In this paper, proposed system delivers an innovative concept of RFID Based Smart Shopping and Billing which will reduce time for billing at billing counters\textsuperscript{[2]}. The Smart Cart Shopping system which generates automatic bill using RFID technology at the time of purchasing itself and helps to reduce time for billing at counters.

For achieving this android app called CartApp will be there which helps user at the time of shopping. First user have to click on the start button in the CartApp after this a booking ID will be generated then customer can start with shopping. While shopping when customer adds products in the trolley RFID tag attached to the product will be read by RFID reader\textsuperscript{[6]}. Information related to a particular RFID tag is stored in the database already. This information about product will be then send to the android device via Bluetooth. Once customer is done with shopping one needs to click on the stop button in the CartApp to stop the service for that particular booking ID. As soon as customer click on stop button all data about purchased items is send to the local server via a Wi-Fi network. At the same time this data will be displayed on android device in the CartApp. Further this data can be used for inventory management\textsuperscript{[3]}. Once this process is done now its the time for payment. For doing cash payment customer needs to go to the counter and tell the booking ID which has been generated after starting CartApp. After entering booking ID at counter side list of products purchased for that ID will be displayed then cash payment can be done. If a customer wants to do the online payment customer have to use an app called ClientApp. If a user is new he has to signup first into the app. After this user have to login by entering user id and password provided at the time of signup. Once the user is logged in there is a option of online payment by clicking on this user can further do the payment. Notification about the payment will be send to the user and server for confirmation of payment.

### 1.1 Component of the System

#### a) Smart Cart

The Smart Shopping Cart is equipped with RFID reader for product identification. For reading RFID tags an RFID reader is provided. To display this information an Android device is used. Microcontroller is used for interfacing between RFID reader and Bluetooth\textsuperscript{[4]}.

#### b) RFID Reader
RFID reader is used for automatic identification of RFID tags. RFID readers or receivers are composed of a radio frequency module, a control unit and an antenna to interrogate electronic tags via radio frequency communication[5].

c) Inventory Management Module
This module is used for inventory management purpose by using data from server. It is used to keep track of stock.

SYSTEM ARCHITECTURE

As shown in the figure.1 following are the components of proposed system

Microcontroller: This is a 8 bit microcontroller used for communication between RFID reader and bluetooth. RFID reader:RFID reader is an electronics device which is used to read RFID tags. One necessary condition of RFID reader to read the RFID tag is that the frequency of RFID tag and RFID reader must be same. If the frequency of RFID tag and reader does not match then tag will not be read by reader. No direct line of sight is required to read RFID tags. This is the biggest advantage of RFID technology.

Bluetooth: Used for sharing the data with android device. When this bluetooth device is paired with android device data is send to android device.

Android device: Used for interacting with the CartApp and ClientApp. As mentioned above in the introduction part CartApp is used while shopping and ClientApp is used at the time of payment. Sharing of data is done via a Wi-Fi network.

Android device and system must be in the same network to achieve sync. This data is stored at local server which can be used for inventory management purpose and future use.

CONCLUSIONS

This model is developed for Smart Shopping System which automates the whole billing system. The system which is proposed is highly trustworthy and time-effective. The developed product is easy to use, economical and does not require any special training. This system simplifies the billing process, makes it swift & increases the security using RFID technique. This will take the overall shopping experience to a different level.

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