Design and Development of LAN Based Printer Control Module

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Abstract: The usual data printing process has to use a relay medium such as a desktop computer or mobile phones. This paper proposes a design and development of a module that allows the user to take print of a certain data using authentication with the help of a raspberry pi which acts as an interfacing medium between the printer and the relay medium. The raspberry pi and the desktop computer or the mobile phone should be connected to a same LAN network.
Keywords: Computer, Printer, USB Printer driver, Raspberry pi, RFID reader.

1. INTRODUCTION

Development in technology should make people's day to day work easier and make them feel comfortable while using them. Printing is a technique which is used by people in day to day life. This paper proposes a design of a printer which uses a raspberry *pi* and many other devices to print the data. For printing purpose, we need some medium which mediates between a computer and the printer.

The printing module which prints the required data, gives data to the printer from a raspberry *pi*. The data to be printed is sent to the raspberry *pi* which stores the data in its memory. The user when first goes to print a data the user needs to access the webpage using a unique id which allows the raspberry pi to store the data in separate memory space. The user on uploading a data in the format of *pdf* or any other format the data from the computer gets stored in the raspberry *pi* under the id the user has used to login the web page or desktop. When the user goes to the printer the user need to use an rfid tag so that the RFID reader detects the number on the tag. After detection, the rfid reader sends a message or signal to the raspberry pi which detects the signal from the reader and checks for the same id number in its memory and it sends the data to the printer which in turn prints the data in the required manner. The raspberry pi and the computer from which the data is transmitted or transferred should be under the same LAN connection for this process to be completed successfully.

2. LITERATURE SURVEY

With LAN based control modules rapidly extending their reach, subject data related to this field is available in affluence. While working on this module we have read about the matter from various sources such as books, you tube tutorials and some reference materials. The knowledge we attained from this project has been of great help to us in understanding the basics of linux, web page designing.

We came to know the importance of raspberry pi in the field of LAN based control modules and the features of raspberry *pi*[2]. We have also learnt in detail about RFID tags and the detector[1].

3. METHODOLOGY

3.1. Existing System

In normal printing process a computer sends the data directly to the printer and the printer when it receives the command gives an printed output to the user. This process is suitable only if the printer is used by less no of people and if two or more prints are given by separate users the one who gives the print command first gets the first priority[3]. The normal printing process requires a person who needs to collect money for the printout taken by a user in case of printer being in an educational institution or an work place.

3.2. Proposed System

The design consists of raspberry *pi*, RFID tag, RFID reader, printer and a suitable LAN network. The configured raspberry *pi* accepts files from the computer working under same LAN network. The CUPS installed in raspberry *pi* helps to covert the given file into printer format. The data transmitted from the computer is stored in different memory locations using an unique *id* available on the RFID tag. The proposed system helps us to take printout on the basis of authentication which leads to less confusion while taking multiple printouts and doesn't mingle one users printouts with the other user printouts.
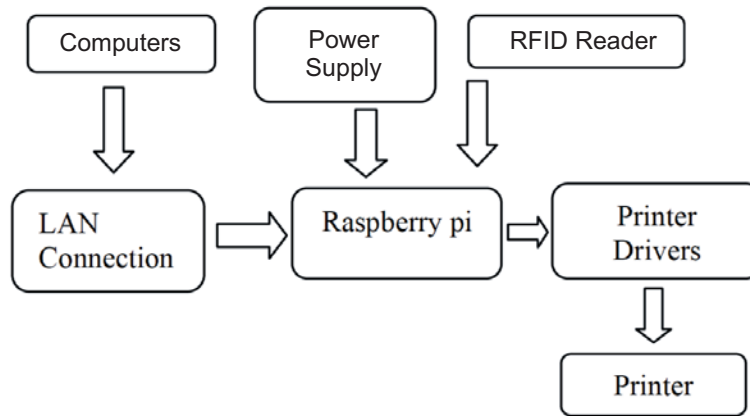
4. BLOCK DIAGRAM

Figure 1: Block Diagram

5. HARDWARE MODULE

The Hardware module consists of important parts such as Printer modules, LAN connection computers, Raspberry Pi, RFID readers, RFID tags.

Printer modules: In this project we are using printers to cover 100 computers that are connected to a same LAN Connection. The printers have a specific frequency and it supports any type of operating systems.

