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Internet of Things (IoT) Based Smart Kitchen Pantry

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ABSTRACT

This paper provides associate insight into the event of associate IoT primarily based on the grocery levels at homes. This implementation can be used to observe food consumption patterns. Continuing our theme around the "Internet of Things," we present another possibility from this game-changing tech., we're going to use to an application that you'll never run out of bacon again! This application relies on sensing the weight of a kitchen storage container to trace food consumption. A compatible and reasonable wireless sensor network is implemented. By this Smart Pantry and now we can monitor the amount of every ingredient of my pantry with my smart phone when we are in a grocery shop or anywhere out of my kitchen. This data can provide valuable insights around consumption patterns and facilitate the user to predict and refill their inventory simply.

Keywords: *Force sensors, Controller and Mobile Application.*

1. Introduction

The concept of the Smart Pantry would allow the average consumer to both keep track of inventory and use automation to retrieve items in a pantry. Today, there are some smart refrigerators on the market that can keep track of inventory via pictures that can be sent to a smartphone. Some smart pantries have motor-driven shelves to more easily access food. But no system can both track inventory and automate item retrieval. The project maps the small but expanding academic territory of consumer food waste by systematically reviewing empirical studies on food waste practices as well as distilling factors that foster and impede the generation of food waste on the household level and provides a better solution to avoid food waste by proper and adequate usage of ingredients. Mapping the determinants of waste generation deepens the understanding of household practices and helps the design of automatic kitchen pantry.

We are developing a project on smart pantry using Sensing the weight of a kitchen storage container. Your pantry will reflect your cooking style. Organize your pantry according to varieties of foods so you can notice things. Grains: Rice, pasta, bread, beans, oatmeal, etc. Root vegetables: onions and potatoes, yams, and they likewise can go in your pantry and we can find out the actual storage and remaining item quantity for a specific period and notify To produce the desired strain for determining the container's weight, the weight sensor needs to be mounted between two flat surfaces with the help of the two rib holes on each side of it. Once mounted, the flat surface can act as a scale for measuring the weight of a storage container on our mobile application and Track food consumption where ever I needed. We are Generating a list of items of remaining item quantity and also generate notification alerts replenishment and expiry.

2. Literature Review

Pranit P. Kathale [1] has proposed to build an Automated Pantry Order System using ZIGBEE. A more advantageous system with its advantages and disadvantages, over current food ordering system in IR which is a manual system. Aristoteles Hadjakos [2] had proposed a smart pantry with innovation in comparison to related work is our Information Acquisition System that allows monitoring and controlling kitchen appliances remotely. This paper presents our sensing infrastructure and novel interactions in the kitchen that are enabled by the Information Acquisition System.

Michael Wayne [3] has discussed “A smart pantry system” can build a data store of the food items and maintain the data store in light of corroborated point of consumption (POC) data. The data store may also include information about those food items, such as names of food items, brands of food items, number of units of food items, expiration dates, dates that food items were purchased. Sarita Acharya [4] had discussed that we often end up forgetting one thing or the other. And individuals living alone have a hard time memorizing to re-fill their fruit/veggie basket the idea of Smart Pantry was derived; individuals will get notifications to re-fill fruit/veggie basket through an app. Using Arduino IDE, Force Sensing Resistors (FSR) sensors use load cells to weigh the products.

Y.Guan [5] this paper proposed a Smart Kitchen, which can sense replenish behaviors through sensors, then analyze those data to track as well as predict the grocery demand. The Smart Kitchen can assist the consumers on the grocery shopping by providing the shopping list or even place the order online automatically, which will greatly facilitate the grocery shopping. Additionally, the historicalconsumption data can also be analyzed using statistical methods.

3. Proposed Work

Our system will take data input for smart home or supermarket ingredients storage. Weight of grocery and other ingredients in kgs application will help to get timely alerts for replenishments and system will suggest recipe for remaining items. The design of dissimilar parameter is planned for kitchen safety. The system can monitor the status of kitchen and send the particulars about all limits on network automatically. Users can monitor and control transducers on active network pages enhanced with embedded C. This system finds extensive applications in part where physical existence is not possible all the time. The system suggestions a complete low cost, prevailing and user-friendly way of real time nursing and remove control of kitchen.

