

## Wi-Fi Enabled Printer Adapter Using Raspberry PI

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### *Abstract*

*The common data printing procedure has to use notebook or desktop computer as a relay medium, first receiving the data from mobile and then sending it to printer using an appropriate printing Method. This is rather cumbersome. This paper proposes a design of a device which directly prints the data stored inside the Mobile without the assistance of a notebook or desktop computer. The design compromises Raspberry pi having Debian flavor of Unix. The configured Wi-Fi dongle accept file from Mobile and gives to RPi. The Printer driver is a program to control a printer that is connected to your system. The CUPS installed on RPi do the print job.*

### **I. Introduction**

Technology development should help people to do their work more easily and make them comfortable [1]. Printing is useful stuff that helps people in day to day life. This paper proposes idea of using Mobile phone through Wi-Fi we print the data [3]. For printing we need some mediates between a mobile device and a printer. The Wi-Fi adapter which helps the printer to print by receiving data from user like mobile or desktop and gives it to raspberry pi and then selecting either of the first operation modes in which data from the data supply device is received by wireless communication and before the completion of receiving the data; a print job is issued to the printer by wired communication. In second operation mode in which data from the supply device is received by wireless communication and after the completion of receiving the data, a print job is issued to the printer by wired communication using USB2.0.

A printing system which prints the required output and then gives data to a printer via an adaptor. The data held by an data supply device gives it to adopter which

comprising a first interface configured with communicate with the printer by a first communication protocol, and a second interface configured to communicate with the data supply device by a second communication protocol different from the first communication protocol. The printing begin configured to operate in a first operation mode in which data from the data supply device is received by the second interface, before completion of receiving the data by the second interface, a print job for printing data that receiving the data by the second interface is issued from the Adopter to the printer via the first interface; and a second operation mode in which data from the supply device is received by the second interface, and after completion of receiving the data by the second interface, a print job for printing data whose reception has been completed by the second interface is issued from the adaptor to the printer via the first interface; the printing system comprising: a selection unit configured to select either of the first operation mode and the second operation mode in which the adaptor is issued the print job; and a switching unit configured to switch between the first operation mode and the second operation mode in accordance with a selection result of the selection unit, where in the selection unit select either the first operation mode or the second operation mode based on at least one of a file name, an data format type, a transfer time and accessory information of the data received from the supply device or user. This is the process of the printing the data [1].

Hear first interface deals by cups drivers using Wi-Fi and second interface deals by kernel drivers using USB cable. This is the process of printing the data.

The proposed system aims at providing a means to directly send data stored in cell phone to printing

device for printing without computer. Sometimes it is not possible to have internet but nowadays everyone has mobile internet facility if we can directly give printing from mobile then it minimizes efforts. The reason is that one has to use a notebook or desktop computer as a relay medium, receiving the data from a mobile and then sending it to the printer to an approximate printer driver. This is rather cumbersome. That is impossible to directly print the data stored inside the mobile without the assistance of a notebook or desktop computer. The input to the system is data file to the print and output of the system is serial data in printing format. We can wirelessly print documents, bills and invoices (MS Office: Word, Excel, PowerPoint; PDF and text files) from device memory, SD card even from Google Drive (Google Docs) by using the printing method.

Instantly print emails from Gmail, print photos and images (JPG, PNG, GIF), also print contacts, agenda, sms/mms, call log, web pages(HTML) and other digital content directly your device to printer right next to you or anywhere in the world. For printing purpose we simply need to be on the device to add some premium feature. In prior to buying the key which is offered by some peoples highly recommend printing the test page to ensure compatibility with the printer.

Proposed system is for printing directly from cell phone. The laptop/computer users wishing to have their document to be print would have to connect to a local printer, has to install print devices drivers which can be reduced by using proposed device. The approach can be used for time saving and it is simply practical. It is easier to print data from mobile device like mobile phones, laptops, PCs etc. which can send data via Wi-Fi.

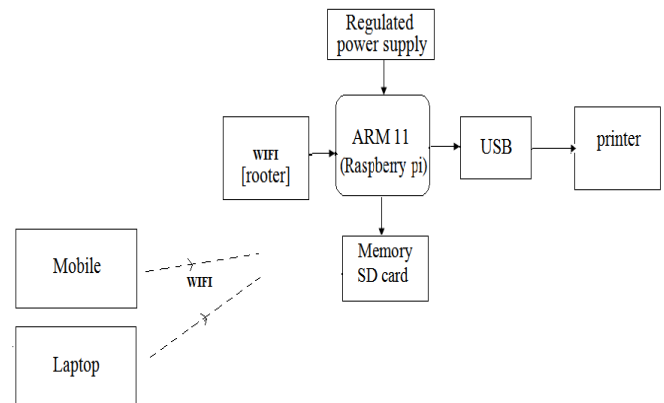
**II. METHODOLOGY**

**A. Wireless connectivity between mobile and printer:**

Fig.2 shows the block diagram of complete architecture of proposed system.