Raspberry Pi: Raspberry Pi is used for interfacing the LAN connection computers to the printer modules. So main idea to use the Raspberry Pi is, when a print command is given from the computers to any printer out of those two, the Raspberry Pi holds the command and keeps it the commands in queue until the authentication is done.
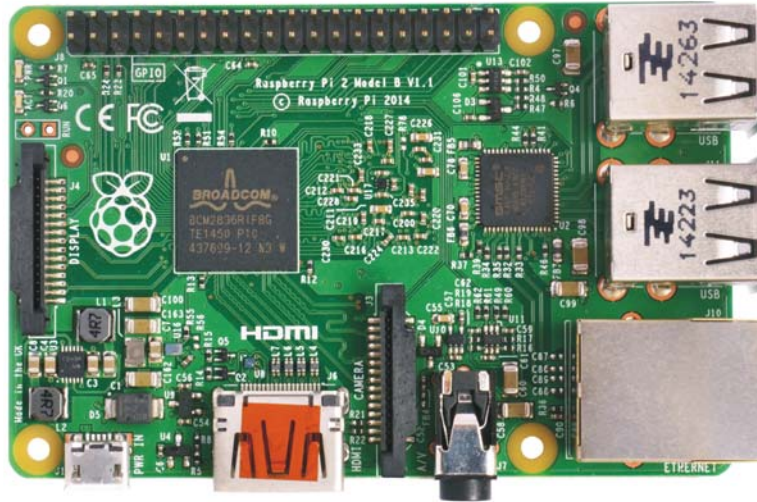
Figure 2: Raspberry pi Board

Authentication: The authentication modes consist of mainly two components such as RFID readers and RFID tags. The RFID readers are connected to the printers and then RFID tags which consist of an ID number and a unique 16 bit identification number is placed above the RFID reader and the reads the tag. In beforehand the information about the tag is stored in the Raspberry Pi and in the main server.
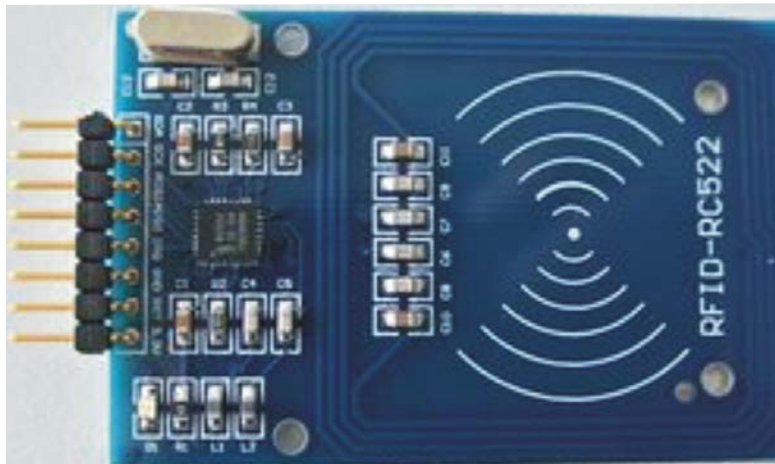

Figure 3: RFID-RC522

6. SOFTWARE MODULE

In this project software plays a major role. The coding has lot of part in completing the project. We are building a web page in order the user can give a file to the printer and also the admin can control and know about the whole web page. So to build the web page we use languages like php, java, sql and various other types of coding languages [4].

