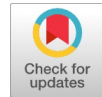# Effective Avoidance of Queuing in Super Market using Li-Fi Technology

Dr. Sumit Gupta, M. Sai Krishna, N. Poojitha chowdary, B. Pavithra reddy, M. Sandeep

Abstract: In extensive general stores, clients feel awkward to remain in long line for charging the obtained items. This will deteriorate at the season of celebration or regular deal. This paper gives an awesome answer for every one of these issues utilizing Li-Fi innovation. Li-Fi is another rising innovation in pattern which employments light waves to exchange information. In this paper, we propose a programmed charging framework which is not just time compelling additionally diminishes human exertion. This framework utilizes Li-Fi innovation to exchange information rapidly. The free accessible android application is conveyed in versatile utilizing which we get the item subtle elements and the installment is prepared in the versatile itself. For security, the items are confirmed in the door area by checking the items in the trolley. The fundamental target of this paper is to maintain a strategic distance from lines in grocery stores and shopping centers.

Index Terms: Li-Fi, Visible light communication, android application, payment.

I. INTRODUCTION

Li-Fi innovation, proposed by the German physicist—Harald Haas, gives transmission of information through enlightenment by sending information through a Driven light that fluctuates in force quicker than the human eye can take after. Li-Fi involves a wide range of frequencies and wavelengths, from the infrared through noticeable and down to the bright range [1]. It incorporates sub-gigabit and gigabit-class correspondence speeds for short, medium and long ranges. The rationale is exceptionally straightforward. In the event that the LED is on, an advanced 1 is transmitted [2]. In the event that the LED is off, an advanced 0 is transmitted. These high brilliance LEDs can be turned on and off rapidly which is quick for transmitting information through light. The working of Li-Fi is exceptionally straight forward [3]. There is a light producer toward one side, for case, a LED, and a photograph indicator (light sensor) on the other. The photograph indicator enlists a double one at the point when the LED is on; and a paired zero if the LED is off. Li-Fi is a critical part of the Internet of Things (IOT), in which everything is associated with the web [4]. It improves vitality effectiveness by joining information correspondence and brightening. Li-Fi advances an extensive variety of use. This venture, shows a new application utilizing Li-Fi innovation which is accommodating to the clients at store. Li-Fi module is connected with portable, trolley and truck. It is interfaced with the microcontroller which is modified utilizing Embedded C dialect [5]. Installment is completed in android portable. Acquired item points of interest are passed to the server and further confirmation is done in door segment.

II. SYSTEM ARCHITECTURE

Li-Fi is another developing innovation in pattern. It gives transmission of information through light by sending information through a LED light that shifts in force quicker than the human eye can take after. Li-Fi is perfect for high thickness remote information scope in bound territory and for mitigating radio obstruction issues [6]. Li-Fi gives better transfer speed, proficiency, accessibility and security than Wi-Fi. In our framework, Li-Fi innovation is utilized to lessen the shopping time of clients in strip malls.
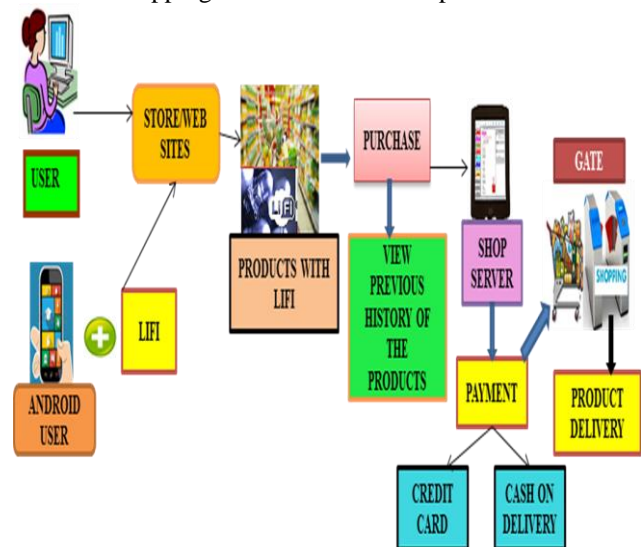

Fig 1. System Architecture

ACTIVITY DIAGRAM:

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Portable Shopping Application is made and introduced in client mobile. It is created utilizing advance Java ideas like JSP and Servlet. In the wake of propelling the application, it is associated with the shopping center server utilizing IP deliver to recover the item data and to send the charging points of interest. Portable contains a Li-Fi recipient which is associated through OTG link [8]. A Li-Fi beneficiary contains the IR identifier which peruses the item ID and transmits it to the portable. OTG link is associated with the UART port of the LiFi collector.

