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RFID based Wallet System and Design and Implementation of Client-Server System with Peripherals for Student Centric Applications

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Abstract

In recent years, frequency identification technology has moved from obscurity into mainstream applications that help speed the handling of manufactured goods and materials. Individuals are extremely keen about concluding their business (money) transactions and virtually each task through internet-based services. A system is created to integrate all applications in one system by using Universal System victimization RF-ID (Radio Frequency Identification) card. A universal system strictly designed to require entire advantage of the facilities provided by the institute, that helps students to avoid excess time wastage during their busy schedule. This is achieved by automating the services provided by the institute. This also includes automation of trip management of field to field bus services, all controlled through an applicable controller like Arduino, Raspberry-pi. An internet page access to administrator is provided to manage student wallet where students are connected to the system through a client-server system which stores the student information in the database.

Keywords: *RF-ID, Arduino, Embedded, Student database, client-server.*

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INTRODUCTION

Radio Frequency Identification (RFID) may be a next generation of machine Identification associated information assortment (AIDC) technology that helps to alter business processes in an open atmosphere with security. This automation will give correct and timely info without any human intervention. Access to such info wherever one will one by one determine each of the labelled things unambiguously, helps in rising your processes and additionally to form informed call. frequency Identification may be a technology that uses nonparticulate radiation signals to transfer information from RFID tag, through a RFID reader and method the info embedded on the tag to satisfy the requirement of a selected application. Usually, RFID tags have a little storage that contains associate identification of that tag. Information which will be embedded within the tag are distinctive number, location coordinates or specific information a developer can use within the product being created. RFID may be used for retrieving from or storing information on to RFID cards with none physical contact. Associate RFID system primarily consists of RFID cards, RFID Reader, Middleware and a Backend info. RFID cards are unambiguously associated universally known by an identification sequence, ruled by the rubrics of EPC global card information normal. A card will either be passively activated by associate RFID reader or it will actively transmit RF signals to the reader. The RFID reader, through its antenna, reads the knowledge stored on these cards, once it's in its neighborhood. The reader, whose effectiveness relies on its operational frequency, is meant to control at a precise frequency. The operational frequency of the reader ranges from 125 kHz—a pair of 4 GHz.

The Middleware encompasses all those elements that are answerable for the transmission of related info from the reader to the backend management systems. The Middleware will embody hardware elements like cables and property ports and software package elements like filters that monitor network performance of the system. The backend information stores individual card identifiers to unambiguously determine the roles of every card. The information stores record entries referring to individual cards and its role within the system application. The RFID system is mutualist on its core elements to realize most potency and optimum performance of the appliance. Thanks to its high degree of flexibility, the system may be simply adopted for associate array of applications starting from little scale inventory cupboards to multifaceted and extremely agile provide chain management systems. Although, the price of incorporating this technology has restricted to reaching, the technology guarantees to own untapped potential. RFID in congregation with biometric technologies has gained vast quality for security problems. Identification of people is usually prioritized in secured places like bus and train stations, national and international airports, business complexes, movie theatres and so on.

LITERATURE SURVEY

In the development method of the system, some reviews were conducted to know the fundamental theory, system needs, hardware needs, methodologies and technologies that may be required to succeed the objectives of the system. By the reviews that were conducted, we have a tendency to conjointly conducted analysis on the present system that gave the insights concerning the present system, needs like hardware and software package upgradation was needed so as to develop a system that may be however higher still associated with the present system. Therefore, good ID Card System victimization RFID was developed specifically for schools and universities. The advancement philosophies of the framework are used to control and supervise the programming configuration process, and also to organize and improve the entire framework improvement process. Ticketing system without human resource (Conductor) is implemented using RFID tag which is rechargeable. The user will have to recharge his RFID tag by contacting the admin. Admin will do the required changes in the users' database. The integrated database stores all the data records of users' expenses and recharges. The database uses the Prophet database which is a distributed database system designed for small to medium scale social database applications and face structure of Java Server. All interfaces were created using the Java programming dialect [1]. The Figure 1 given below gives an insight about the system propose and design of the system for better understanding.

