

NFC Pendrive

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Abstract: Near Field Communication (NFC) is an emerging technology, which offers an enhanced interaction for users by simplifying data transfers, secured payment transaction access and many more. In this paper, we use NFC technology inside a pen drive, where the data transfer occurs wirelessly by keeping the pen drive in contact with the laptop without plug and play. NFC technology is mainly based on mutual induction.

Keywords: RFID (Radio Frequency Identification), NFC Module, Raspberry Pi

I. Introduction

In recent years' flash drives have become common place as detachable storage devices for personal computers and similar portable computer devices. The progress of flash drives in the industry has been characterized by a continual increase in storage capacity and a continual decrease in price per unit of storage. Although many peripheral devices are converting to wireless connectivity, flash drives typically only transfer data through a hard-wired universal serial bus connector.

In this paper, we propose an NFC pen drive, which comprises of a NFC coil, WIFI module and a flash memory. Here an ordinary Wi-Fi pen drive is attached by an NFC coil which is having a potential to act both as an emitter and a receiver. By making use of NFC pen drive, data transfer can take place wirelessly without plug and play between the pen drive and the parent device.

In this system, pen drive is kept powered near the parent device so that exchange of data can take place easily. The Raspberry Pi is a credit-card sized computer that plugs into a computer monitor or TV. We can interface Raspberry Pi using a standard keyboard and mouse. In this Project, we are using Raspberry Pi for interfacing the NFC Explore module with pen drive.

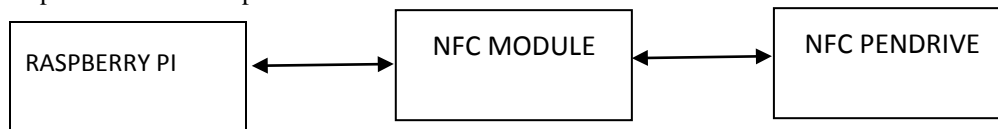


Fig no:1 Block diagram

II. Proposed System

In this paper, we propose an NFC pen drive, which comprises of a NFC coil, WIFI module and a flash memory. Here an ordinary Wi-Fi pen drive is attached by an NFC coil which is having a potential to act both as an emitter and a receiver. By making use of NFC pen drive, data transfer can take place wirelessly without plug and play between the pen drive and the parent device.

The proposed system consists of two main parts namely:

- NFC port
- NFC pendrive

The data from NFC pen drive can be displayed and decoded with the help of this NFC port. The port acts as a working medium for the NFC pen drive. The NFC port is build-up of many components namely Raspberry PI, NFC Explorer, Wi-Fi dongle.

