Digital Token Management

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Abstract-

The paper discusses efficient time management in various applications, through a Digital Token management system. The system presented here uses IOT technology, a firebase data, serving as the main server and a microcontroller, making it embedded in nature. Digital Token management system is a system that helps service provider to manage students in efficient way. The system can ease the student flow management which is useful for manager of the service provider. The purpose of this project is to develop an Digital Token Management System for organizing queuing system that can analyze the queue status and take decision to provide the available time slot to the student. This project focuses more on the college queuing system, different queuing algorithm approaches which are used in college to serve student and the average waiting time. This queuing architecture model can switch between different scheduling algorithms according to the testing result. There are several process undergo, which control by NodeMCU Microcontroller that is compatible with the Arduino software development environment. Every student allot a RFID based ID Cards with the unique ID associate with this RFID Card. So each student book a time slot for their visit in respective department. Therefore, this paper presents the development of a system to manage queues more efficiently and eco-friendly. The proposed system consists of a Graphical User Interface (GUI), which is used to obtain student RFID no and the processing unit, which generates the queue number and initiate the time slot to student via LCD Display. Finally, the systems have been tested under different conditions to evaluate its performance.

Keywords: Queue management, Internet of Things (IoT), NodeMCU, Data Access Object, Data logging, Firebase.

INTRODUCTION

Nowadays, Customer service oriented companies facing difficulties of lengthy queues. These problems often occurred in the banks, post office and airport and it became worsen when the time reached peak hour. The improper management of such queues will cause tension and stress among students and employees. So here we designed a Digital Token Management system. This proposed system working with IOT technology. Here the proposed system consist of NodeMCU which is the heart of proposed system it has a inbuilt wifi and it is easy to connect with the system server that is with firebase. Also for the unique identity of every student is associate with the RFID cards which having different number so we can easily identify the information of particular students.

If any student want to book slot of particular department then he/she punch this RFID card in front of RFID Reader which can read the unique number of this card and the details of student and student need to

select which department he/she want to go to department them he/she select the suitable time and this allocated time shown on the LCD display then he/she visit the particular department on the particular time allotted with the system. If no time is booked then the web page show that the No Digital Token Available

PROBLEM STATEMENT

- To avoid gathering due to queue system.
- To organized queue by assigning visiting time slot.
- To provide smart web application to get booked time slot.

Many companies provide queue management system for controlling queue of people in various situations and location in a queue area. Most of the techniques used are manually for a small space and simple flow. On the other hand, automated queue management system deal for a large space and complex flow. These can be see widely used in bank, hospitals or clinical and post offices.

We designed a Microcontroller Based Electronic Digital Token Management Systems. The aim of that designed systems is to maintain a queue with order and efficiency. The fundamental of the designed system is similar like the one, which has been use broadly today's in queue area. The flexibility is that students have the flexibility of being processed by more than one service point and service points possess the capability of processing more than one customer class. However, the system cannot integrate to the number of customers per certain time. The system cannot change and remain it is when there are not much customers in the waiting area and when there are crowded of students in the waiting are. Therefore, the purpose of this research is to design and built an automatic queue management system that has more flexibility when dealing with its surrounding.

RESEARCH OBJECTIVES

The aim of this research is to develop an Automated Queue Management System in a way that solves queuing problems.

The objectives of this project to:

1) Investigate the current approaches for queue management system.
2) Design a working system for automated queue control system.
3) Implement the system using Electronics solution.
4) Evaluate the system for effectiveness.

LITERATURE REVIEW

Several works were reported in the literature based on ESP8266 Wifi module. In this section, a brief summary of the works are presented.

The system proposed in [1] uses stable communication plays an important role in a banks, post offices, hospitals, rationing stores etc. you need to wait for long time by standing in queue. It is very annoying in now days because of the busy schedule of the people. You cannot seat for some time by leaving your line or queue. Because if you are leaving your queue then you will lost your number. For avoiding such kind of trouble we are designing a token system known as smart waiting token. It contains an android app in which will handles the token over Wi-Fi network. This containing an AP (Access Point). Android devices connected to the AP will be able to handle the tokens. Token contains a Wi-Fi module with controller, power supply and led (light emitting diodes). It will communicate to the android app over Wi-Fi network via access point.

The system proposed in [2] represent the development of a system to manage queues more efficiently and eco-friendly. The proposed system consists of a Graphical User Interface (GUI), which is used to obtain customers' mobile phone numbers and the processing unit, which generates the queue

number and initiate the ticket to be sent to customers' mobile phones via SMS, thus replacing the utilization of papers. Moreover, this system additional features allow customers to remotely obtain their queue number just by sending a request to the system through SMS and also reminding the upcoming customers that their turns are nearly arriving, a feature which is very useful especially for those who are waiting outside the premise. Simulations and experimental tests were conducted to ensure the reliability and the efficiency of the proposed system. The proposed system is supporting the development of sustainable green technology, and the expected increase of system efficiency may contribute to improving customers' satisfaction.

