

Remote Tutor – A Novel Interactive Collaborative Teaching Method for E-learning an application of Raspberry Pi

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Abstract

The motive is to offer a framework that deliver free educational content to school children in rural areas who need the resources without any internet connectivity. The Raspberry Pi with wifi router creates a Network Attached Storage (NAS) environment and the data on Raspberry Pi can be made available to everyone with the app connected to same network as that of Raspberry Pi. This system offers an effective solution for students and provides them with a mobile learning platform using the application developed. The whole system is built on Raspberry Pi along with wifi adapter which is used for wireless communication with the android application. The system is completely portable which can be implemented in areas that lack of educational resources and internet facilities are not available.

Keywords: NAS, Raspberry Pi, ICT.

1 INTRODUCTION

The relevance of basic education is a major concern in rural areas of developing India. When community schools are relevant and educate the right target, the process of rural development can occur relatively much faster, but many a times schools either don't exist or service their purpose. The problem of education and relevance in rural areas needs to be recognized and addressed immediately through strategies and technologies. Our attempt is to expand basic education to reach more learners in rural areas needs to be complemented by ICT to ensure that the content, quality, delivery, and relevance of educational content to effectively meet the learners' needs.

The Raspberry Pi is extremely low-cost, low power hardware with the size as that of credit card. It can be a very nice platform for a small network appliance. This is a single chip contains the Pi's memory, central processing unit and graphics chip. The Raspberry Pi uses a chip designed by ARM. It is a small computer that can be used for a variety of projects and has been heralded as a great boon to education due to its flexibility and simplicity.



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Network attached storage (NAS) is a networking storage device where you connect to a network where the NAS is connected, and you will be able to access the files in the device itself. Network-attached storage (NAS) is a type of storage device that is connected to a local area network with file-based shared storage through a standard Ethernet connection.

2 LITERATURE SURVEY

“A novel Educational Platform, based on the Raspberry-Pi” suggests that the purpose of the platform is “education using ICT”, as opposed to computer education, on which most other Pi-based projects concentrate. The Pi hardware is very small and of sufficiently low cost facilitating students to own for home use, in addition to its obvious use in schools, for which it is primarily intended [1].

“E-Workbook System Based on Raspberry Pi”, the paper presents an efficient method that automatically tutorial distribution over student, tutorial checking, marking and grading has been done through paperless. The whole system is built on Raspberry pi along with Wi-Fi adapter is used for wireless communication [2].

“Experimental model of Low Power NAS and Cloud drive based on Raspberry Pi” this existing paper focused on integrating NAS and Raspberry Pi for designing low power network storage. This existing system was implemented on Linux with a samba server with NTFS file system [3].

“Exploring the Internet of "Educational Things"(IoET) in rural underprivileged areas”, this paper presents the design and development of an Internet of Things (IoT) educational mobile learning tool for primary school students in rural underprivileged areas of northern Thailand is presented [4].

“GreenEduComp: Low Cost Green Computing System for Education in Rural India”, in this paper, an inoculated combination of technologies is used to facilitate and advocate education in Rural India. A combination of open-sourced Arduino, single board-processors like Raspberry Pi are used to develop infrastructure to empower education in remote and rural parts of India [5].

3 METHODOLOGY

The proposed method is developing an android application Raspberry Pi & Wi-Fi adapter to provide wireless communication for duplex data transmission between admin unit & students unit through the access point, if they are available in one network.

Figure 1.1 shows the basic setup of the project. Raspberry Pi consists of USB ports, to this ports storage pool like hard disk is connected. 5V/2A of power is supplied to the Raspberry Pi. SD card is inserted in card slot, input devices like keyboard and pointing device like mouse is connected to Raspberry Pi's USB port. Through the HDMI port monitor is connected to Raspberry Pi. Wi-Fi router is connected to Raspberry Pi and a static IP is generated.

