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IOT-AIDED CHARITY: AN EXCESS FOOD REDISTRIBUTION FRAMEWORK

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Abstract:

A trusted and dynamic network helped and bolstered by the Internet of Things (IOT) is a key factor in nourishment squander decrease and the executives. This framework proposes an IOT based setting mindful system which can catch constant powerful prerequisites of the two merchants and buyers and perform ongoing match-production dependent on caught information. We portray our proposed reference system and the idea of keen nourishment sharing contain- are as empowering innovation in our structure.

A model framework shows the practicality of a proposed approach utilizing a shrewd compartment with inserted sensors. The idea and an underlying model of a Smart Food Container was presented. Albeit current spotlight is on the overabundance nourishment these can be utilized to distinguish the best condition for non-abundance nourishment just as for different assets for gift. Weight, DHT11 will be added to the Smart Container in the following period of the usage. Eventually these permits ongoing, dynamic, savvy and setting mindful match production between the merchants/nourishment things and shoppers.

Introduction

This project proposed novel approach towards efficient food waste reduction via an IoT enabled dynamic and real-time match-making system which addresses the strengths and shortcomings identified in system. A Smart Food Container /Smart Container containing different sensors is designed to capture real-time context of food donations made available by the vendors to facilitate sharing with consumers. Although the concepts are proposed for the Food Wastage Management (FWM) domain, our approach can be adopted, customized or extended to manage other resources as well.

It summarizes the strengths and weaknesses of existing ICT based food wastage management systems describe the overall conceptual architecture of the proposed framework. We take a deep look into the concept of a Smart Container, a prototype and some results are presented as well. The proposed framework consists of four main components which are Virtual Marketplace, Data Management Engine, Recommendation Engine and Trust, Reputation and Fraud Detection and Prevention Engine.

This system proposed an IoT based novel, real-time and dynamic framework to efficiently distribute excess food which would otherwise end up in waste lands. This framework addresses the weaknesses identified in the existing systems as well as maintains the strengths they have. The concept and an initial prototype of a Smart Food Container was introduced. Although current focus is on the excess food these can be used to identify the best environment for non-excess food as well as for other resources for donation.

Weight, DHT11 will be added to the Smart Container in the next phase of the implementation. Ultimately this allows real-time, dynamic, intelligent and context-

aware match-making between the vendors/food items and consumers. In the future, drones (on land or flying) can also pick up such excess food from the Smart Food Containers and help deliver them to matched consumers.

Block Diagram

Block Diagram Overview

ESP32-WROOM-32 is a powerful, generic Wi-Fi+BT+BLE MCU module that targets a wide variety of applications, ranging from low-power sensor networks to the most demanding tasks, such as voice encoding, music streaming and MP3 decoding. At the core of this module is the ESP32-D0WDQ6 chip. The chip embedded is designed to bescalable and adaptive.

There are two CPU cores that can be individually controlled, and theCPU clock frequency is adjustable from 80 MHz to 240 MHz. The user may also power off the CPU and make use of the low-power co- processor to constantly monitor the peripherals for changes or crossing of thresholds. ESP32 integrates a rich set of peripherals, ranging from capacitive touch sensors, Hall sensors, SD card interface, Ethernet, high-speed SPI, UART, I2S and I2C.

