

ABSTRACT

The COVID-19 pandemic has significantly impacted the global food system, causing a huge disruption and increasing food wastage and insecurity. In India, approximately 40% of the food produced goes to waste. Despite adequate food production, it is disheartening to note that around 190 million Indians continue to suffer from undernourishment, as reported by the United Nations (UN).

This project focused on utilizing Internet of Things (IoT) and AI & ML concepts to create a smart refrigerator system that enabled efficient monitoring of food inventory. By integrating a conventional refrigerator with sensors, microcontrollers, and a smartphone, the proposed system offered users the ability to wirelessly monitor their stocks in real-time. The IoT-based smart refrigerator leveraged sensor networks, including weight, temperature, humidity, proximity, RFID, and LDR sensors, in conjunction with the Arduino Mega microcontroller. This integration provided a cost-effective and efficient alternative for accurately tracking food items.

The implementation of the IoT-based Smart Refrigerator involved several modules, including the sensor module, communication module, and processing module. The sensor module had the task of identifying and collecting data related to temperature, humidity, and weight of food items. The processing module utilized machine learning algorithms to process and analyse the collected data. As a result, the refrigerator was able to understand food conditions, expiration dates, and optimize energy consumption. The communication module facilitated the transmission of this information to the user.

Furthermore, an AI-based shopping list predictor was created using a personalized dataset of food items and purchase patterns. These datasets were combined with collaborative filtering and association rule learning algorithms to provide the user with personalized recommendations and insights. By combining IoT and machine learning, this dissertation contributed to the advancement of smart home technologies aimed at reducing food wastage and provided practical solutions for food management and monitoring.

Keywords: IoT, Machine Learning, Arduino, Sensors