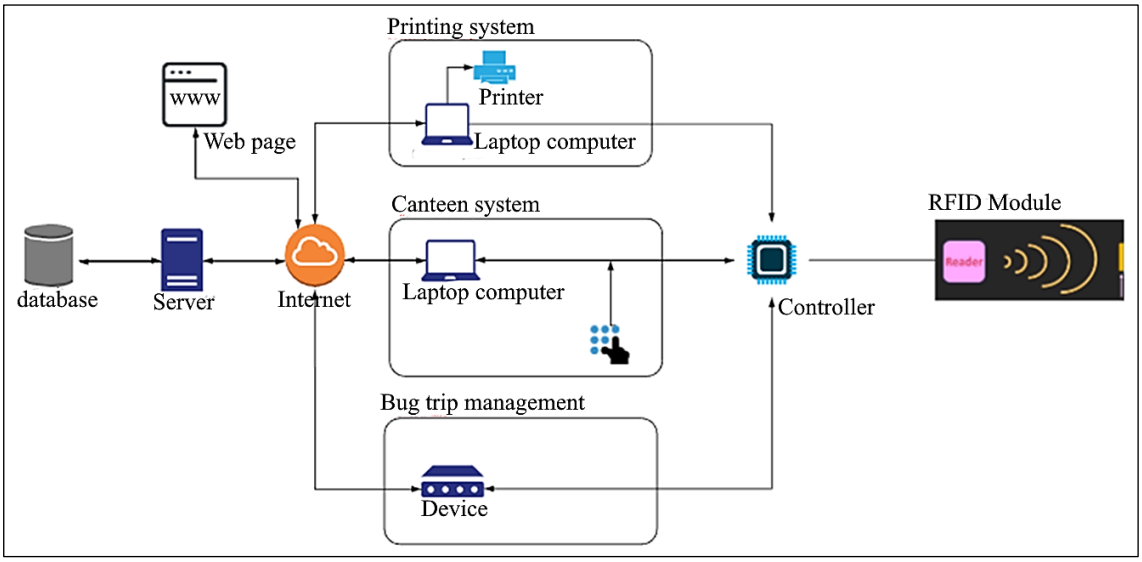

Fig. 1: *System Diagram.*

EXISTING SYSTEM

Traditionally, RFID tags are designed for commercial applications to replace the barcodes for asset counting and identification. A standardized identification is a visual portrayal of information that is filtered and hindered for data. Radio Frequency Identification innovation (RFID), includes a label fastened to an item which recognizes and tracks the item by means of radio waves. The physical punching of bus pass is still encouraged.

Disadvantages of Barcodes

1. Barcode scanner needs a direct line of sight to the barcode to be read.
2. Barcodes doesn't have read or write capabilities, they only contains the information of product and manufacturer.
3. The range of barcode reader is small, nearly 15feet.
4. If the barcode is damaged, it doesn't support the scanning.
5. Barcodes have less security, because they can be more easily reproduced or forged.

Advantages of RFID

1. Can read RFID tags from a greater distance than barcodes.
2. The read time of RFID tag can be very small when compared to barcodes. Approximately 40RFID tags can be read at the same time.
3. RFID tag doesn't need the line of sight with the scanner.
4. The data can be read or write into the RFID tags as they are read or write devices.
5. RFID tags can work within much greater distances information can be read from a tag at up to 300feet.

PROPOSED SYSTEM

Need of project

- To gain maximum advantage of facilities provided by the institute.
- To save valuable time in students life.
- To bring ease in day to day tasks which needed to be done through automation.

Functioning

In our planned system, a complicated automation method is to be enforced for our institute which can facilitate in simple access to student at numerous facilities provided. A main centralized server is required to make a system which can management each scheme and is the first information. Every student is given an RFID card. The total system is split into several subsystems with every having its own practicality. The primary scheme is machine-controlled printing service provided to students. Each student is assigned with predefined variety of pages from the institute. By simply putting the RFID card the quantity of pages student use, are subtracted from his account. The scholar also can recharge his account to extend the pages. The second scheme takes care of the canteen asking procedure avoiding long queue. In schools, faculties or within a University field canteen or facility is provided. Students, faculty employees or university employees uses this facility. Similarly, food facilities and canteen service are provided in numerous firms. During this canteen, students or staff pay their bills by money, money payment is that the solely possibility out there for creating the payment. In some huge canteens Mastercard facility is obtainable however that's terribly rare. During this canteen management system project canteen owner or canteen body person can give a RFID card to the user. This user is often a student just in case of faculties and a worker in case of a company or company [2]. For the payment procedure virtual pocketbook are created secured by 4-digit pin and with an application to supply an easy expertise. The same as this scheme a module is to be enforced at the xerox center out there at the institute [3]. This is often additionally connected to the pocketbook that is handles all the dealing procedure this method additionally consists of a RFID reader that is employed to spot the traveler, a sway unit that uses the information to observe the visits taken by a student. This scheme is to be enforced at the field to field bus transportation out there for the scholars. Currently the method uses an orthodox process of punching card for noting the quantity of rides taken. This will get replaced by simply putting an RFID cards at RFID reader in bus wirelessly connected to the centralized server through RFID provided by the applying and handling all the transactions for constant [4].