Smart Food Container

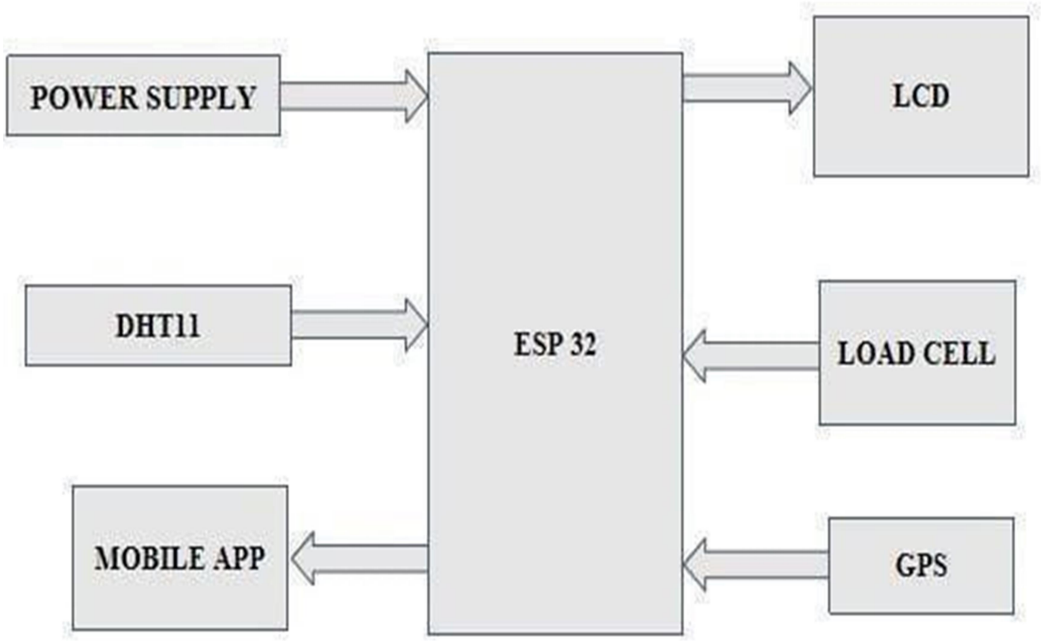

Fig 1: Block Diagram

It's been revealed that 1 in 6 Australians had to deal with food insecurity in the past 12 months.33% of those

who sought food relief were children. Overall, 8% of increase in people who sought food relief is recorded in 2015. Another report has revealed that 795 million of world's population are undernourished. Food insecurity has both physical and psychological impacts on a person's life which could be short term or long term.

Tiredness, loss of weight, loss of focus, exposure to illnesses are some of the physical impacts, and stress, loss of confidence, sadness and loss of hope are some of the psychological impacts on a person's life. In contrast, few other studies have released staggering statistics on food loss and waste both locally and globally .This clearly indicates that if food loss and waste can be managed efficiently, it will have a large impact in reducing the number of people who are undernourished.

Our critical analysis on popular existing non-ICT based systems, ICT based systems and different scenarios has exposed their short comings, strengths and approachestowards dealing in reducing food waste.It novel approach towards efficient food waste reduction via an IoT enabled dynamic and Realtime match-making system which addressesthe strengths and shortcomings identified in the above mentioned analysis.

A Smart Food Container/Smart Container containing different sensors is designed to capture real-time context of food donations made available by the vendors , to facilitate sharing with consumers. Although the concepts are proposed for the Food Wastage Management (FWM) domain, our approach can be adopted, customized or extended to manage other resources as well.

Related work

A summary of how ICT has been utilized by some of the popular existing systems ispresented in Table 4.1. This illustrates how different systems have utilized ICT to performmatch-making between food vendors and needy consumers, the use of social media andother mechanisms in promoting and building trust in the community, the geographical coverage by each system as well as their approach in deciding the consumers (who shouldreceive the donations).

Table 1: Different ICT usage of analyzed ICT based systems and tools

	Covered Geogra phical Area	**Trust measuring mechanism**	**Biased consume r decision**	**Social Media Usage**	**Match making of vendors and consumers based on**
1	AUS	No publicdata available	No publicdata	Raise awareness	Location

2	GBR	No Public data available	No	Raise awareness, updates via FB (future)	Shopping List Location(future)
3	AUS	No public data	No public data	Raise awareness	No public data
46	DEU, NLD, CHE, AUT (more possible)	Referring and contribution statistics	Yes	Raise awareness	Location
57	GBR, NLD (more possible)	Anonymous rating	Yes	Raise awareness	Location, food,non- food, wanted
68	USA (North)	Rating Friends	partially	Raise awareness , crowd shipping	Location
79	ITA	Rating removed	partially	Raise awareness	Location
810	Global	Rating, subscript- ion, reviews and Friends	Yes	Authentication and raise awareness	Location, Food category, price , friendship,ownership, availability ,subscriptions,
1012	USA (New England)	No public data available	partially	Raise awareness	Location, Transportation,quality, instruction- s