User whether it is a mobile or laptop is communicating with raspberry pi using WIFI connectivity and then the raspberry pi and printer are connected with wired communication i.e through USB2.0 cable. The Wi-Fi

dongle receives the signal from mobile and gives it to the controller. The memory unit of controller saves the data temporarily and gives it to the extraction unit. The extraction unit retrieve information and the compiling unit converts it into printing format. Through USB 2.0 cable it is given to the printer for printing [3].



**fig 1: System block diagram**

**B. The reasons for using Raspberry pi:**

The Raspberry pi (or ‘Raspi’) is a computer about the size of a credit card, designed to cost is less. This includes a 700MHz processor, an HD-capable graphics setup, and at least 128MB of memory: there’s also a memory card slot, audio/video outputs to connect to your TV, and a USB port for your key board, mouse and so forth. With all this, the system uses less power than a light bulb. It was developed by a group of computer science lectures from Cambridge University, one of whom (Eben Upton) now works for computer chip designers Broadcom. The main thing about this is we can install OS and do our required stuff.

**C. Detailed Description:**

The system structure is shown in Fig.1. The disclosed Wi-Fi/USB printing converter can receive data transmitted from user (mobile or laptop) through Wi-Fi. The data can be directly sent to a printing device for printing without needing any computer device. In the following, we explain the main components and relevant devices.

**1. Wi-Fi transmission module:**

It is used to receive data transmitted from user such as mobile phones and laptops. And then send it to raspberry pi [8].

**2. Microprocessor:**

It is connected to the Wi-Fi transmission module and contains an extraction unit, a memory unit and a compiling unit. The memory unit temporarily stores the image data for subsequent uses. The extraction unit extracts the data information to be printed from the data transmitted by the user [5].

**3. USB transmission module:**

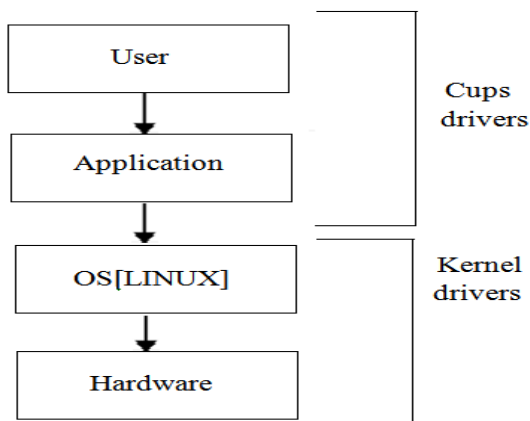
USB 2.0 is connected between the microprocessor and printer. It can transmit the printing data provided by the microprocessor to the printing device for printing. It has the capability of 480Mbps speed of serial data transmission [4].

**Drivers:**

**Kernel Drivers:** To detect the printer by using kernel driver module.

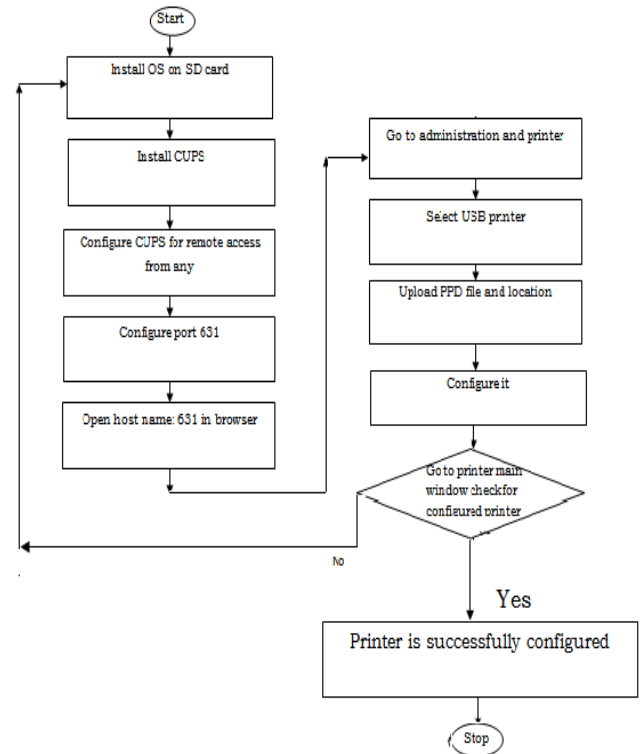
**CUPS Drivers:** Adding PPD files to add the printer to the user.