RFID Scanner Module

It is the main hardware section of the project consisting of RFID reader which is connected to an Arduino controller and keypad. The main purpose of this unit is to detect the RFID card and display the card information. The second main function is to authenticate the four-digit pin assigned to every student which will be a meaningful element in the canteen module providing security to the system. This four-digit pin will be encrypted using MD5 protocol which is latest, reliable and widely used security protocol. The Figure 2 shows the configuration of the unit on testing base.

Database

XAMPP is a free and open-source cross-stage web server arrangement stack bundle created by Apache Friends, comprising chiefly of the Apache HTTP Server, MariaDB database, and translators for contents written in the PHP and Perl programming dialects. The main reasons to use this software is, PHP is quite easier to understand and quicker to learn overall. The database ER diagram was initially designed. The database was then update with information related to the students. Dividing the information into four section that will be used to subsequent subsystem in the whole system [5]. The Figure 3 illustrates admin view of the database through a web page where he can make appropriate updates.

IMPLEMENTATION

The system primarily consists of hardware half that is RFID module, a back-end software system that incorporates a information, server and web content designed, and therefore the last section contains three sub system that handles all the automation method of entire project all integrated along.

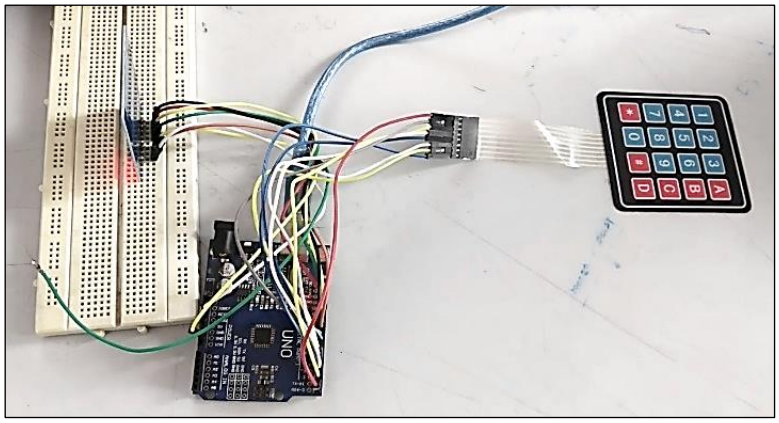

Fig. 2: *RFID Scanner Module.*

Fig. 3: *Webpage for Subsystem.*

The hardware half consists of RFID reader or receiver module, a RFID tag or card along with Arduino controller large an ARM. The RFID tag is a passive device that is energized by a reader and therefore the tags are scanned. Once the card is detected the RFID receiver is interfaced with controller through CLK, MISO, MOSI pins. The controller helps to display the information linked from the database with RFID card or RFID tags [6].

The back-end software part has database at its heart which is used to store all kind of user data. This data will be accessed at various parts in the system according to need and requirement [7]. An administrator access is provided to manipulate or update if needed. To create a database Xampp which is a free and open-source cross platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages. Using Xampp php a webpage is created which is used for admin and user login. The admin login allows to add data in system using sql commands while user has view only access to database for that particular user only. A server which is computer or computer program which manages access to a centralized resource or service in a network. The function of computer server is to store, retrieve and send computer files and data to other computers on a network. We use a local network to connect a number of computers [8]. This basically provides a connection between the all the hardware side and the database over internet. The three subsystems are the core of the entire project and serve all the function. The first subsystem which is printing mechanism. Every student is assigned with predefined number of pages from the institute. A user or student has to initially scan a RFID card provided and upload the file which is to be printed. Once the selection of file is done by clicking on print the process of printing is initiated and according pages are deduced in the database for that user. The second subsystem takes care of the canteen billing procedure avoiding long queue. For the payment procedure virtual wallet will be created secured by 4-digit pin and with an application to provide a user-friendly experience. This is also connected to the wallet which handles all the transaction procedure [9]. This system also consists of an RFID reader which is used to identify the passenger, a control unit which uses the database to monitor the trips taken by a student. This subsystem is to be implemented at the campus to campus bus transportation available for the students. Now the process uses an orthodox process of punching card for noting the number of rides taken. This can be replaced by just placing an RFID cards at RFID reader in bus wirelessly connected to the centralized server through wallet provided by the application and handling all the transactions for the same. Once an RFID card is scanned the trip will be noted and automatically updated in database [10].

CONCLUSION

The designing of the system was largely depended on resolving the problem statements. A design which is worked upon to specially utilize the facilities of the institute and betterment of the students in the institute which could help students focus more on their work and achieve a lucrative life. The main advantage of such system is that it provides great flexibility which means further more subsystems can be added to the system which will be constructive in keeping the system upgraded and modernized. The three subsystems overall cover all the problem statements which are studied to be most common issues in every institute. Minor changes can be made into the system to adjust or suit the institute to be implemented.

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