FOOD STORAGE MONITORING AND SERVING PEOPLE USING IOT

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Abstract.Due to the growing population in India, food has become a major scarcity. This paper is proposed to fill the hunger of few by using the concept of IOT (Internet of things). We use a box which stores the leftover food in it and an ultra sonic sensor is used to sense the distance by transmitting and receiving high frequency waves and based on the program in arduino, GSM and GPS modules will send the message with current location of the box. It is sent on daily basis using ATcommands because, the stored food is already left over one so it may get spoiled. The message is sent to NGO's as they play a mediator role in this service. If any external disturbances occur, then a weight sensor can be used for an optional purpose.

1. Introduction

At present, in view of the noticeable points of interest of little warm inactivity, accommodation in Food wastage is the uneaten food or excess food which is left over. The food which is wasted in functions, restaurants etc. To reduce that wastage of food we are trying to make a setup which consists of a box or a rack provided which consists of very cool temperature and it must be placed in every street. The left-out food or the wasted food should be kept in that box so that it can be served for people who require food.

Practically, this was chosen from the small concept of people in the restaurants, who helped the poor people starving from hunger. This was done by storing the leftover or wasted food in the nearby small box type refrigerator. The hungry people would reach there and pick the food up and reduce their hunger. But there are many places where restaurants or hotels are not available. So, it would be difficult to such kind of people to eat food. Therefore, we planned to distribute the wasted leftover food from everyhouse using many social service organizations.

Internet of Things has become very popular to build any type of system. As, Internet and smart phones are easily available to everyone. Almost in every administrative, the internet is an important requirement. In this paper, we are going to introduce an idea which will be used to serve people with food. The components used in this paper are easily available, simple to use and fare in cost.

2. Experimental Methods

This paper is technically related to smart garbage collection and smart bin using Arduino Uno with GPS/GSM modules. Smart garbage collection basically, deals with the collection trash which is placed in the bin. The garbage is collected using arduino based platform by interfacing a GSM and GPS modules. An ultra-sonic sensors s placed on the top of the bin which will measure the distance using ultra sonic sound waves and the value which is measured is compared with a pre-defined value. If that value is reached then the bin is filled. Once, the bin is filled, then a message with location is sent to the truck driver about the status of bin. This is done by the GPS and GSM modules. The truck driver will empty the bin and then it again reaches to its starting value. By using this concept our paper was selected.

In this paper, we made a prototype on storing food and serving it to the people through NGO involvement. Block diagram is shown in Figure-1 consisting of Hardware parts which in turn has only electrical components and the black lines indicate the connection. A power supply of 12V and 2A is given to the GSM and GPS modules which are both in integrated to make the paper concised.