1113	GBR	No public data available	partially	Promotion and raise awareness	Location, food type
1214	USA (Chicag o & Champaign)	No public data available	No	Raise awareness	Location, product types, time and schedule
1315	USA	Rating , award program	No	Raise awareness	Location, supply , demand, capacity
1416	DNK, GBR, USA AUS, FRA DEU, NOR CHE	Free purchase when a storeis introduced	Yes	Raise awareness	Location
1517	USA	Volume based discounts Anonymous feedback	No	Raise awareness	Amount, food type, location, time, storage& freeze r capacity
911	AUS	Rating	Yes	Raise awareness	Location

Overall it can be stated that almost all the systems lack the use of IoT in capturingreal-time dynamic context data of the donations, and most of them are not context-aware in decision making which results in inefficiencies in food distribution and notifications to consumers about excess food, bias or inaccurate decisions about the distribution of donations.

Also, although there have been several attempts in building trust and reputationwithin the community they lack a trust and reputation building and measuringmechanism which could actively collaborate with a fraud detection and prevention mechanism.

Fraud detection and prevention system is an essential part of the system to preventmisuse of donations by several parties as identified via several studies [6-9]. With the knowledge gained via analyzing existing systems a new framework (and architecture) is designed to address the shortcomings of existing systems while building on the strengths they already have.

Result

Result for Phase1

Implementing an IoT (Internet of Things) aided framework for excess food redistribution in charity involves utilizing sensors to monitor food quantities, coordinating with local charities or food banks, and creating a system that efficiently matches surplus food with areas of need. The result could significantly reduce food waste while ensuring timely and effective redistribution to those in need, creating a more sustainable and impactful approach to charity.

Fig 2 Output Display (without food)

An IoT-aided excess food redistribution framework has the potential to make a significant positive impact by reducing food waste and addressing hunger, but its success depends on effective implementation, collaboration among stakeholders, andaddressing potential challenges.

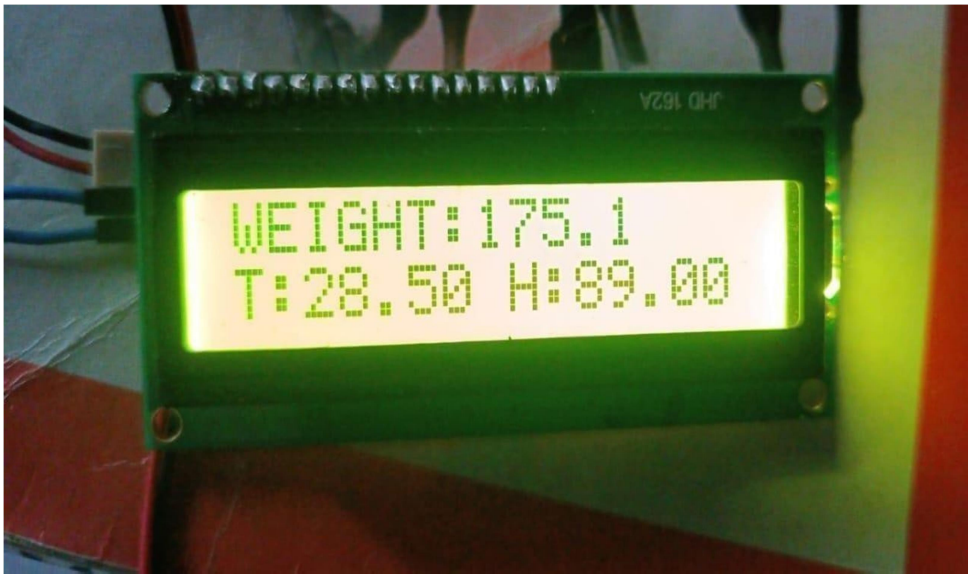

Fig 3 Output Display (with food)

The container is equipped with IoT sensors that can detect and identify the type of foodand its quantity. These sensors may use various technologies such as weight sensors, RFID (Radio-Frequency Identification), or image recognition to determine the contents accurately.

