

Smart and Secure Delivery System: a Novel Idea using IoT and Cloud Computing Technologies

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Abstract -Now a day, security is becoming a major problem in any online delivery system. There may be chances of theft or misuse of customer ordered item. The main theme of the paper is to deliver goods in a smart and secure way without misuse of the goods. Here goods mean food. The Customer orders the food, through a mobile app and the restaurant accepts the order. When the order is ready to ship, the ordered item will be placed in a delivery box with digital locking mechanism and an OTP will be generated by respective associate of restaurant to the registered mobile number of the customer. Using OTP, the delivery boy opens the digital lock and delivers the item to the customer. With this, there is no worry to the customer about his ordered item and he gets more satisfaction. It is not only for food, it can be applicable to any online delivery products without change of item. This problem is solved by the IoT technology and Cloud Computing concepts.

Keywords: Security, Delivery System, OTP, IoT Technology, Cloud Computing

I. Introduction

Security is becoming a major problem in any online delivery system. There may be chances of theft or misuse of ordered item. The main theme of our proposed system is to deliver goods in a smart and secure way without misuse of ordered items. For this to happen, we use a safe and secure box with digital locking mechanism. Customer orders the food, restaurant management accepts the order and when order is ready to ship, the order will be placed in the delivery box with a digital lock. An OTP will be generated by respective manager or restaurant associate to the registered mobile number of the customer. Using OTP, item can be safely reached to customer without any disturbance. It is not only for food, it can be applicable to any online delivery products without change of item. In this fast-moving world, everyone is getting busy with their own works. People are thinking to make their daily works smart. That is the reason why online systems like online shopping, online food ordering, online bookings are growing rapidly. Security plays a major role in online ordering systems because it involves a third-party. We took online food delivery as our project to provide security, based upon a recent incident experienced by zomato.

The Internet of Things (IOT) is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware such as sensors, these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled. The definition of the Internet of things has evolved due to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems.

In the consumer market, IOT technology is most synonymous with products pertaining to the concept of the "smart home", covering devices and appliances such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smart phones and smart speakers. The IOT concept has faced prominent criticism, especially in regards to privacy and security concerns related to these devices and their intention of pervasive presence. According to its developers, "ThingSpeak is an open-source, Internet of Things (IOT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation

of sensor logging applications, location tracking applications, and a social network of things with status updates". Thing Speak was originally launched by ioBridge in 2010 as a service in support of IOT applications



II. Literature Survey

Ajinkya Kumar Jadhav proposed the “Development of wireless ordering system for hotel”. This work presented in-depth analysis on the technical operation of micro controller and ZigBee module based wireless ordering system (WDS) [1] including system architecture, function and limitations. In the past decades, the rapid growing of network and wireless technology did a great impact for how people communicate with each and other remotely. At the same time, this technology also leads different kind industries to change their entire management aspect. F&B industry is one of the industries in the market that apply these technologies into their business processes that assist them to be much more convenience and efficient.

From the message above, Wireless Food Ordering System is a system that integrated both concept of intranet and wireless technology (Khairunnisa, K. and Ayoub, J., 2009). This system provide user to access the data, information and services from a remote server, which enable user to access the central databases distributed across the restaurant network. Most of the handheld devices have implemented and support wireless technology and thus mobile devices is an ideal hardware device that use to support this system in order to allow user remote access to the database for data retrieval. The system requires the user to build an intranet network within the restaurant and there will be a central database server resides in the network and the client can perform data retrieval by using the mobile devices such as PDA (Personal Digital Assistant) connect to the wireless access point.

Aman Jain proposed “Automated Restaurant Management System” which works as a link between waiters to provide optimum quick and effective and almost effortless services to the hotels and restaurants. In an automated food ordering system is proposed which will keep track of user orders smartly. Basically, they implemented a food ordering system for different type of restaurants in which user will make order or make custom food by one click only. By means of android application for Tablet PCs this system was implemented. The front end was developed using JAVA, Android and at the backend MySQL database was used.

This order system overcome the drawback of traditional paper-based order system, it changes everything from paper based into computerized. First of all, the system will be programmed with the food availability from the respective restaurant and display on touch screen devices that have been setup in each of the tables within the restaurant. In addition, the touch screen device will have a very attractive Graphic User Interface (GUI) that displays the food menu for customer to make their choices and enable customer to place an order by touching the particular food image that display on the device screen. Next, when the customer placed an order, the food order will be sent to the kitchen and the chef can prepare for the food. This system eliminates the issue from traditional paper-based system that the waiter has to manually deliver the order to kitchen. Other than that, the system provides a sub-module that enable restaurant owner to update the food details, food price and etc. It was very convenience compare to the traditional paper-based system, because paper-based system requires the restaurant owner to dispose all old food menu cards and re-print the latest food menu card to serve their customers.

Last but not least, the system was fully relying on the gadgets and the gadgets don't need leave or vacation and

thus it can work efficiently 24/7. Therefore, it can reduce the excess man power need in the restaurant business by reducing the number of the employee within the restaurant.

III. Existing System

In the modern world, online food ordering system is a one of popular e-business tactics used all over the world. In those systems restaurant or cafeteria lists their products and other relevant information about the products. Buyers will browse the listed products through internet, and they order some food, some of them has ordering facilities among those system few of them has facility to order online in other system customer have to give a phone call to order.

Disadvantages

- Less Security
- The ordered item can be misused, disturbed or replaced
- There is no proper tamper proof packing.
- In between there may chances of replacing or misuse of item.