2.3. Trolley Module:

The Trolley contains a Li-Fi Transceiver coordinated with PIC Microcontroller. Whenever an item is dropped into the trolley, Li-Fi module consequently peruses the item data. It will keep up a record of the considerable number of items which are inside the trolley. LCD screen shows the item ID. The LCD screen is associated with the D port of the microcontroller. The flag is passed as encoded computerized information. The item ID is shown on the LCD screen [9]. At the point when the item is expelled from the trolley, it will be consequently refreshed. MPLAB IDE is utilized to program the PIC microcontroller. It is a coordinated toolset for the improvement of inserted applications utilizing Microchip's PIC and PIC microcontrollers. It utilizes Hi-Tech C compiler and PIC Developer/Debugger

2.4. Gate Section:

Mobile will send the acquired item data to the server. At that point server will transmit it to the entryway segment. Li-Fi collector likewise gets the item points of interest which are inside the trolley. Cross confirmation is completed. DC Motor which is associated with the B port of microcontroller runs when every one of the items are charged [10]. It is a normally utilized actuator for delivering nonstop development. At the point when the bungle happens, bell sound will be delivered to demonstrate that there is some unbilled item inside the trolley

III. METHODOLOGY:

Li-Fi innovation is utilized to diminish the shopping time of clients in substantial stores. Li-Fi module is appended to portable, trolley and door segment. Each item has a Li-Fi module which contains a special ID. Utilizing these ID's, item points of interest are extricated from the database of the server. At the point when the item is appeared to the portable, Li-Fi module peruses the item ID. The item points of interest will be removed from the database and shown in the cell phone. The trolley segment will likewise store the item ID at the point when the customer drops them into the truck. On the off chance that the client needs to evacuate any item, he/she needs to demonstrate the item again to the versatile and trolley. At that point the subtle elements of the item will be expelled from both the areas. Once the client wraps up shopping, the installment is done in versatile itself utilizing versatile managing an account framework. After installment, the charged item subtle elements will be refreshed in the server.
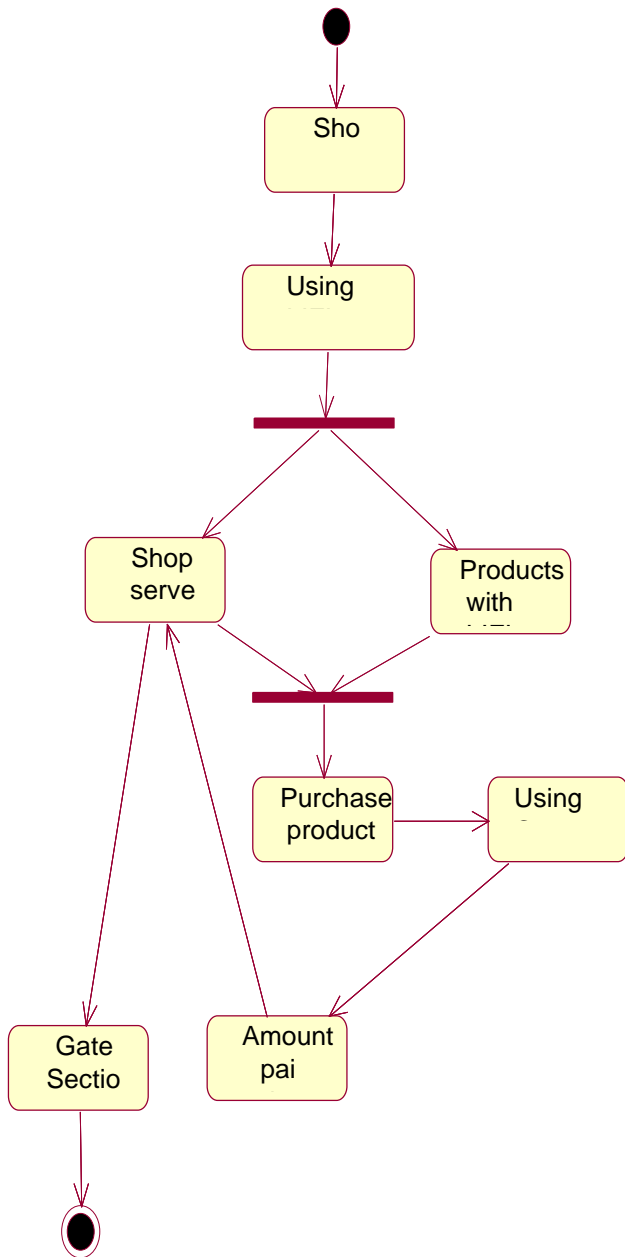

Fig 2. User Diagram

2.1. Product Module:

Each item comprises of a Li-Fi transmitter. It is interfaced with PIC microcontroller. PIC microcontroller depends on Harvard engineering. PIC microcontrollers are generally utilized for modern reason because of its superior capacity at low control utilization [7]. It is additionally exceptionally well known due to direct cost and simple accessibility of its supporting programming and equipment instruments like compilers, test systems, debuggers. Here it is utilized to store the item ID. Utilizing the item ID, item points of interest are removed from the server database. The Li-Fi transmitter contains a LED light which is exchanged on furthermore, off rapidly to exchange information. The IR indicator is used to peruse the information at the collector end. Li-Fi transmits the subtle elements of the item to the portable and the trolley. These subtle elements will be transmitted in the type of encoded computerized information.