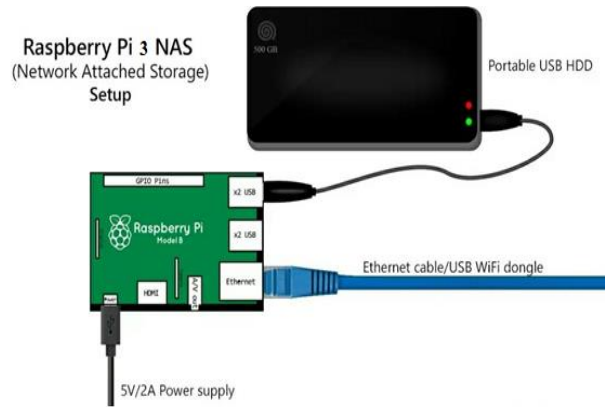


Fig 1.1 The Basic Setup of Raspberry Pi

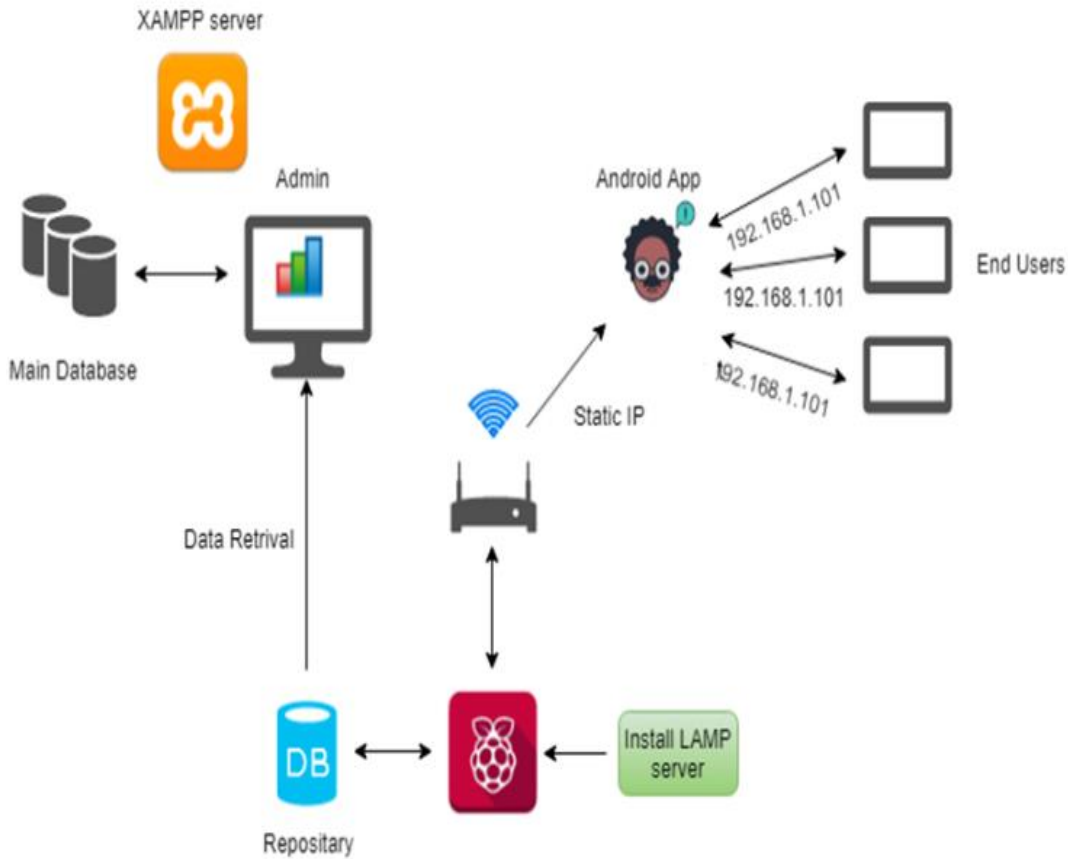


Fig 1.2 Experimental Setup of Raspberry Pi

Figure 1.2 shows the experimental setup of the project. Once the basic setup is done static IP is obtained from router through this IP address all the devices can be connected to access resources.