The system proposed in [3] discusses efficient time management in various applications, through a queue management system. The system presented here uses GSM technology, a personal computer serving as the main server and a microcontroller, making it embedded in nature. The entire system is controlled by a master controller VB program, and the access to the PC is achieved through standard RS232 protocol (Serial Communication). Though designed for clinical application i.e. doctor –patient interaction, the system can be suitably modified and extended further to serve many such applications.

The system proposed in [4] demonstrates a cost effective implementation of an IoT system for managing the visitors in an office environment. The automation system comprises low cost NodeMCU based Wireless Transmitter; NodeMCU based Wireless Display Unit and an android mobile phone. The mobile phone also serves as Wireless Access Point to which the Wireless Transmitter and the Wireless Display Units are wirelessly connected for exchanging the messages using UDP protocol. The Wireless Transmitter and the Wireless Display Units are kept in the visitor's waiting area. The consulting person possesses an android mobile phone in which the automation software is installed. The visitor enters a message using the Wireless Transmitter and notes down the acknowledgement token number sent by the automation software.

The system proposed in [5] brings the idea of mobile acknowledgement message informing the token number or the queue position. This technique is IOT based which generates token and senses the position of queue and is uploaded in the cloud which is then informs the token holder's mobile phone or computer. The cloud instantly gets informed by the position or the token number and informs the customer. Thus he/she can avoid crowd queues and saves plenty of time of the day.

BLOCK DIAGRAM

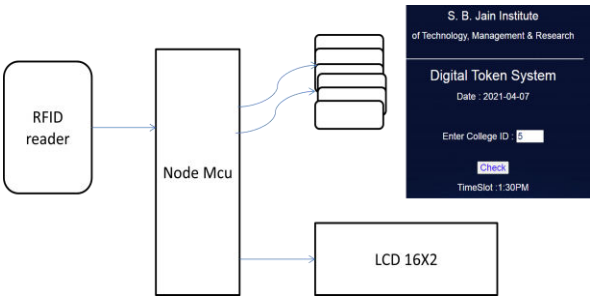

Fig 1: Block Diagram of Proposed System

- **Hardware Used**
  - NodeMCU
  - LCD16*2
  - RFID Reader Module
  - RFID Cards
  - Buzzer

- **Software Used**
  - Arduino IDE

NodeMCU

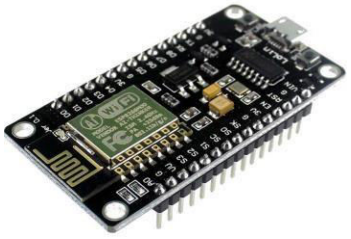

Fig 2: ESP8266 NodeMCU

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing micro controller to WiFi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly

LCD16*2:

We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

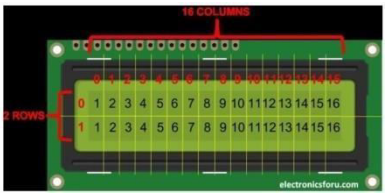

Fig 3: 16*2 LCD Pin out Diagram

EM 18 RFID Reader Modules:

This board is based on the EM-18 RFID Module. Using the board with microcontrollers to read a card's data is very simple and requires just a serial connection. The board has a 5V voltage regulator so it can be powered by 9~15V DC adaptor. Module can also be powered through header wires (+5V & GND) from other interfacing board. The board has power indication LED (Labeled red in color) and to indicate the detection of Card/Tag, it has a LED (Labeled green in color) and Buzzer. SEL selection jumper is used to switch between two output formats:

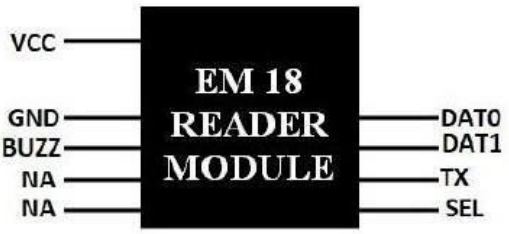

Fig 4: EM 18 RFID Reader Module

RFID Tag

An RFID tag is comprised of a microchip containing identifying information and an antenna that transmits this data wirelessly to a reader. At its most basic, the chip will contain a serialized identifier, or license plate number, that uniquely identifies that item, similar to the way many bar codes are used today. A key difference; however is that RFID tags have a higher data capacity that their bar code counterparts. This increases the options for the type of information that can be encoded on the tag, including the manufacturer, batch or lot number, weight, ownership, destination. and history (such as the temperature range to which an item has been exposed) in application needs. An RFID tag can be placed on individual items, cases or pallets for identification purposes, as well as on fixed assets such as trailers, containers, totes, etc.

Fig 5: RFID Tag

Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open.