IV. Proposed System

The online food ordering system sets up a food menu online and customers can easily place the order as per they like. Also, the online customers can easily track their orders management maintains customer's database, and improve food delivery service. This system also provides a feedback system in which user can rate the food items. Also, the proposed system can recommend hotels, food, based on the ratings given by the user, the hotel staff will be informed for the improvements along with the quality. The payment can be made online or cash or pay-on-delivery system. For more secured ordering separate accounts are maintained for each user by providing them an ID and a password. Security is less. The ordered item can be misused, disturbed or replaced. Proposing digital locking mechanism for delivery box.

Advantages

- Provides security to the delivery item.
- Trustworthiness
- Digital Technology

V. Methodology of Proposed System

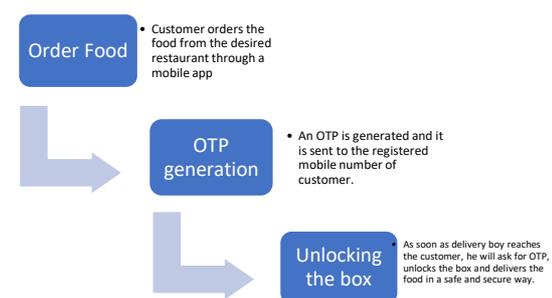


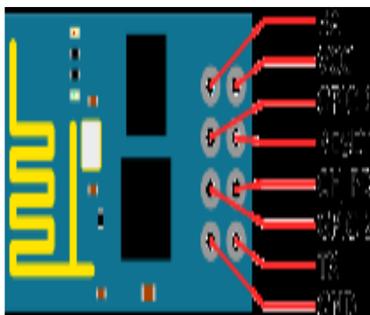
Fig: Flow of Delivery System

The user has to create an account by using his details like user name, password, email, contact number. Later login to the app by using user name and password. When the user login in to the account, then the menu items are displayed. Later he can order the food from the respective restaurant. After the food is packed then the restaurant associate kept the food in a box and lock it, once locked an OTP will be sent to the customer. When item / food reach home, delivery boy will ask for OTP to unlock the box.

VI. Requirements to Implement

Wi-Fi module:

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems. The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation. The ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi. The successor to these microcontroller chips is the ESP32. In late October 2014, Espressif Systems released a software development kit (SDK) that allowed the chip to be programmed, removing the need for a separate microcontroller. Since then, there have been many official SDK releases from Espressif; Espressif maintains two versions of the SDK – one that is based on Free RTOS and the other based on callbacks. An alternative to Espressif's official SDK is the open source ESP-Open-SDK that is based on the GCC tool chain. ESP8266 uses the Cadence Tensilica L106 microcontroller and the GCC tool chain is open-sourced and maintained by Max Filippov.



Wifi- module

NodeMCU:

NodeMCU is an open source IOT platform. It includes firmware which runs on the ESP8266 WiFiSoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source.

ESP8266 Arduino Core:

As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors [2]. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the target MCU's machine language. Some ESP8266 enthusiasts developed an Arduino core for the ESP8266 WiFiSoC, popularly called the "ESP8266 Core for the Arduino IDE". This has become a leading software development platform for the various ESP8266-based modules and development boards, including NodeMCUs.



Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.^[1] It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft. The motor is paired with some type of encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero and the motor stops. Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.

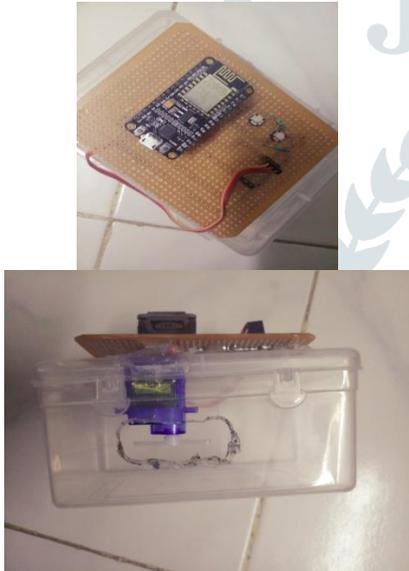


VII. Working Model & Procedure

Customer ordered particular food item in particular restaurant, the ordered item is placed in the delivery box. After the delivery box is locked, the OTP will be generated to the customer for the respective registered mobile number. When the delivery boys reach the destination, the OTP should be entered by the customer itself and have to submit it. Later, the delivery box is unlocked. We have written code in nodeMCU for two operations one is, when we pressed the button either the box (motor) has to be closed or it has to rotate. Whenever the motor rotates it will generate one number to think speak address and it has to check whether any data is available near server.

The two operations done by nodemcu is to close the box by pressing the button and to check the data from the server. Whenever we get the data from the server then the box will be unlocked. In UI, first one is the OTP which was generated should be compared and submitted and it was received by the server, if it was true then box will be unlocked.

VIII. Results / Working Prototype



IX. Conclusions & Future Directions

The entire idea has been developed and implemented as per the requirements stated by the user. It provides safety and security. It does not allow the delivery boy to unlock the box. So, our project is feasible for coming versions, which are planned to develop in future. Therefore, conclusion of the proposed system is based on user's need and is user centred. The system is developed in considering all issues related to all users which are included in this system. Wide range of people can use this if they know how to operate android smart phone. Various issues related to Mess/Tiffin Service will be solved by providing them with a full-fledged system. Thus, implementation of Online Food Ordering system is done to help and solve one of the important problems of people. The future directions of our project are to add extra racks in the delivery box with same locking mechanism. So, that multiple orders can be delivered safe and secure. Robotics will play a major role in future in deliver the goods across the world.

X. References

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