

# A GROCERY LEVEL INDICATOR FOR HOUSEHOLD APPLICATION DEVICE USING IOT

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**Abstract:-** In fast moving world, novel technology enables machine to perform hard work rather than humans. In these times there is a rise in the proportion of career women, duly they have no time to measure the level of grocery and to catalogue the groceries for shopping. To overcome this crisis a desirable research using IOT technology based grocery level indicator for household application is initiated . The incorporation of Arduino nano board , node MCU , , ultrasonic non contact sensors which are hooked up with the android application. This paper investigated on advanced grocery level indicating system using IOT technology. This system is undoubtedly essential for the career women and the oldsters. The motto of this research paper is to diminish the time spent for making grocery catalogue and to bring to mind all necessary groceries during shopping that could also be implemented in upcoming smart kitchen. This could be made possible through IOT, this technology facilitates interconnection of networks to bring to the world this digitalized device. This research paper will be useful for upcoming researchers on building up IOT based level indication system.

**Keywords:** *IOT, Grocery Level Indicator, SMS Allotting System, Arduino nano, in built technology.*

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## I INTRODUCTION

This research paper is mainly initiated for the concern of aged people and career women , as there is aging occurs the memory power gradually starts decreases, so people begin to forget things while getting older [1], likewise people forget some necessary groceries while making grocery catalogue and they skip to purchase while shopping [2]. As yet people couldn't find any solution to indicate the grocery measures. Due to this issue you may face lots of consequences like further more travel quarrels and misspend of time [3]. To subdue this crisis I have done a research on IOT technology based grocery level indicator [4]. Exclusiveness of this research focuses on particular system invented to indicate the grocery level. Previous studies of research analyse the grocery shopping behaviour of people in the shopping malls[ 5, 13]. Henceforth for user-friendly and adoptable measures this research takes place mainly using IOT technology, this technology enables the home appliances to communicate information through internet where it creates a network of

networks[5-8].Arduino- nano (microcontroller) ,it works like a control room consist of input and output pins to deal with the parameters ,here we will be programming our prototype into it , the whole system is linked to this board [9]. Arduino nano is the central part of this system [10]. The ultrasonic sensors that has been taken directly contacted with the groceries is to sense the material level, it consist of transmitter and receiver by which the level is calculated through analysing the distance of the signal transmitted [11]. The node MCU is mainly used to enable the IOT technology ,which is a open source firmware , here the prototype to communicate with mobile application is given and this system is the part of SMS allotting system. Ultrasonic sensors [12-13] is used to collect data , then with the help of SMS allotting system the data is retrieved and intimates the level of grocery to the people through mobile application. The focus of this research paper is to bring to mind all essential groceries during shopping.

## II. LITERATURE SURVEY

Hardidesai et. Studied that the “IOT based grocery monitoring system”. The methodologies used are IOT, raspberry pi, wireless sensor network and automation. This system is developed especially for monitoring the supermarkets [1].

Sunmiyoo et al. experimented the “Food purchasing patterns for home-a grocery store intercept survey “By this survey ,they have found that the frequency of grocery shopping varied substantially across families [2].

K. Lovaraju et al. observed on “IOT based dustbin monitoring system using Node MCU. In this research node MCU, ultrasonic sensors and flame sensor for implemented. To intimate the level of wastages in dustbin to the corporation office. Water level monitoring system IOT and ATmega328p microcontroller [3-4].They have used water level indicating sensors, Arduino ATmega328p and IOT for implementing this system .It is mainly implemented for the applications like government reservoirs and tanks.

Neng wang have studied Future internet-the Internet Of Things IOT ,M2M and ubiquitous computing . Here they have concentrated on improving standardization, security and privacy in IOT technology. This system is made possible through IOT, RFID for waste management and waste segregations. They have developed an application for

intimating the level the wastes. This system is initialized to ease the process of waste collection.