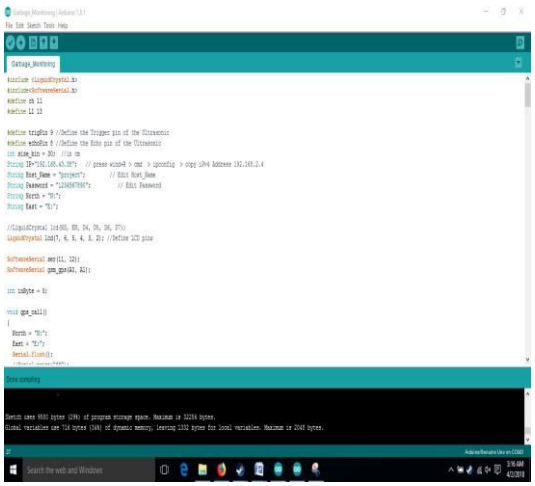

Fig 6: Arduino IDE window

Working:

The student scans (RFID Tag) into (RFID Reader) where (RFID Reader) reads the (ID) for the student in particularly via student ID (Reading Process) and then transfer information via Arduino board (Microcontroller Process) and Ethernet shield (Transmission Process) to send data to the Wamp server (MySQL and PHP) by wired (Server Process) to record, manage, and display student token records by a web-based application.

The RFID reader reads the student's ID (Reading Process), Arduino UNO (Microcontroller process) is used to transfer student's information to the Wamp server through the cable via Ethernet shield card (Transmission Process). Server (MySQL and PHP) is used to identify student ID and to send student's information to the screen. The student scans the (RFID Tag) to the (RFID Reader) where (RFID Reader) reads (ID) for the student and then send it through Arduino board and to the server side (MySQL and PHP) where it searches for the ID of the particular student and fetches his data from database then the information can be presented on the screen or LCD.

The parts of RFID reader is connected to the Arduino device's pins (the first pin to 3.3v, the second (RESET) is connected to D9, the third pin to the ground, the four (NC) is not used, the fifth pin (MISO) is connected to (D12), the sixth (MOSI) is connected to (D11), the seventh (SCK) connects to (D13) and the last pin (SAD) connects to (D10)). Ethernet device is setup with Arduino device. The signal that input to the Arduino is processed inside it.

Student will fall in range of the readers installed with their respective Smart Cards, Receiving the data at the reader will be fire to the server where the complete raw data is processed. SMS will send to each student's mobile. SMS can be sent to group of student (_n' number of group can be created).

This systems integrates the token generation system which gives the facility that they can view daily token generation report the which class has how much strength, etc. Benefits of this system to Schools & Apprentices – Completely automates the token generation system. Saves time. Educates student about new technology. Generates reports of any student in a click. Installation is very easy and quick. . Onetime expense on system, as Machine and Cards

both are reusable. Very much cost effective. Most important – Safety of Student.

The proposed system is to draft an automated system for catching generated token and post data to the cloud storage to save the generated token record and token status to the particular user.

User module contain sensor and management module detects user sensor data, and another module is cloud storage. The management module checks the data whether it is confirmed or not and also sent data to cloud storage for authenticated person.

In sensor-module, user holds a RFID to their labeling card (ID) or every node conduct sensor module. This card contains all the information about that the particular student. RFID sensor IS used to make the chip. It is used of holding the student ID number for authenticating particular user.

Management system, in this unit, data is collected from sensor node and the management system authenticates the user of the system after collecting data. If user ID is verified then collected data will be sent to the central database via application. In this case the user is not authorized to this system the data will not send to the cloud storage system. Management system unit manage the authenticating part of the system. The management system process is main part of the proposed system.

Cloud storage, this proposed framework has a cloud storage system which has the storage space and an application. Application use to collect data and save to cloud storage. Cloud storage helps to save all the presence data about individual token generation status.

RESULT

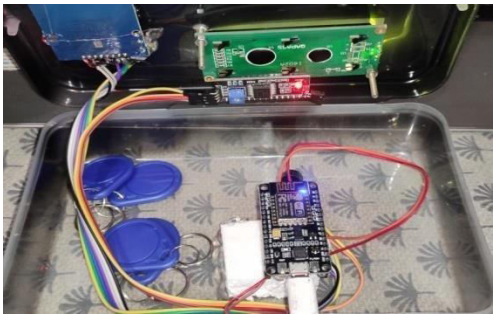

Fig 7: Implemented Digital Token System

The experimental model was made according to the circuit diagram and the results were as expected. Here we use four RFID Tags which are provided with the information of different student also this information is available in the firebase server. Also allotted time is shown in LCD so that the student gets the information of allotted time also student check the allotted time in the web page. Here the Proposed Digital Token System is implemented successfully.

CONCLUSION

Here we have used NODEMCU which has inbuilt wifi module. It is one of the easiest Digital Token control system based on IOT. The project proposes an efficient implementation for IoT (Internet of Things) Used for allotting the time slot for student.By developing the system we came to the conclusion that we can avoid lots of time, space in various department by using digital token system.Digital Token could be used whenever the queue system needs to avoid

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