Result for Phase2

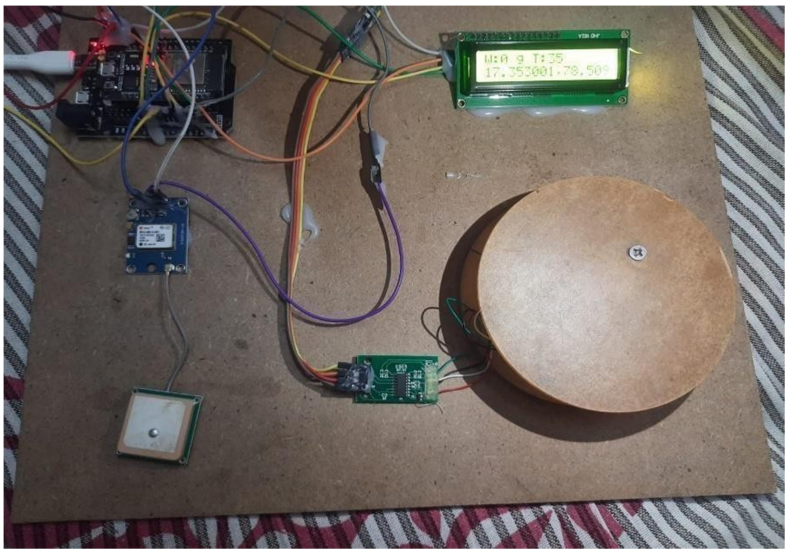

Fig 4 Container Without food

The container may enter a low-power mode to conserve energy, or it may display areminder to refill the container with food.

Fig 5 Container With Food

The container may maintain a stable temperature to preserve the food, or it maytrigger an alert to notify someone that food is available.

Fig 6 Output on Food Redistribution Application (without food)

The image shows a description of an excess food redistribution system using IoT (Internet of Things). It

provides information about temperature (35 degrees Celsius), weight (0 grams), latitude (17.353001), and longitude (78.509521). Additionally, it includes a link to Google Maps pinpointing the location.

Fig 7 Output on Food Redistribution Application (with food)

The image shows a description of an excess food redistribution system using IoT (Internet of Things). It provides information about temperature (35 degrees Celsius), weight (26 grams), latitude (17.353001), and longitude (78.509521). Additionally, itincludes a link to Google Maps pinpointing the location.

Conclusion and Future Scope

This project proposes an IoT based novel, real-time and dynamic framework to efficiently distribute excess food which would otherwise end up in waste lands. This framework addresses the weaknesses identified in the existing systems as well as maintains the strengths they have. The concept and an initial prototype of a Smart Food Container was introduced.

Although current focus is on the excess food these can be used to identify thebest environment for non-excess food as well as for other resources for donation. Weight, GPS, Air pressure, Light and RFID readers will be added to the Smart Container in the next phase of the implementation.

This will enable to gather more accurate context-data about the Smart Food Container's environment, including actions taken with the food and the condition of the food. Ultimately these allows real-time, dynamic, intelligent and context-aware match-making between the vendors/food items and consumers. In the future, drones
(on land or flying) can also pick up such excess food from the Smart Food Containers help deliver themto matched consumers.

Hence we are making a Smart system which allow to user to manage food and allow to avoid food wastage. Our proposed system is avoid the drawback to existing system and overcoming this drawback. Proper supply of food to needed people is beenmonitor.

The future scope of solar-based e-uniforms for soldiers who work in extreme high or low temperature is vast and exciting. The future scope of smart containers is
immense, with ongoing advancements in technology and the increasing need for efficiency and sustainability in logistics. Smart containers, equipped with sensors and IoT capabilities, can revolutionize the shipping industry by providing real-time data onlocation, temperature, humidity, and other environmental conditions.

This data can optimize supply chain management, improve security, and reduce losses due to spoilage or theft. Furthermore, smart containers can enhance sustainability efforts by enabling more efficient use of resources and reducing carbon footprint. As technology continues to evolve, smart containers have the potential to become even more sophisticated, offering enhanced tracking, security.

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