The main web page consists of elements like login page, admin page, and a box for entering one's id number in order to give a file for the print. Also, The web page has a module for cash paying online method and total number of pages that are consuming each day. This keeps a record for the admin to know the amount that is received and one can check the amount whether one can check the amount gets balanced or not.
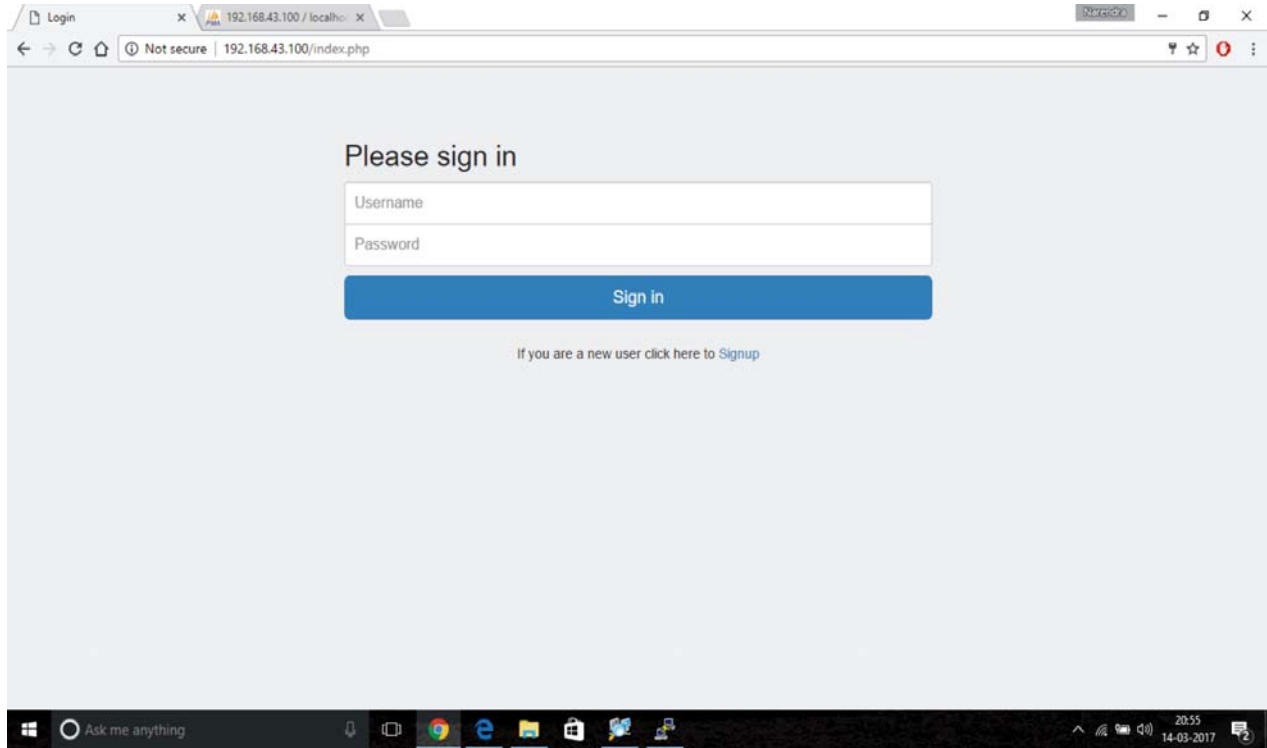
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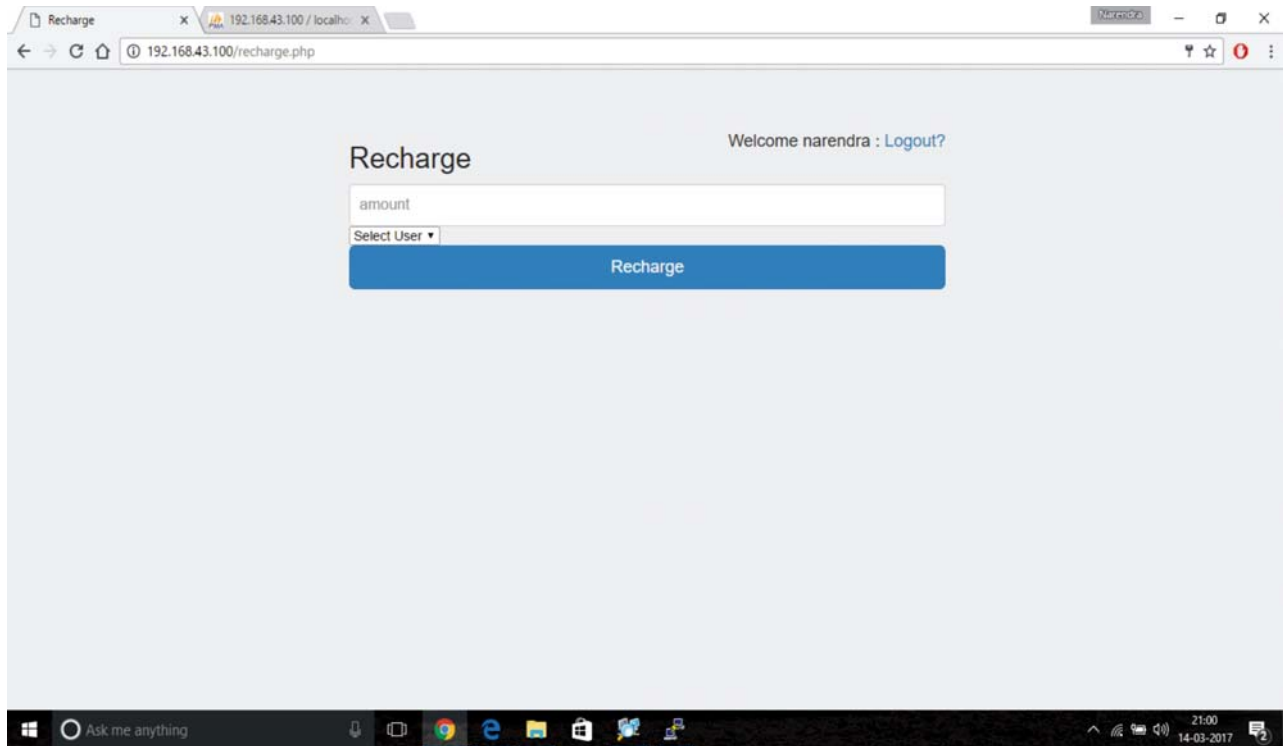