Between OS in raspberry pi and hardware (i.e printer) the required control action is done by kernel drivers. And in other hand between user and OS required controlling action to access printer using Wi-Fi is done by LINUX administration tools i.e CUPS (common UNIX printing system). A computer running CUPS is a host that can accept print jobs from client computers, process them, and send them to the appropriate printer. The print-data goes to a scheduler which sends jobs to a filter system that converts the print job into a format the printer will understand [11].



**Fig 2: overall system description**

**Flow chart for entire process:**



**Fig 3: Flow chart for entire process**

**Steps for entire process:**

1. Install OS on SD card
2. Install cups
3. Configure cups for remote access from away if hosts
4. Configure port 631
5. Open host name: 631 in browser
6. Go to administration and Add printer
7. Select USB printer
8. Upload PPD file and location
9. Configure it
10. Go to printer main window check for configured printer.

**III. Hardware Description**

**A. Introduction to Raspberry pi Primer Board:**

The kit is designed in such way that all the possible features of the microcontroller will be easily used by the students. The kit supports In system programming (ISP) which is done through serial port. We can also install any OS for getting the purpose done. The Primer Kit is proposed to smooth the progress of developing and debugging of various designs

encompassing of High speed 32-bit Microcontrollers [7]. Here raspberry pi board is leading main role in communicating user to the printer.

### **B. WIFI:**

Wi-Fi is a technology that allows electronic devices to connect to a wireless LAN (WLAN) network, mainly using the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands. A WLAN is usually password protected, but may be open, which allows any device within its range to access the resources of the WLAN network.

The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network" (WLAN) product based on the IEEE 802.11 standards. Devices which can use Wi-Fi technology include personal computers, video-game consoles, smart phones, digital cameras, tablet computers, digital audio players and modern printers. Wi-Fi compatible devices can connect to the Internet via a WLAN network and a wireless access point [8].

### **C. Interfacing Wi-Fi dongle:**

Wi-Fi technology handles the wireless part of the communication channel; it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). We need to install some software to configure Wi-Fi dongle on device [8]. Once it gets configured we can establish connection between them. Here, wifi communication established between user and raspberry pi using CUPS (common UNIX printing system) drivers [12].

### **4. Printer Drivers Development:**

CUPS uses PPD drivers for all of its PostScript printers, and has even extended the concept to allow for PostScript printing to non-PostScript printing devices, by directing output through a CUPS filter. Such a file is no longer a standard PPD, but rather a "CUPS-PPD". CUPS clients usually read the current PPD file from the server every time a new print job is created [11].

We install and configure CUPS drivers and then add and configure our printer in cups print server by

uploading PPD (Postscript Printer Description) file. A PPD file is a file that describes the fonts, paper sizes, resolution and other capabilities that are standard for a particular Postscript printer. A printer driver program uses a PPD file to understand the capabilities of a particular printer. PPDs function as drivers for all PostScript printers, by providing a unified interface for the printer's capabilities and features [12].

The entire scope is to print the transaction data from the raspberry pi to Printer through USB interface. The device driver is developed using Real Time Operating system. ARM compiler and debugger provided by ARM. The printer class driver handles the printer specific request. The printer class driver will be designed to support Printer [1]. The USB Bus Driver (USBDB) is involved in mediating bus access at two general times: While a device is attached to the bus during configuration and during normal transfers [5]. Where we are using USB 2.0 is connected between the raspberry pi and printer.

### **5. Results:**

We can print data anytime, anywhere from your Mobile phone or laptop without any manual wired connection through it. Now you can instantly print PDF files, text files and png ,jpg format file more directly from your device to a printer. It requires an interfacing between the controller and Wi-Fi dongle. The Wi-Fi module accepts data and gives to controller for processing. The Printer is interfaced with Controller which receives data from Mobile and gives to the printer. The CUPS is installed in OS of Raspberry pi which converts normal data file into printing format and we get printed document.



**Fig 4: Printer setup**



**Fig 5: Experimental result**

#### IV. Conclusion

In common data printing method, one has to use laptop or desktop computer as a relay medium. First receiving the data from Mobile, Copying it on computer and then sending it to printer for printing. This is time consuming process.

This paper proposed the design of a low cost Wi-Fi to USB data converter, which is capable of receiving data and controlling Printer device via the Wi-Fi port of Mobile. This approach can be used for time saving and it is simple and practical.

By using this approach we can more easily print data from mobile device.

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