2.2. Mobile Module:

The server sends the data to the door area. It will cross check with the items charged and the items in the trolley. On the off chance that any item is observed to be not charged, then the caution sound will be delivered. The principle point of this venture is to give a programmed charging framework to maintain a strategic distance from line in shopping centers and markets.

3.1. Server login and adding items to the database

Executive needs to login to the shopping center server to include the item points of interest, for example, item ID, item name, cost and markdown. The item points of interest will be put away in the database utilizing MYSQL.

3.2. Interfacing portable to the server

Portable is associated with the shopping center server utilizing the IP address. The server will acknowledge the versatile demand and the database will be associated with the versatile.

3.3. Adding the item to trolley

At the point when the item is dropped into the trolley, the item ID will be perused by the Li-Fi recipient and shown on the LCD screen.

3.4. Android installment

In the wake of acquiring the item, the aggregate sum is figured. The bank database is associated with the portable. The client needs to enter their card and stick number. Verification is done and the sum will be executed to the shopping center database.

Circuit Construction:

Fig 3. Hardware of Billing System

3.5. Door segment check

 After installment, the obtained item points of interest will be sent to the door segment. The door segment cross check with the items inside the trolley. On the off chance that there is any befuddle, the bell sound will be created. Something else, the entryway will open.

3.6 System Testing:

After payment the items that are billed and the items customer is taking out should be matched. For this the gate section controller helps with two operations one is if the items matched then the gate opens automatically else if not matched with the paid items then the buzzer rings.

Serial Number	Test Case	Expected Output	Actual Output	Remarks
1	For two items the bill is paid and the third item is added to the trolley and tried taking the item out of market	Buzzer should ring	Buzzer rings	As the items in the trolley not matched with the payment made
2	Complete payment for the items present in the trolley is made	Gates should open	Gates opened	As the items taking and the payment made for the items matched

IV. RESULTS AND DISCUSSION

With the mobile application it has to be connected to LIFI hardware with the help of the OTG cable. When it is connected to the hardware the application gets opened and the

details have to be entered in that. It will get connected to the server (localhost) with the help of the IP address the same network should be there in both the mobile and the laptop to able to communicate. we should pay the bill in our app the bill should contain the price that is corresponding to that item we added to the trolley and then the other part of integrating is after payment the items that are billed and the items customer is taking out should be matched. For this the gate section controller helps with two operations one is if the items matched then the gate opens automatically else if not matched with the paid items then the buzzer rings.

From the below output figures we can understand the process of avoidance of queuing in supermarkets using LiFi technology.
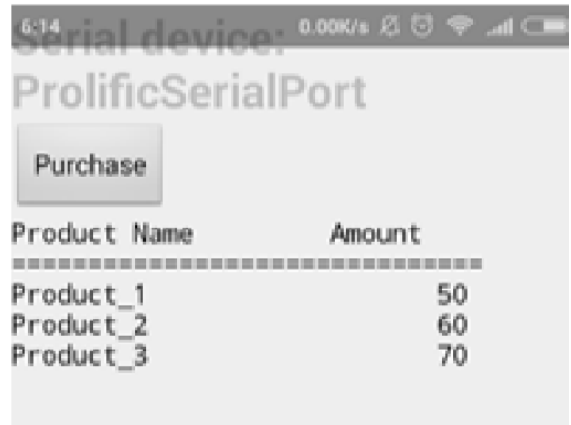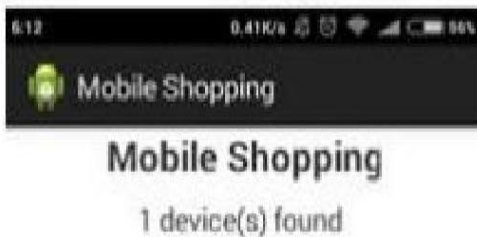

Fig 4. Scanning the Product

Fig 5. Interfacing with Mobile

Fig 6. Details of the Product

Fig 7. Display of Product IDs

Fig 8. Payment Process

V. CONCLUSION AND FUTURE SCOPE

The fundamental goal of this framework is to abstain from standing in lines while charging and lessen the time taken for shopping. With the utilization of Li-Fi innovation, the charging process happens naturally and installment is likewise improved utilizing versatile keeping money. Security is likewise overseen by checking items in trolley and checking it with charged items.

On the off chance that any item is unbilled, a bell sound will be created. There are numerous valuable thoughts for further improvement. Programmed charging framework with a credit/check card office in the trolley itself will additionally decrease the human exertion. Indoor mapping innovation alongside IOT can be utilized to find the products in huge stores. Consistent improvement around there will prompt a progressive change in shopping encounter.

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