Figure 4: Login Page

Figure 5: Admin Page

Also, the coding for the Raspberry Pi must be done. Because when the print command is given the Raspberry pi has to hold the command and should store those commands in an sequential order. For this coding of Raspberry Pi must be done. Also, we store all the information such as the unique identification number and the 10 digit id number in the Raspberry Pi and also in the server.

So, when the tag is shown above the reader reads the tag and sends the information to the Raspberry Pi. Then the Raspberry Pi checks the information through that pool of numbers and it also checks with the server. This is the main idea of the software commands that are used in this project.

Process of Operation: Firstly, the printer is should be compatible with the given raspberry pi and the readers. The Raspberry Pi has to be installed with the printer drivers and also the coding softwares that one is using in making of the web portal.

Raspberry Pi: The Raspberry Pi we us are model 3 and we installed all the drivers and softwares that are required for operating it. We installed softwares such as Python, My SQL, PHP and we also installed operating systems such as Linux and Apache in the raspberry Pi.

Web Portal: Web Portal consists of a user page and an admin page. In the user page the user can upload their files and then when the user shows their identity card then the printer prints the necessary file.

When one or more users has given a file at the same time to the same printer, the printer holds the command in queue form and takes the printout whoever keeps their RFID card on the reader.

In the admin page the admin can enter or remove a user from the account. The admin can recharge a user. The admin can see the history of each printout and also so does the user. The history includes time and date at which the print out had been taken.

So, when the printout part is done once the user takes their print out he or she can see the amount being deducted from their account. We installed a calculation part here to deduct the amount when the print out is taken. The admin can also set the amount that has to be deducted.

RFID readers: The RFID readers should be compatible with the RFID tags. Both frequencies should match in order to an RFID reader to read an RFID tag

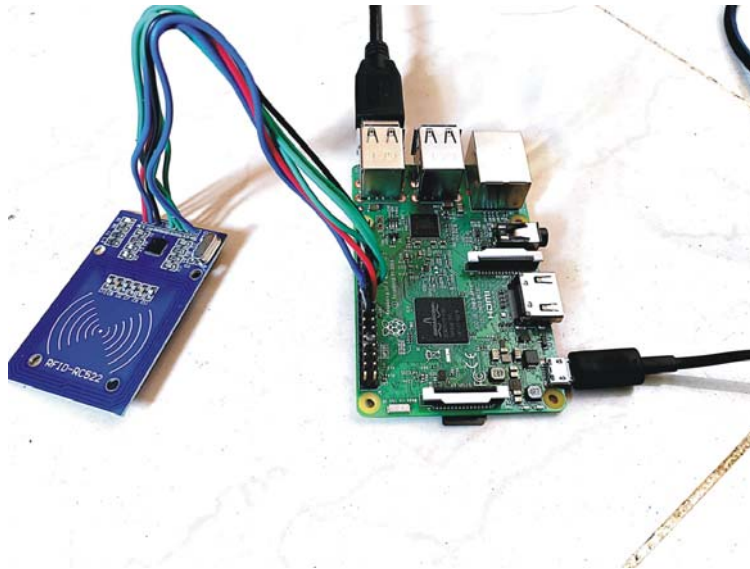## 7.   EXPERIMENTAL RESULT

Figure 6: Raspberry Pi Connections

We can print data from any number of computers connected under the same LAN connection. Now we can print PDF, png, jpg format files from any PC. It needs an interface between the Pi and the PC. The Pi accepts the data and stores it, when particular user uploads the file in their's login page. When the user gives the RFID authentication, the Pi checks the unique identification number form the database an gives command to the printer to print the uploaded files.

The CUPS (Common Unix Print System) is installed in OS of Raspberry pi which converts the data into the printer format.

Figue 7: Printer Setup

Figure 8: Output Result

8. CONCLUSION

In the present days there are no printers that are interfaced with an authentication mode which are useful in Offices, Universities, Training Institutions and many other work places. So, printing an important document with security is necessary at important work places so as to work in an efficient functioning way. Thus this printer with RFID as an authentication mode serves a better place in the present day use.

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