4. Block Diagram

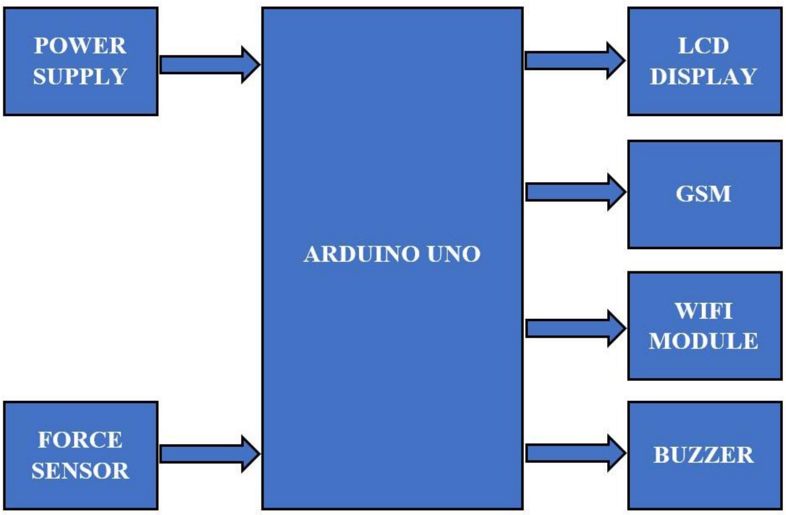

Fig.1 Block diagram

5. Arduino Uno

The Adriano Uno is a microcontroller board based on the ATmega328 as shown in Fig (iii). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.

Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

6. Wi-fi Module

The ESP2866Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP2866 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP2866 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Adriano device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP2866 module is an extremely cost effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.

Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP2866 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

7. Force Sensor

The main usage of the Force sensor is to measure the amount of force applied. There are various types and sizes of force sensors available for different types of applications. Some of the applications of Force sensor that uses force-sensing resistors include pressure-sensing buttons, in musical instruments, as car-occupancy sensors, in artificial limbs, in foot-probation systems, augmented reality. Force-sensing resistors based Force sensors are also known as FSR. FSR sensors are used in transportation systems for measuring the amount of stress applied to the goods while transporting them one place to another. The functioning of the FSR can be changed by changing the properties of the Force-sensing resistors. Force -sensing resistors requires a small interface and can work in moderately hostile environments.

Here the small conducting and non-conducting particles are formulated to reduce the temperature dependence of the sensor, increase the sensor surface durability and improve its mechanical properties.

8. Buzzer

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on bread board, Per Board and even on PCBs which makes this a widely used component in most electronic applications.

There are two types are buzzers that are commonly available. The one shown here is a simple buzzer which when powered will make a Continuous Beeeeeeppp sound, the other type is called a readymade buzzer which will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But, the one shown here is most widely used because it can be customized with help of other circuits to fit easily in our application.

This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.

9. Future Scope

A future exertion for this application would be routinely place an order with suppliers when record falls below a grave level.

The model that was made used barcode acknowledgement to govern what items were in the pantry. Although this was practical and worked at recognizing barcodes, and by delay items, this would not be reasonable for marketable product. Because barcodes come in a variation of different positioning, some of which might not be noticeable or lighted suitably by a camera, image founded acknowledgement, yet these facilities are not established enough yet to identify variety and size of the foods. Image acknowledgement or some other substitute would be unconditionally critical in generating a usable product.

Due to the statistic that the smart pantry is not yet full scale and only houses one product, it was not conceivable to build in functionality to acclaim recipes to users based off what is in their pantry. This would be a great feature to advance in a commercial product as it would take the stress off the users to choose what to make based on the components available in the kitchen. This would include aspects of machine knowledge and artificial intelligence similar to the already prevailing. Chef Watson developed by IBM, which takes in a list of components and productions possible recipes [7].

10. Conclusion

In this method, proposed a model which helps us to keep a track of kitchens pantry. Sensors can sense the weight of kitchen storage containers and calculate the quantities of available components in pantry. The smart pantry model only structures one weight sensor that can measure a single item and report its figure back to the database. In order to make a everyday pantry, there would have to be a network of weight sensors on the floor that would all feedback their info into the software that would distinguish what weight sensors are carry which products weight. This would allow users to place their products anywhere in the smart pantry without unease for what weight sensors the produce was resting on. We can easily find out the components which is lesser and we can obtain it from market. And the recipes on accessible ingredients also show to the users.

Declarations

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Competing Interests Statement

The authors declare no competing financial, professional and personal interests.

Consent for publication

We declare that we consented for the publication of this research work.

Code availability

The programming code that we have used for this research is available and authors are willing to share when it is required.

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