BLOCK DIAGRAM

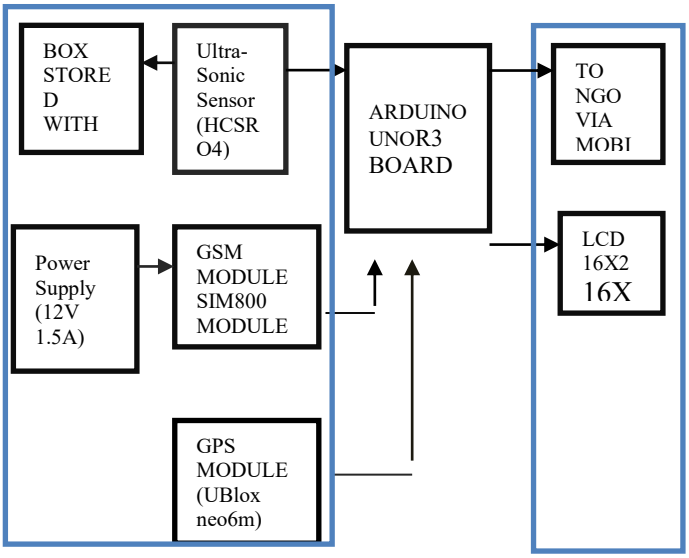

Fig. 1. Block diagram showing the hardware components used

A. ULTRA SONIC SENSOR

An Ultrasonic transmitter transmits an ultrasonic sound wave, this wave travels in the air and when it hits an object then the wave it gets reflected toward the receiver of sensor. This reflected wave is given as input to the arduino UNO.which converts it into digital data and the output is obtained in the form of distance. We are using an ultrasonic sensor with specification HC SRO4. It has stable performance and high accuracy ranging from 2cm to 450cm with a resolution of 0.3 cm.

Figure 2: Ultrasonic sensor (HC-SRO4)

B. SIM8000A GSM MODULE:

A GSM module is a chip or circuit that will be used to establish communication between a mobile device or network. GPS is a satellite-based system that uses satellite and ground stations to measure and compute the position on the earth.

This module is used to send the exact location of the destination to be reached. SIM800A module which consists of both GSM and GPS features. It is shown in figure 3 as it sends the required message to the user with the location too. It only works under 2G ,3G and 4G slots.

It has GSM/GPRS Module Quad-Band. With RS232 Interface solution in an LGA (Land grid array) type which can be embedded in the customer applications.
ATcommands are required for MODULE,for communicating with the Arduino, Serial communication is the medium. The MODULE gives back the result after it receiving a command. There are various ATcommands supported by the MODOULEthat can be sent by the processor, controller and computer to interact with the GSM and GPRS cellular network.

Figure 3: GSM module (SIM 800A)

C. U-BLOX NEO-6M GPS MODULE

This GPS antenna has a ceramic receiver which is controlled viz serial communication with arduino and raspberry pi. A transmitting signal is sent to satellite and if the signal is received back then the data will be in the form of latitude and longitude values. It blinks if there is a transmission and reception of signals

This module is connected via 4 pins ground, VCC, tx, rx. The tx, rx are connected to digital pins of arduino. There is a receiver in a ceramic form. It is very sensitive to receive signals. It is compatible with various flight control modules that provide GPS computer test software.

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Figure 4: U-BLOX NEO-6M GPS Module

- It has a GPS external antenna of 18x18mm.
- EEPROM to store configuration settings.
- Power supply: 3V to 5V
- Configurable baud rate is from 4800 to 115200bps.

D. ARDUINO UNO

Arduino is an embedded based electronic device based on both hardware and software. These boards can read inputs like light on a sensor, a finger on a button, ormessage andconvert it into an output activating, by turning on an LED, publishing something online, a motor. It is a microcontroller cantered on the ATmega 328 P. Thiscontains 14 pins of digital input or output, 6pins of analog inputs, A 16 MHZ quartz or Xtal, one connector of USB, a power jack, one header of ICSPin circuit serial program) as well as a button to read.

Figure 5: Arduino UNO

E. ARDUINO SOFTWARE

Arduino is an Integrated Development Environment (IDE) of cross-platform. It is working jointly with an Arduino controller so that writing, compiling, and uploading code into the board is possible. The software provides back up for a wider range of boards of Arduino. It includes Arduino Uno, Esplora, Mega, Ethernet, Pro or even Pro Mini Fio and LilyPad Arduino. The languages used for programming the Arduino are C and C++. The aspects like automatic indentation, syntax highlighting, As well brace matching enables that as an alternative which is modern for the other IDEs.

