Hassle Free Shopping Experience for Customers

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Abstract - *The project "Hasslefree Smart Shopping Experience for Customer" presents IoT based applications for day-to-day problems like parking and billing processes. As we all enjoy our weekend by shopping in malls or watching a movie at the cinema theatre but finding parking slots is quite difficult on weekends or holidays. Also, after shopping is done, when it comes to billing we see a long queue for billing which is most stressful and time-consuming for customers. To make this hassle-free this project will help us. With the help of this project, we can avoid queues for parking as well as billing. The proposed system is a combination of IoT as well as smart systems. For hardware processing, Arduino is used and for the client-side HTML/CSS is used. Communication between hardware and software is done by REST API's.*

Key Words: IoT, Smart Shopping Experience, Arduino, REST API.

1.INTRODUCTION

As we all know, nowadays IoT is changing the view of industry. With making things automated we can achieve higher efficiency and with less time and saving a considerable amount. With this in mind, we can add IoT systems to parking systems, shopping complexes that will not only save customers time but also will increase the revenue of the shopper as the shopping experience will be hassle free for them. Giving customers the ability to book the parking slot from his mobile phone will save time and they will not be scared to get a parking slot. Also, places like D-Mart, Big Bazaar we can see a long queue for billing which is annoying for many people, so by making shopping cart smart enough that it can automatically make a bill of items available in that cart and giving ability to customer to pay directly from his phone will be a big change ion shopping experience.

2. LITERATURE REVIEW

In 2018, work was published by P.S. Sarika and T.Sudha about IoT Bases Market. They suggested a supermarket which is based on smart carts, it will improve the shopping experience.In the system they had RFID tags attached to every product. The details of products which are similar to selected products will be displayed on the display. The customer will be able to choose the product which is reliable and appropriate from the displayed list. The price for selected items will be added to the total amount to be paid.This way customers' billing time would get reduced.

Customers can also check the website of the supermarket before visiting and know the complete details for the available products. If particular product is unavailable in the market ,then the customer will notified that the product is unavailable and this makes shopping experience better for customers.[1]

In 2018, work was published by Manickam Ramasamy , Elango Natarajan et al. The paper is based on the Smart Parking System for Large Parking Lots using IoT. They have used an IoT platform known as thingSpeak used to store for availability of parking space and through BLYNK mobile app the driver can access the application. The user has to login to the server and send a message requesting for parking space available nearest to him. If any nearest parking space is available, the user will be guided to the parking area and will be allowed to park the car.Current parking space information will be updated in the cloud.A car park mapping method is used to calculate the nearest parking area.[2]

In 2021, a work was published by Zhanghua Cai et al.The paper is about Iot based Smart parking system using Millimeter wave Dual lens Antenna.They proposed millimeter wave dual lens radar antenna for parking system using IoT(Internet of Things). They have used a flat dielectric punch lens to increase the gain of the transmitting antenna so that compensation of penetration loss will be done in millimeter waves. The dielectric rod lens is also used for correction of beam direction and maintaining a wide beamwidth to overcome the loss of energy due to scattering of car chassis. The accuracy and stability of millimeter wave radar can be improved by operating it at 24GHz.The measured gain for transmitting antenna is 15.8 dBi and for the receiving antenna it is 7.9 dBi and the beam width is 65° approximately. The antenna proposed has stable measurement effect and is suitable for smart parking system is proved by the system measurement results.[7]

In 2019, a paper was published by Augustina Ampuni et al. The paper focused on automatic cashier machines for smart parking systems by utilizing IoT technology.Cloud computing is used along with the internet of things.They have divided the system into two automatic machines as smart car receiver machine and automatic cashier

system.They have done study on smart parking categorized systems.Smart parking system will help people to find perfect parking spot and allocation decision process.They have used smart devices such as sensors, RFID and cameras for more exact implementation of smart parking system using IoT technology.[3]

3. PROPOSED SYSTEM

The proposed system consists of hardware as well as software. The proposed system will help to achieve automation in booking parking slots and billing systems.

Hardware used in the proposed system are Arduino Microcontroller, IR Sensor, RFID Card, RFID Card Reader, Wifi Module. Communication between software and hardware will be done by restful API's[4].