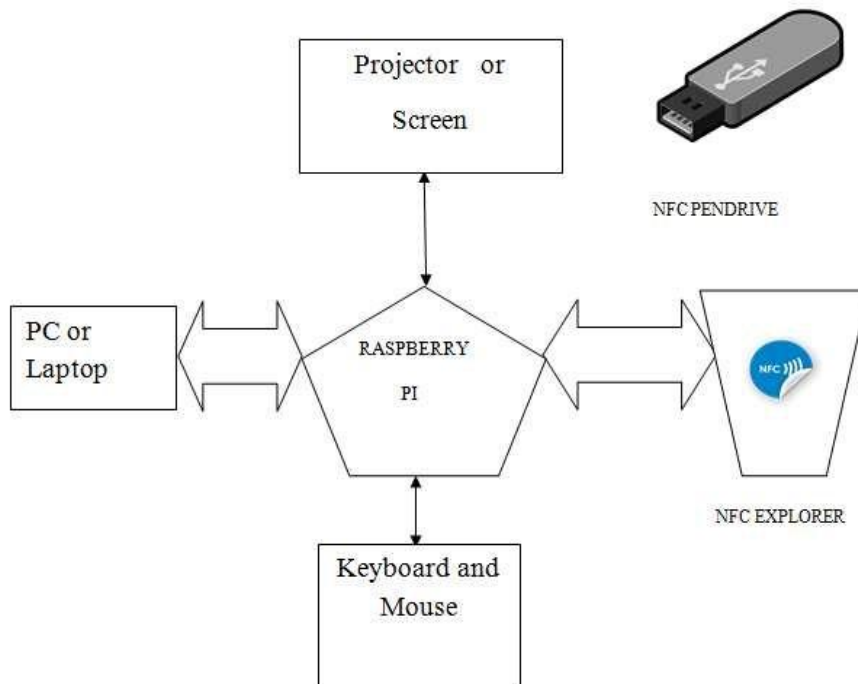


Fig no:2 Block diagram of complete system

The block diagram of proposed NFC pen drive is shown in Fig 1. It consists of 5 modules representing Raspberry pi, NFC explore, LCD display module, screen/projector. The circuit diagram of the system is shown in Fig 2. The screen/projector is connected with raspberry pi to display the received data from pen drive. The NFC explore is interfaced with the raspberry pi which decodes the information present in the NFC pen drive.

2.1 NFC Port

2.1.1 Raspberry PI

The Raspberry Pi is a credit card sized computer. To get started quickly, the Raspberry Pi Foundation provides several preconfigured Linux distributions. For the project described in this guide we are using the “Raspbian Jessie”. The Raspberry pi is not having any inbuilt Wi-Fi network as we are using Raspberry Pi 2 so a Wi-Fi adapter is to be plugged in and configured for Wi-Fi connections.



Fig no:3 raspberry pi

2.1.1.1 MAIN COMPONENTS OF RASPBERRY PI:

There are mainly ports available inside the raspberry pi. 1 GB of RAM size is available for storage purpose. A 5v Micro USB power connector is there into which you can plug your compatible power supply. USB is used as connection port for peripheral devices of all types (including your mouse and keyboard).LAN acts an interface between pen drive and parent device. HDMI allows to hook up a high-definition television or other compatible device using an HDMI cable.SD CARD is used for installing pi OS or any other system. Audio Out is a standard 3.55-millimeter jack for connection of audio output devices such as headphones or speakers. Light-emitting diodes(LED'S), for all indication light needs.GPIO pins are exposed general-purpose input/output connection pin through which modules can be connected and programmed.

2.1.2 EXPLORE-NFC

EXPLORE-NFC is a high performance fully NFC compliant expansion board for the Raspberry Pi. Based on the NXP PN512 solution, EXPLORE-NFC meets compliance with Reader mode, P2P mode and Card emulation standards. The board features an integrated high performance antenna and offers a flexible SPI interface. It is fully supported by the NXP NFC Reader Library. The NFC Explore is been interfaced with raspberry Pi to help the automatic pairing process of the NFC Pen drive.

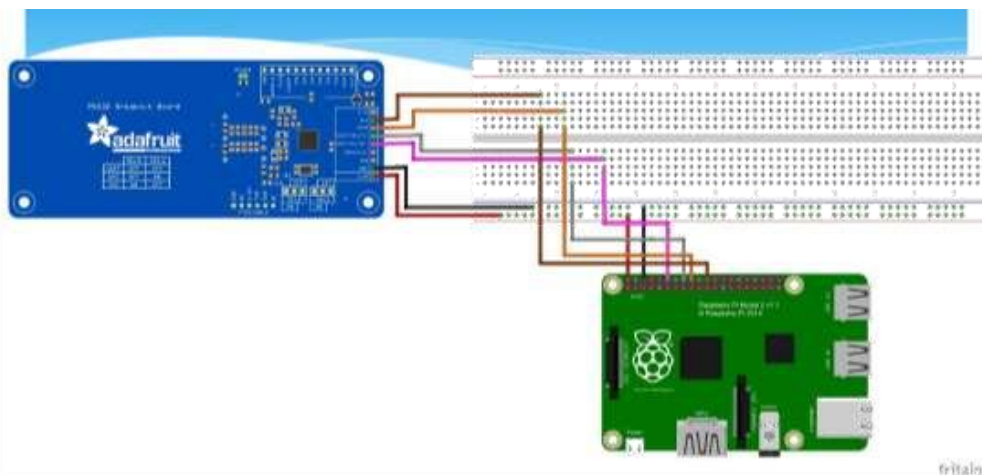


Fig no:4 interfacing of pi and NFC explore

2.1.2.1 FEATURES

NFC Explorer is having high performance full NFC compliant expansion board for the Raspberry Pi Based on NXP PN512 full NFC forum compliant solution, and meets compliance with all 3 NFC modes (Reader, P2P and Card Emulation).Reader mode supports 4 NFC tag types and NXP MIFARE proprietary commands. The Software available at www.element14.com/exploreNFC.Flexible interface selection (SPI or I²C), software currently supports SPI.Integrated high performance antenna is an important feature. It is complete with MIFARE RFID card.