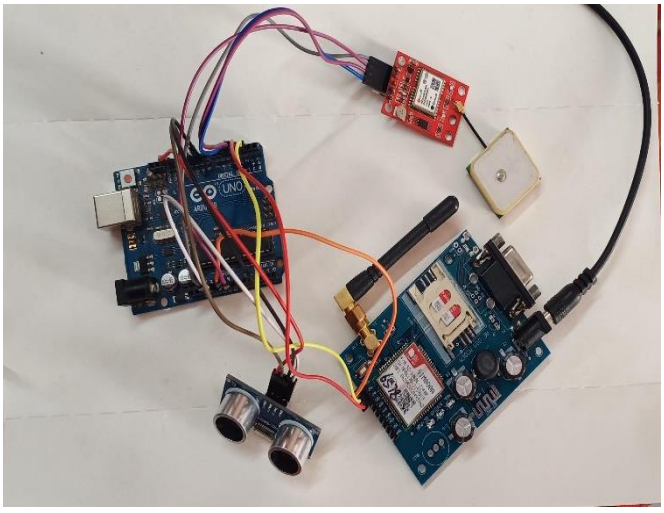

Figure 6: Circuit diagram

The ultra-sonic sensor is kept on the box by connecting its pins echo to arduino pin 2 , trigger to arduino pin3 , gnd to gnd and vcc to 5v arduino pin. SIM800A is connected to arduino in two different ways. Firstly, the (RX) receiver and (TX)transmitter pins of DIM800A . is connected to TX and RX pin of arduino. Another way is to connect the SIM800A pins

directly top Arduino digital pins (2,3) which should be mentioned in the program. This way is more efficient than the first one because if there are any external disturbances then the RX and TX pins won't receive the required value. GPS module that is U-BLOX neo 6m TX an RX pins are connected to arduino digital pins (4,5). All the devices will work using a an arduino IDE program. The output device is a mobile to which no connections are given but they are connected using IOT. Hence, the message sent using arduino software is received by the mobile. An external LCD (16x2) can also be kept as an optional output device for more appropriate output.
In the proposed system, the Ultra-sonic sensor (HC-SRO4) placed at the top of the box or a rack, detects the food level by triggering a high pulse or sending the data from the TRIG pin of the sensor. When the pin TRIG becomes HIGH followed by LOW (for a time duration that is not less than 10µs) the clock internally available starts ticking. Audio of 40 kHz for 8 cycles is being sent out from its transmitter. Then it will start counting the time taken for the signal to strike and revert to get echo received at the ECHO pin. Thus, the elapsed time is recorded and the distance of the object is calculated as distance = (speed of sound in air x elapsed time)/2, where the speed of sound in air is 29cm/ µs or 340m/s.

The Atmega 328 microcontroller present in the Arduino board is used to control the sensor along with GSM and GPS module (SIM 800A).SIM 800A module which has a receiver antenna computes its position, based on the information it receivedfrom the GPS satellites. The GPS module present in the SIM800A sends the real-time tracking position data in the form of latitude and longitude values to Arduino microcontroller. There are only two levels in this paper that is, either the box is empty or filled (partially or full). We didn't choose for more levels because the food which is placed is already leftover or wasted food. So, choosing only two levels was the final option. Using GSM module present in the SIM800A, it sends the notification to the predefined mobile number. It sends the message as well as the exact location with both latitude and longitude details to the NGO.

NGO's play an important role in our paper because they have huge information based on poverty in India. So, it might help us to find the people suffering from hunger. This setup must be placed in every street as even in the houses there will be the food leftover which can fulfil the hunger of at least one person. It should also near hotels, function halls and many more.

The flowchart shown below in figure 7 states the process of the paper. Whenever, the food is kept in the box then ultra-sonic sensor will sense the food present in the box. If it contains the food then it alerts NGO's by updating message as "FOOD IS AVAILABLE" and sending location using GSM and GPS modules. This process will continue until the food is collected. If the box is empty then, after a particular time it will update the status directly to NGO people that "FOOD IS UNAVAILABLE". This process will be continuous.