3.1 AUTOMATION IN BILLING SYSTEM

Every shopping cart will contain an RFID reader so that it can scan the item. Every Smart Cart will be connected to a main terminal via wifi network. RFID can scan the product beyond line of sight. It will automatically identify items, it will get the cost of that item, and it will automatically add that product name and price in the bill[8]. Every product in the store will have a paper based RFID card so that the cart recognizes the product when it is put in the cart and sends the info to the main terminal, in the database unique id of RFID tack will be saved with specific item so that we can get unique item just like barcode. Customers will only pick up the item they want and they will drop it into the cart and all further processes are automated[11]. When a customer starts shopping, he will have to scan a QR code through a specified app which will connect the cart to his account. It implements quick payment to provide a more comfortable shopping mode[12]. When the cart is connected to the customer's account he will be able to view his cart's content and also pay for them. By this way customers can pay from their mobile and they don't need to wait in the billing queue[10]. This system can make both customers and shopkeepers experience smart[14].

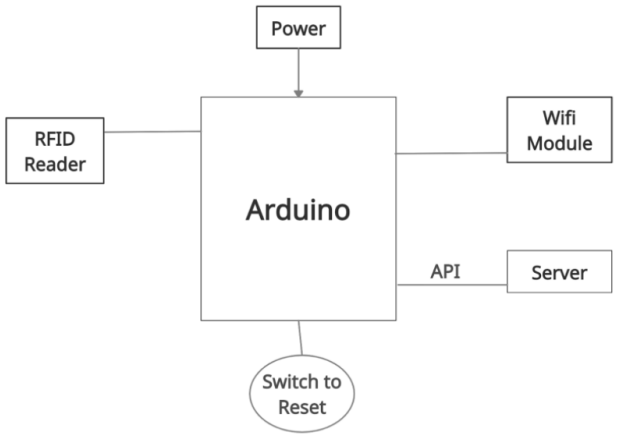

Fig-1 Block Diagram of Smart Cart

3.2 AUTOMATION IN PARKING SYSTEM

IoT systems can also be embedded in parking systems to make things hassle free[13]. In the Smart Parking system every lane in the parking area will have an arduino and every parking space will have an IR sensor which will be connected to the arduino of the lane it is present in. IR sensors can detect if the vehicle is there or not. The Arduino will be connected to the main terminal using a wifi network. The Arduino will update the main terminal with status of every parking space in it's lane.[9] When the customer has to book a parking spot, he can go to a specific app and enter the time span for which the parking is required, the app will show him whether space is available or not for that time span. If available then the customer can pay and book parking for the particular time span. If the time limit is reached then he will be charged extra. Further, tracking the route to the exact spot can be added as a feature to navigate the driver to the exact parking spot[2]. With the proposed system, drivers can easily track for an empty spot in the parking lot to park their vehicle[15].

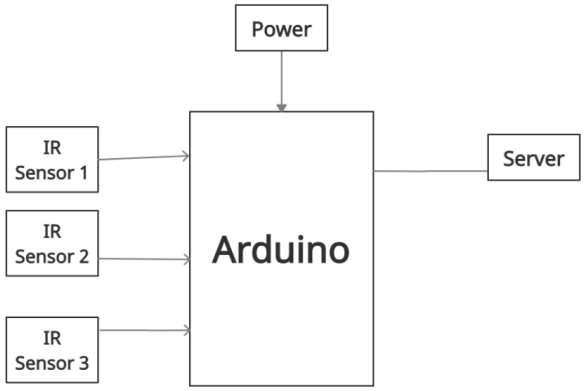

Fig-2 Block Diagram of Smart Parking System

4. DESCRIPTION OF HARDWARE USED

4.1 Arduino

Arduino is an open-source platform[5]. It is used to build any application which needs to be monitored by a controller. We can use arduino in IoT based applications. It can communicate between the sensors, it can also connect to the internet and we can control it from anywhere in the world. To start with, an arduino developer needs to have knowledge of embedded C. By connecting the Arduino to the wifi module will make the Arduino online.