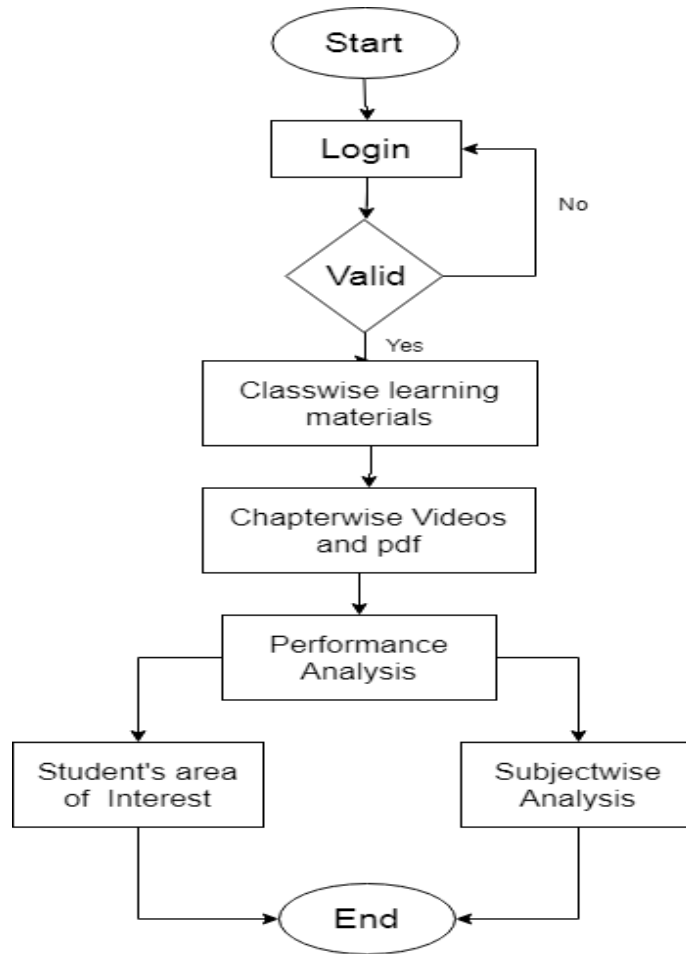


Fig 1.3 Flow diagram of the mobile application

Figure 1.3 shows the flowchart of the application. Student will login to the application using unique id like roll number once it matches with the specified one student can access the course material which is present in folder structure format like class wise, subject wise, chapter wise data containing pdf and videos, by considering statistics of video viewed admin will provide a report containing student’s area of interest.

4 RESULTS

Connection is made as showed in figure 2.1 and content stored in Raspberry Pi is accessed by the developed app using IP address. Developed app’s view is showed in figure 2.2 to 2.3.