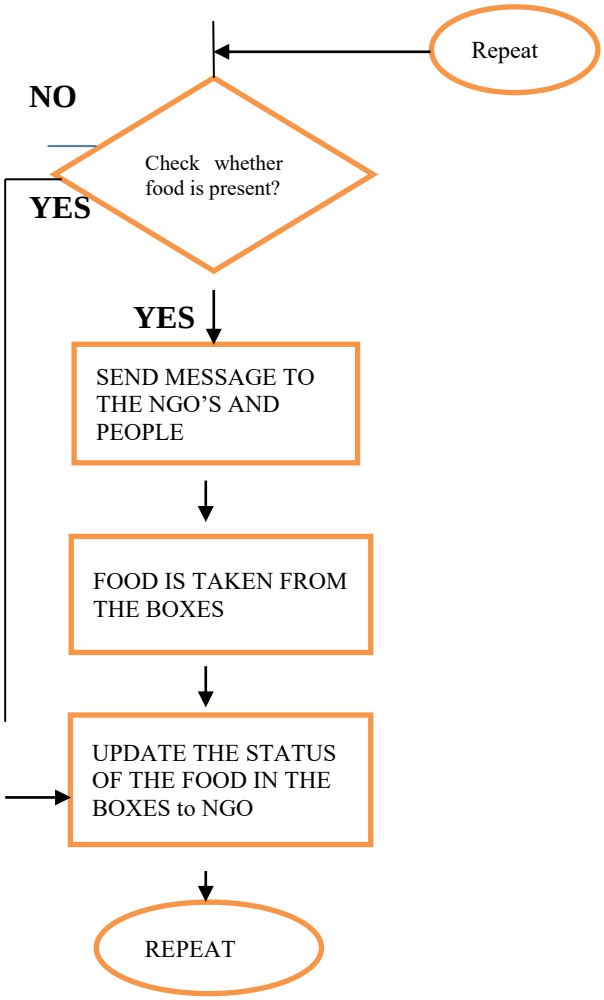

Figure 7: Flow chart

3. Experimental Results and Discussions

Figure 6 which is shown above represents the complete circuit of the paper. This device is using n embedded based application that is attached with boxes to show the real time application. This circuit is made from any components which consists of ATMEGA328 controller. Ultra sonic sensor, UBLOX neo-6m GPS module, SIM800Amodule, LCD that interface with microcontroller, Power supply of 12V and 1.5/2 mA and a bread board if needed.

The system works on two cases:

Case1: When FOOD IS AVAILABLE then the ultra sonic sensor measures the distance and provide the information to arduino and using GSM and GPS modules message with the current location will be sent to NGO people which is shown below in the figure 8(a).