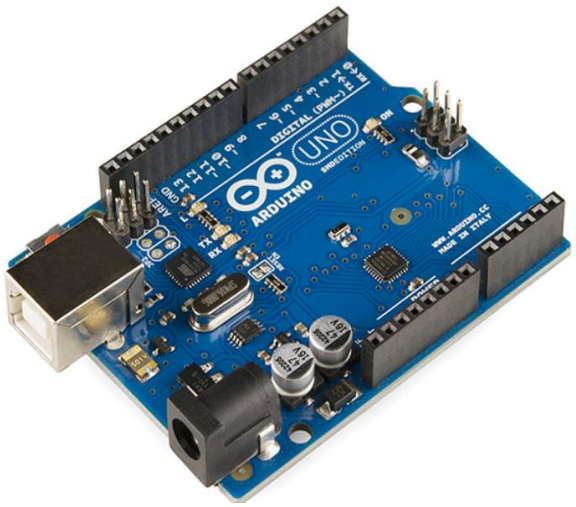

Fig-3 Arduino UNO Board

4.2 IR Sensor

An infrared sensor can detect any avoidance in front of it with help of emission of infrared light and receiving back. Active infrared sensors both emit and detect infrared radiation. IR sensor has 2 parts as light emitting diode and receiving diode, which helps IR sensor to detect if there is an obstacle present or not. With the help of LED, IR rays are sent and after hitting an obstacle rays come back and with help of the receiver obstacle is detected. In this system, IR sensors are being used in the parking slots. Whenever a car is parked in a parking slot, IR sensor will detect that as an obstacle and a signal will be sent to the arduino which will update the parking slot status as "Parked".

Fig-4 IR Sensor

4.3 Wifi Module for Arduno

The ESP8266 is a WIFi Module which is an integrated circuit having a TCP/IP protocol stack. It gives the ability to the arduino to communicate with the internet.

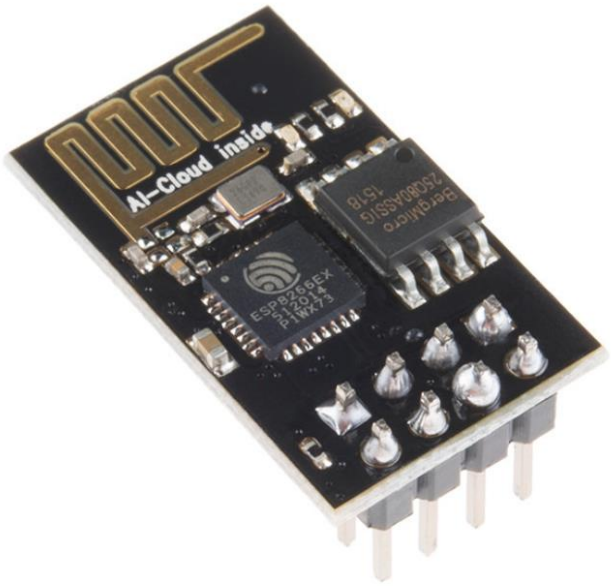

Fig-5 Wifi Module

4.4 RFID Reader

RFID is Radio Frequency Identification. In RFID data is encoded in the tags. It is similar to barcode but it can work without line of sight. Which means the item we want to scan must not have to be in line of sight. RFID has so many advantages as it is fast, works beyond line of sight. Compared to barcodes, RFID can scan 1000 items in just 2 hours[6].

Fig-6 RFID Reader

5. ALGORITHM

5.1 Smart Parking System

While user logged in:

If book_slot:

Show all location;

If user selects spot:

Call API to book slot at required time

Else if pay or parking:

Check if user parked car till now;

If spot is empty:

*Fare = (out time - in time) * charges;*

Display fare and go to payment gateway

Generate gate pass

Else:

Show: take out car first.