2.1.3 NXP NFC Reader Library and Linux

The software described in this guide is based on the NXP NFC Reader Library. The NXP NFC Reader Library is written in C language enabling the customers to create their own software stack for their contactless reader. To get the NXP NFC Reader Library to work on Linux, some of the relevant parts have been ported to Linux. At the moment, only SPI protocol is ported for the communication between reader IC and the Raspberry Pi.

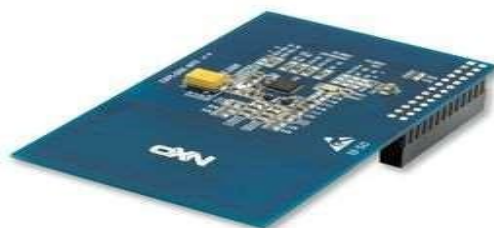


Fig no:5 NFC Explore Module

2.1.4 NFC TAG

NFC technology is pretty common these days and features in most high-end smartphones. As well as phone to phone communication, small little NFC tags can also be used to store and transfer information. You will probably have noticed small NFC tags next to advertisements near bus stops, stickers in shops, or may have even come across the clever idea of using NFC enabled business cards. These tags can store wide ranges of information, from short lines of text, such as a web address or contact details, to links to apps in the Google Play Store. It's a quick and efficient way to quickly push information to your phone and these little tags can replace bar and QR codes, and could even be used instead of Bluetooth in some cases. So here's how it works.

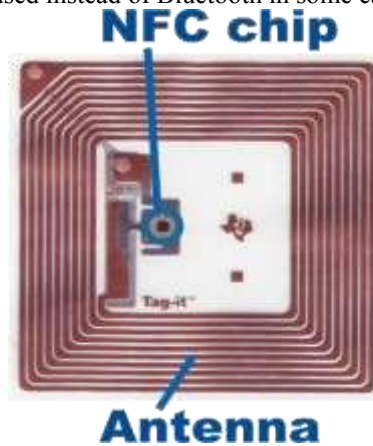


Fig 6 NFC Tag

2.2 NFC PENDRIVE

NFC pen drive consist of Wi-Fi module and SD card slot with the power supply. AURDINO based Wi-Fi module is used to interface SD card slot soldered to it. The Wi-Fi module is programmed to display the contents of the memory card inserted in the SD card slot. The data can be transferred using an IP address. There is no data restriction for the pen drive, it is depending upon the memory card inserted. The Wi-Fi module act as hot spot device.

III. Working

The NFC port consist of Raspberry-PI, NFC explorer and Wi-Fi module. The Raspberry PI is used to interface explore module which help in automatic pairing of pen drive. The interfacing has been coded in Python. The NFC explore act as Tag reader which helps in detecting the tag and connecting to the Wi-Fi network of pen drive.

After the program is initialized the LED 16*2 Display will show to place the NFC pen drive on NFC port. Then place the NFC pen drive consisting of NFC chip. The NFC chip is being coded to generate the Wi-Fi SSID and password generated by the hotspot module of NFC pen drive. When the pen drive is detected by NFC explore module the led display will shows that the pen drive is connected and Wi-Fi network of the raspberry pi switches to the newly initiated pen drive Wi-Fi network. So, it will automatically pair up the Wi-Fi network and data transfer is possible through an IP address. Whenever the Pen drive is detected it will automatically open up the browser with the IP address in which data of the pen drive is accessible.

IV. Conclusion

In this present scenario when technological innovations are on its hype, this project will be a great boon to the world. Every field is changing to wireless connectivity. But one of the major drawbacks in attempts to convert flash drives to wireless have generally suffered from by the problems of slow data transfer rates and excessive manual setup by the operator to initiate a transfer. Our project is also facing those problems. The smart future depends widely on applications with NFC. By recovering the speed of NFC and other defects of NFC it will make a wide range of upgrade on technological field. All we have to do is to make all aware about applications of NFC which is the future.

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