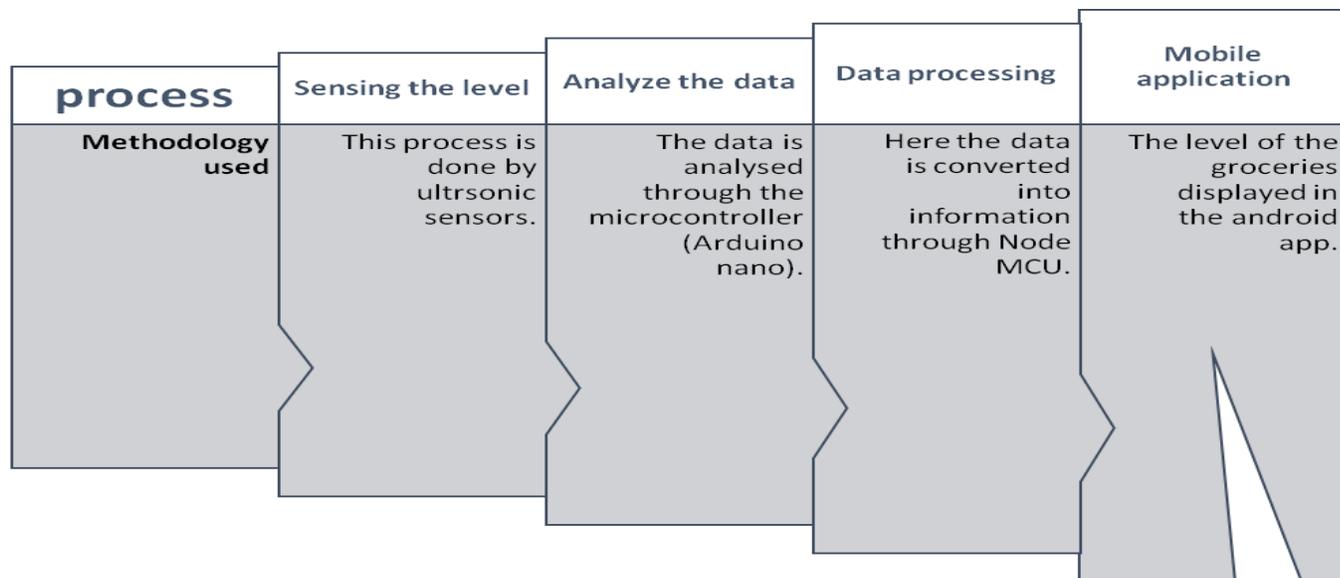
## III. EXPERIMENTAL METHOD

### 3.1. Proposed system

In this incorporation, first have ultrasonic sensors with water level indicator which is fixed at the bottom of the lid [4], by that it can sense the distance of the grocery items filled. This indicators are directly connected to the Arduino nano, with the help of this Arduino nano we could retrieve the parameters from the sensors and can calculate the distance the signal travelled to identify the level of grocery through the prototype programmed in the Arduino nano . Then in this research have chosen Node MCU since we are handling in the IOT technology, the data is transferred from Arduino nano to Node MCU . Node MCU converts data into information and transfers to the mobile application. This mobile application consists of the groceries name and their level.

**This system consists of four methodologies:**

- 1) Sensing the level of groceries
- 2) Analyze the data
- 3) Data processing
- 4) Mobile application



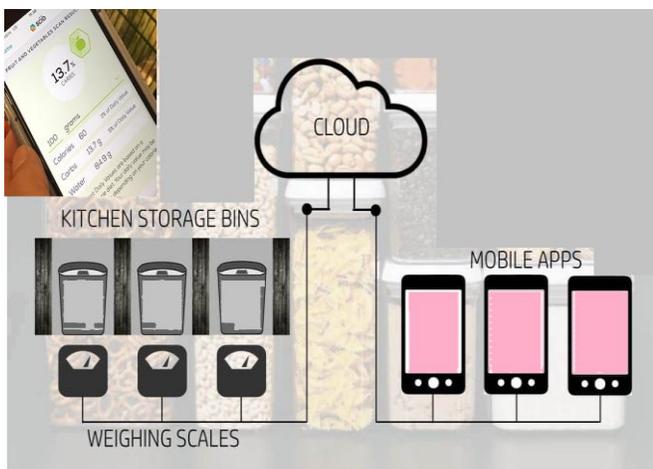
**Fig.1 Schematic Flow Chart of IoT Grocery Indicator Methodology**

### 3.2 Sensing the level of groceries

The process of sensing the level of groceries is taken care by the ultrasonic sensors . This sensors are in direct contact with the groceries. This system is fixed at the bottom of the lid of the grocery box.

Here we are using HC-SR04 ultrasonic sensor. This ultrasonic sensor can measure the distance up to 2cm to 4m and this sensor will emit 40,000 Hz , which is handled by transmitter and the receiver present in the sensor . The signal emitted by the transmitter reaches the material (grocery), when it touches the object the signal will bounce back to the receiver.

Here by the time and speed it takes to transmit and receive the signal is taken as the input parameters, which is used to calculate the distance of the material. This input parameters are send to the microcontroller [10].



**Fig.2 Grocery Level Indicator**

### 3.3 Analyze the data

To analyze the data we are using Arduino nano, this is also said as microcontroller which is the central part of the whole system . It is like a small computer where the program of the system is inserted as prototype [12]. It is (bread board) friendly board based on ATmega328 also known as Arduino nano 3x. This Arduino nano we are going to use consist of analog input pins, digital pins, ATmega328, mini USB jack, output voltage and some LEDs.