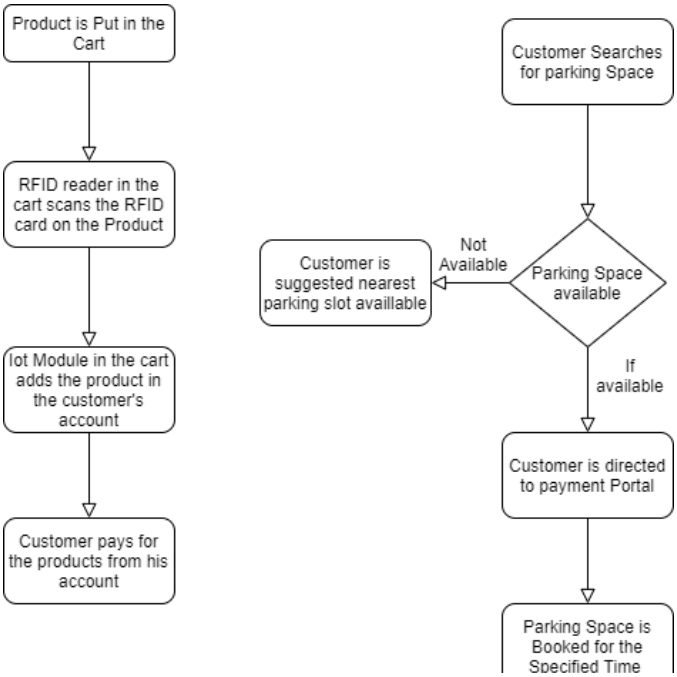

Fig-7 Flow Diagram For Smart Parking System

5.2 Smart Billing System

When user starts shopping:

If user drops item into cart:

Call API and add a specific item to that cart

Else if user take out item:

Call API to remove item

When user scan QR code:

Generate bill

If user confirms bill:

Go to payment gateway

Generate gate pass

Else:

Do changes;

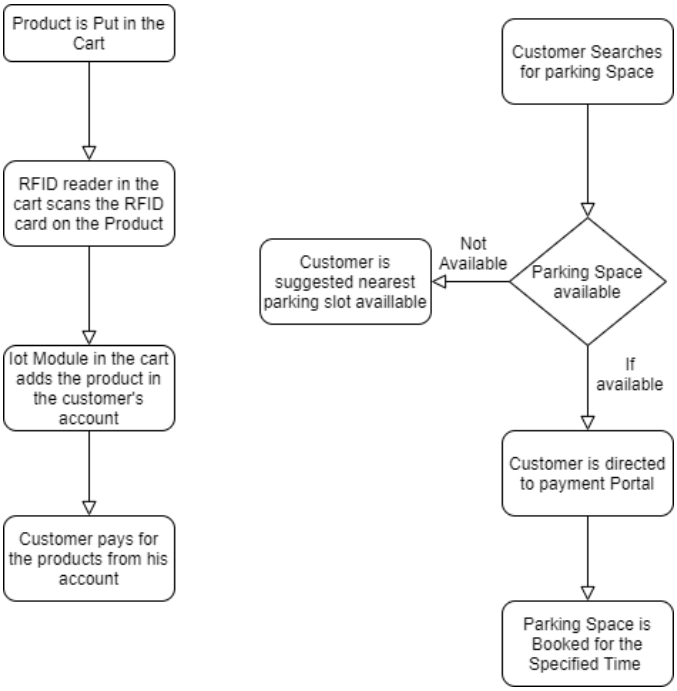

Fig-8 Flow Diagram For Smart Billing System

6. CONCLUSIONS

The scope of the project is to improve the shopping experience by automating the shopping process and improve the shopping experience for shoppers. The scope can increase drastically as we are going to automate the process of shopping and even the payment process which can bring a revolution in the whole shopping experience in shopping malls etc.

In the Smart Shopping Experience, trolley and parking systems will be automated with help of IoT. In smart trolly, bills will be automatically generated as the customer drops items in the cart. By scanning the QR code, customers can pay the bill. In the Smart Parking System, the user will get all empty slots on the app so that he or she won't need to seek the empty slot. Users can also book and pay for the parking online.

Scope is huge as this project will save time and increase efficiency. It will be beneficial for both customers as they will get a good shopping experience and as well as for the market as they can get real time data of goods. The smart parking system will reduce congestion and make the available parking slots available to the people and avoid delays and waiting in billing queues.

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