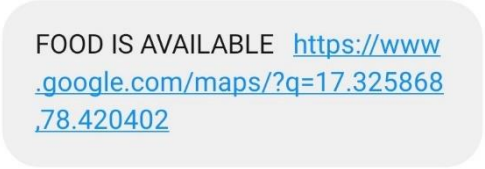

Figure 8(a) : When box is filled or partially filled

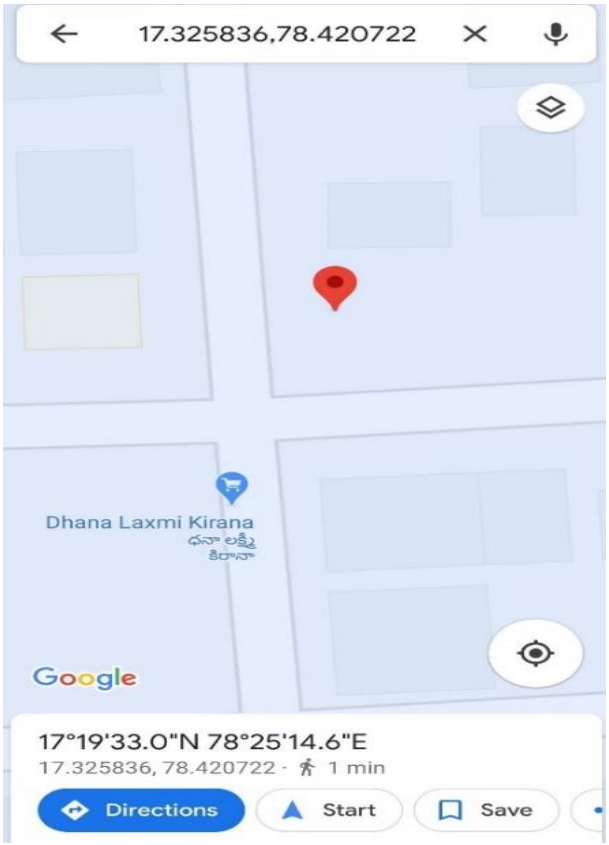

Figure 8(b): location of the box

The above shown figure is the exact location of the food present in the box. It is sent using a GPS module which directly connects to satellite and sends a location containing latitude and longitude values. This should be collected by the NGO people.

Case2: When there is no FOOD in the Box or even if the food is collected it sends a message containing "**FOOD IS NOT AVAILABLE"** as shown below.

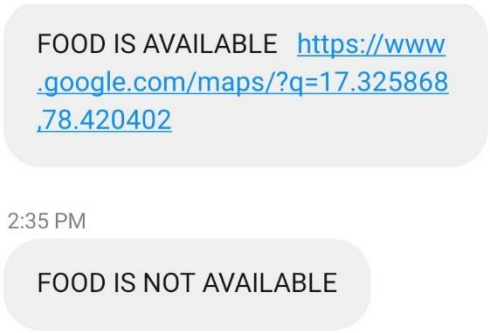

Figure 8(c) : When box is empty

The location which is shown using GPS module in Arduino serial monitor is shown.
The GPS module located in the box is to provide therequired latitude and longitude values to NGO's on daily basis tocollect the food which is placed in the box. The values are shown in Fig. 8*(c)*.

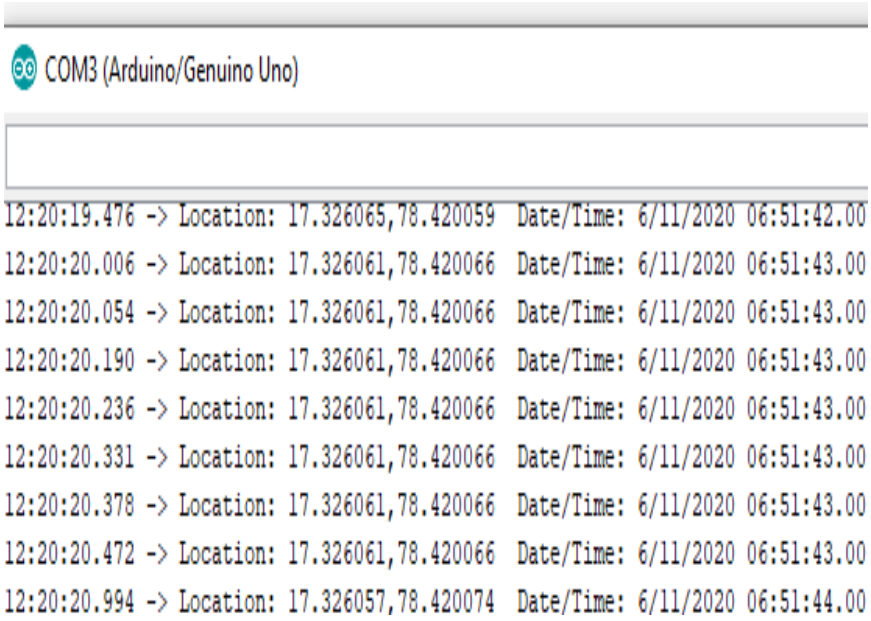

Figure 8(d): Picture showing latitude and longitude.

4. Conclusion

We developed a well-organized food monitoring system which tracks whether the food is present or not in the box. This data can be further used to plan food collection trips more efficiently, ultimately reducing the spoiled food and help to have better food serving and is used to fill hunger of many needs**.**

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