The prototype for this system, where it should get the time and the speed as its input parameters. Then with that collection on the basis of data received, the prototype programmed should calculate the distance of grocery

items[6]. The user could analyze the level of the grocery in the grocery box.

Formula:

$$D = S \times T$$

D = Distance of the grocery filled in the container.

S = Speed of the signal to transmit and receive.

T = Time taken by the signal to transmit and receive.

This is going to be programmized through the Arduino software which is IDE( Integrated development environment ) and this a common software used for running both on time and offline . It could be used online or installed through the Arduino web editor , then we could upload our prototype and programmize our Arduino nano board by the Mini USB jack.

The sensors are connected to Arduino microcontroller where sensed information are passed for action to be performed. Now we are going to create a interface between Arduino nano and ultra sonic sensor HC-SR04 . To create this interface we are going to connect four terminals between sensor and Arduino board , the first terminal to link this is Arduino 5V and VCC pin of sensor . Then Arduino GND is connected with GND pin of sensor, next the Arduino D8 is linked with trig pin of sensor , at the end we link Arduino D9 and Echo pin of sensor. By this way the raw data is send from the sensors to the microcontroller , then the data is being analyzed through the Arduino nano.

### 3.4 Data processing

In the processing of data node MCU plays a major role in it , node MCU is an open source firmware which is especially targeted for IOT based android applications. The code which is programmed in Arduino is executed and then we retrieve the data from Arduino to node MCU, where node MCU is connected to internet using portable hotspot in mobile [7].



**Fig.3 Grocery Level Indicator setup- Testing**

In the node MCU we will program the prototype to process and share the information to mobile application. Here we use the same software we have used in Arduino nano that is IDE [12-14]. This prototype will contain the code to get the data from Arduino then convert it as user understandable format and to share the information to the mobile application through internet of things as shown in fig.2.

To implement the data exchange between Arduino nano and node MCU we use JSON format, that is java script object notation because it is used for light weight data interchange for structuring data and this node MCU runs on ESP8266 Wi-Fi Soc by the hardware based on ESP-12 module.

Looking at the hardware interface between Arduino nano and node MCU we have only two links, That is pin 5 from Arduino is connected with pin D5 of node MCU, then pin 6 of Arduino is linked with pin D6 of node MCU. At the end the node MCU is connected to the mobile application through the mobile hotspot to transfer the information to the user. Here using IOT technology we can make a network of several grocery boxes in the kitchen which is inbuilt with level indicating system.

### 3.5 Measuring Principle

The principle of measuring ultrasonic distance is used here for measuring the time from launch to reflection. Once the obstacle is encountered, and then the distance between the transmitter and obstacle is calculated. The calculation done according to the time and also the speed, and also according to time difference distance measurement principle. This measured distance output is sent to Arduino uno board

### 3.6 Mobile application

As shown in Fig.1 & Fig.2, This is the last process of this system which is in direct contact with the users, the all live information is now shown to the user through mobile application. There are lots of free app developing software like MIT and google app engine, previously they have used MIT app in dustbin monitoring system [3]. Here google app engine is preferred. This application displays the information regarding level of groceries of the grocery boxes which are all fixed with the level indicating system. We are going to use google app engine. This is the platform where we can run the our apps and store our data in cloud and the main advantage

in this platform is, this is for absolute free of cost, to develop this app we can use popular languages such as java, python and PHP. In this paper I will prefer java with an eclipse plug in because of my own interest in java programming language. Here only the google have to worry about database administration and managing the server. The only thing we have to work in to it is to create the coding and developing in the google app engine. The data storage is done through cloud technology by that way we no need to worry about the storage system. This is the process of developing the mobile application for grocery level indicator. This application displays us the level of groceries at live.

### IV CONCLUSION

The main purpose of writing this research paper is for two major reasons:

1. To bring to mind all necessary grocery items to make a grocery catalogue during shopping.
2. To implement an additional system (Grocery level indicator) in the smart kitchen to make it further advanced.

This research resulted in an effective outcome based on IoT connected with cloud and alerts grocery level is indicated through SMS patterns to the user, This proposed system is easy and user-friendly to the user and this system enhances the nutrition habits and increase the health fitness by delivering the indication to the user. Henceforth this research proposed system in this research is totally unique using IoT and achieved effective outcome by receiving a message to the user on time once every 50g reduced alert and nearing to box get empty it gives an continuous alert and call indication system to the user. This system will intimate the grocery level of kitchen to your mobile application. It is very useful for the career women, aged people and who deserve smart kitchen.

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