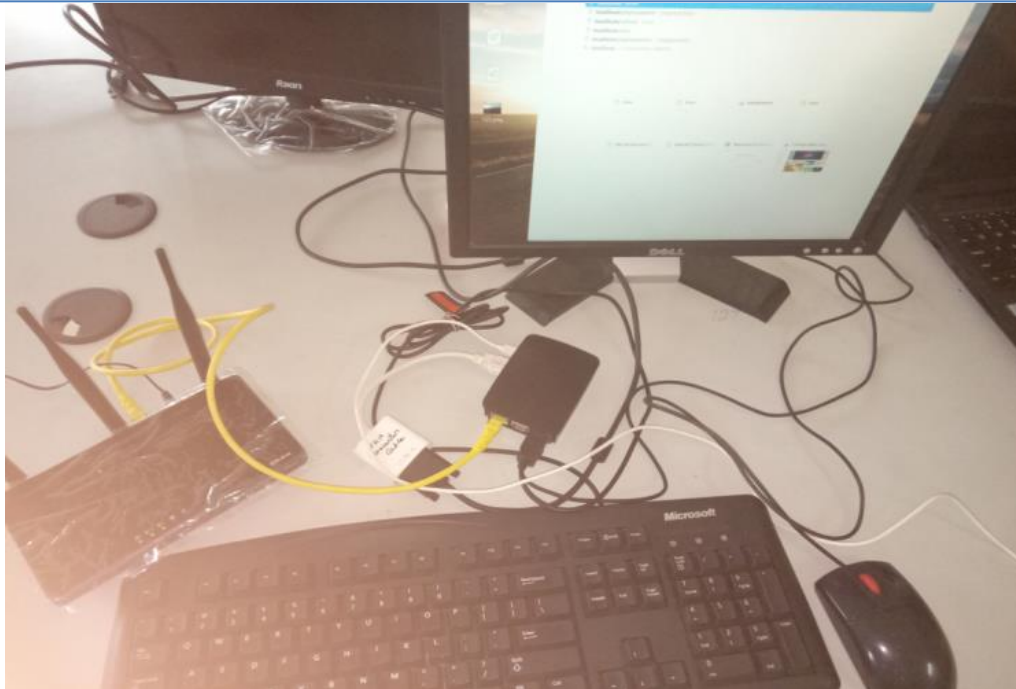


Fig 2.1 Actual setup of Raspberry Pi

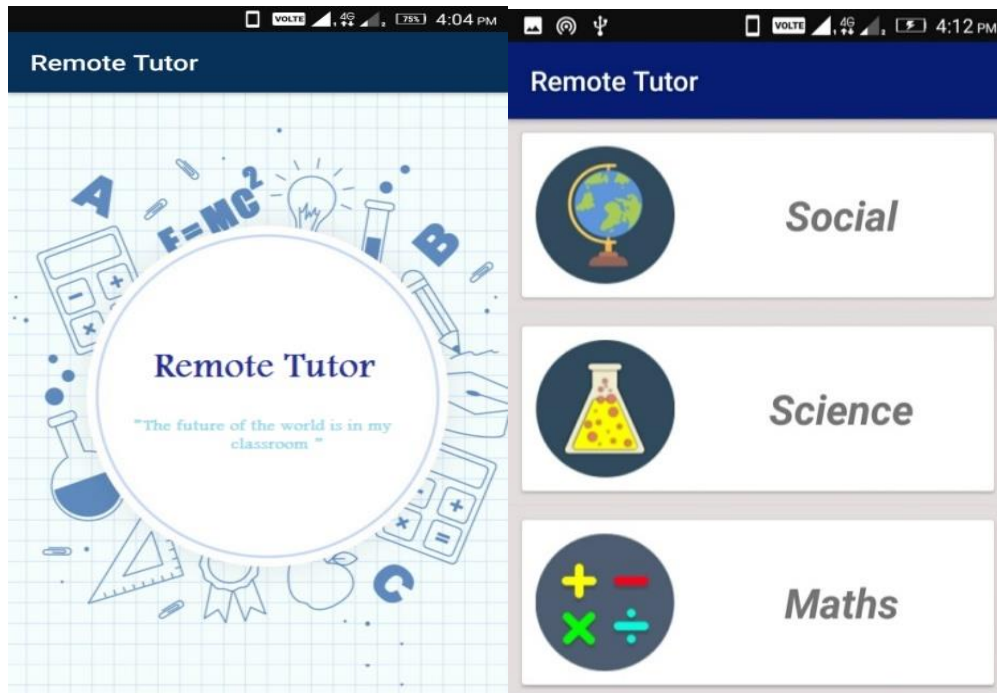


Fig 2.2 Splash screen of the app

Fig 2.3 Grid view of the app

5 Conclusion and Future Work

This project concludes by implementing Network Attached Storage using Raspberry Pi for efficient data accessing over centralized storage with low cost. An Android app is designed to

access the contents of the storage connected to Raspberry Pi using a Wi-Fi router. The project implemented helps in accessing educational materials without any internet connection provided to students from remote areas. The whole system has low-cost, good openness and portability and also it is easy to maintain and upgrade. We can further enhance this project by adding offline dictionary support, adding learning materials in native languages and Scalability can be increased by connecting more devices to Raspberry Pi using the Wi-Fi router using repeaters to increase the network range.

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