Food Quality Monitoring System" by various authors (2022) - This survey covers the evolution of food quality monitoring systems, highlighting the advantages and disadvantages of current technologies and emphasizing the function of IoT and sensor networks in enhancing food safety and reducing waste. These studies collectively illustrate the integration of cutting-edge technology such as machine learning and internet of learning, and AI in improving food quality monitoring systems.

III. PROPOSED SCHEME

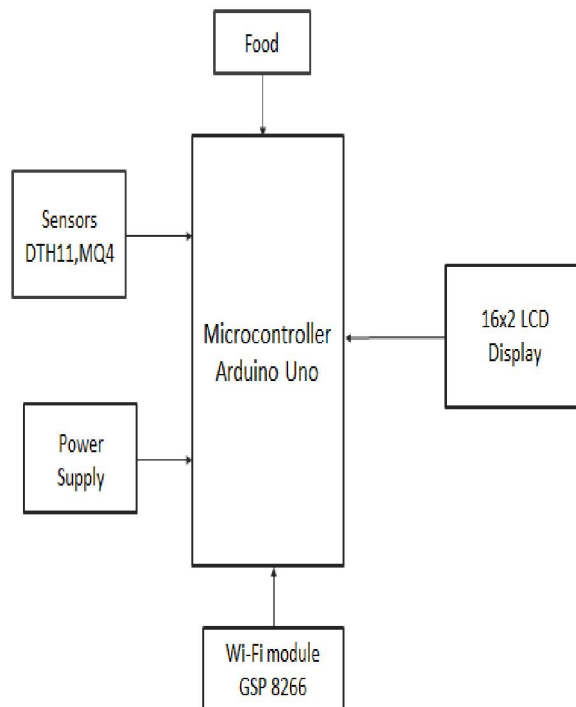


Figure 1: Block Diagram of Food Quality Monitoring System

A gas sensor is a tool that quantifies the concentration of gas in the room and transforms the concentration variable to its equivalent voltage. Temperature sensors measure air temperature, while humidity sensors measure relative humidity. Both sensors are often applied in combination to reduce cost. The light sensor is employed to detect light intensity. The display unit is accustomed to display the information from every sensors. In the monitoring system, the information collected by the sensors is transferred to the Internet. The relevant people can monitor the gas concentration levels of the dish store, temperature, relative humidity and the light intensity through an open source Internet platform. System Specifications The maximum gas concentration level in the study is 10,000 ppm (parts per million) and the minimum level 10 ppm. The proposed system should be able to detect concentration levels from minimum to maximum and upload the information to an Internet platform. The temperature range in this study is between 0°C to 50°C while the humidity ranges between 20% to 90%. The light sensor operates within a range of 0 to 1023 where 1023 is the maximum value equivalent to a +5 volts supply. The circuit should operate at 5 V DC.

IV. RESULTS AND ANALYSIS

A food quality surveillance system checks if food is safe and meets standards. It tests for contaminants like bacteria and chemicals. Sensors and technology track temperature and freshness. Data is collected in real-time and analyzed for quality control. Alerts are sent if food is unsafe or spoiling. This helps prevent foodborne illnesses. The system ensures

compliance with regulations. It can also track food from farm to table, ensuring transparency. Consumers get safer, fresher food. Overall, it improves food security as well as quality assurance.

A food quality control system guarantees food products are safe to eat and meet quality standards. It involves using sensors and technology to track various factors such as temperature, humidity, and contamination levels during food production, storage, and transportation

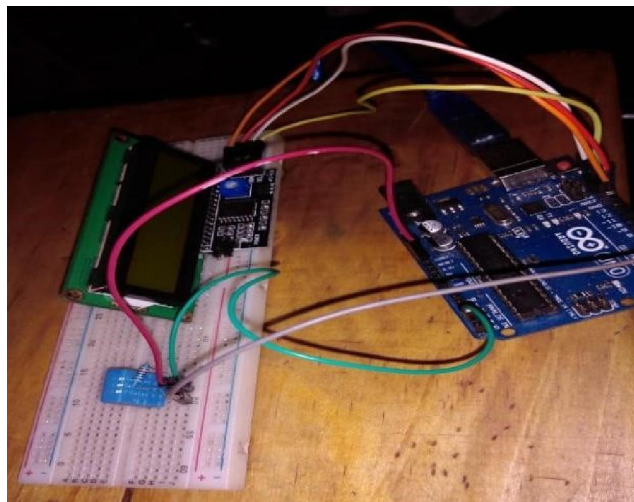
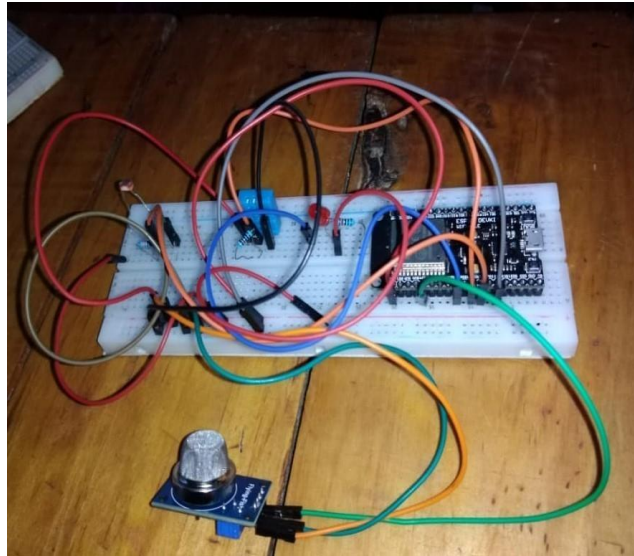


Figure 2: Result Snapshot

The system checks for harmful bacteria, chemicals, and additional pollutants that can result in illness. It continuously collects data in real-time, which is analyzed to guarantee the food remains within safe parameters. If any issues are detected, such as spoilage or contamination, alerts are sent to take immediate action. This preemptive strategy aids in preventing foodborne illnesses and ensures that food is suitable for consumers. The system also ensures that food producers comply with health rules and specifications. It provides a transparent way to trace food from its source to the consumer, ensuring accountability at each step. For consumers, this means they get fresher and safer food. For businesses, it means reducing waste, avoiding recalls, and maintaining a good reputation. Overall, a food quality monitoring system enhances The dependability, quality ,and safety of food items, benefiting both producers and consumers.

V. CONCLUSION

The food quality monitoring system enhances consumer safety by ensuring adherence to standards, detecting contaminants, and minimizing risks. It fosters openness in the food chain, instilling confidence in consumers while facilitating regulatory compliance for producers. Continuous advancements in technology and data analytics further contribute to the system's effectiveness in safeguarding food quality and minimizing the likelihood of foodborne illness.

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