Turkish Journal of Computer and Mathematics Education Vol.12 No.10 (2021),6073- 6077

Research Article

Implementation Of Low Cost Classroom Education Using The Smart Pi Zero

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 28 April 2021

Abstract- The Raspberry Pi and its editions have brought with them an aura of amendment in the global of embedded structures. With their amazing computation and verbal exchange capabilities and low footprint, these gadgets have thrown open the chance of figuring out a network of things at some stage in a very fee-efficient manner. At the same time as such networks offer accurate solutions to super issues, they may be honestly a long way from being clever. Most of the currently available implementations of one of these community of gadgets involve a centralized cloud-based totally server, which helps to make the necessary sensible selections, leaving those devices underutilized. Although this paradigm offers a quick and easy solution, it has limited scalability, is less robust and sometimes proves costly. As the technology increases day by day there came many changes even in the home automation system in the present-day world and everything can be managed with the help of raspberry pi. This paper presents a minicomputer using Raspberry Pi which can play videos, power point presentation.

Keywords: Raspberry Pi, IoT, System on Chip, Education, Low cost

INTRODUCTION

Many Processors came into existence from padt few decades which are serving for various purposes. Out of many borads in market recently heard device is absolutely in card size the Zero Pi by Raspberry using Rasbian OS. This is a board computer of very small in size like credit card.

It has evolved within the united kingdom by means of foundation of "Pi" Stimulating with the purpose to serve the Schools for teaching the Computer Science basics. But not only the Schools it is serving the purpose of higher educational institutions at low cost. The development in recent times about the "Raspberry Pi" acting as a mini-pc , and unlocking the excellent capacity for computing.It can be implemented in a substantial number of regions. Due to the specific benefits of the raspberry pi system, this technology holds tremendous promise for supplying answers in the developing world. There are various cheaper gadgets available , but no relate with this processor comaparivtely , As this uses the ARM processor which is highly reliable. It is based on net and technologies of wireless band having numerous structures which are priced reasonably with high data transmission. It networks wirelessly.

The adevent availability of this credit card sized computer brought revolution in this era. It enabled several automatic gadgets, having low consumption strength with processing capability quicker at a very decresed cost.But, the state-of-the-art advances have helped to reduce the complexity of enforcing wi-fi sensing and actuation systems and have made it quite smooth to put into effect a prototype tool for evidence-of-idea and demonstration functions.

The Young people who are students got encouraged as it super cheap for the to use as a computer system, with which they can learn , program and innovate new things.

It's also a really perfect platform for interfacing numerous devices with an extensive series of software for it has a huge quantity of i/o peripherals and network verbal exchange . Although it can not update the big laptop systems and laptops however despite the fact that it's miles very efficaciously used in lots of huge responsibilities because of its low fee and powerful capabilities and functionalities although it can not update the big laptop systems and laptops however despite the fact that it's miles very efficaciously used in lots of huge responsibilities because of its low fee and powerful capabilities and functionalities . The most suitable operating system which may be used with raspberry pi is the raspian working gadget. This is because it's far a linux primarily based working device, that's specially designed for the raspberry pi. Raspian is a formally supported working system by using the raspberry pi basis . This working system is a linux based definitely one and it helps all programming languages like python, c, c++and so forth.

The IoT (Internet of Things) is a group a devices related over a network the use of cloud computing, web packages and network communications for you to proportion facts, keep and retrieve information. The Computing system is engraved on SoC(System on Chip) which is an integrated circuit and electronic chip. Development of (SoC) has led drop in production cost of computing systems. This has led a very low cost for and end user . A highly dynamic, large number of intelligent objects and distributed network is Internet of Things they can communicate and interact with any network or end-users. IoT devices senses and act on the data. IoT is small, flexible and less cost that allows computing made easy for the end-user in this era. Raspberry Pi, is one of such smaller computing and prommable device which is an inexpensive and successful in the usage of IoT applications.

The ARM Processors

The ARM processor is the heart of the Raspberry Pi board having RAM, SnapShots chips, GPIO and other devices are connected with connectors. ARM means " Advanced RISC Machine processor" which is the CPU family.The instructions required for this processor is very less and it uses very low power for operation. This is built with reduced complexity in ciruit. SO that the SoC perfectly fitted in to devices with very less in size. ARM is one of the widest range and fastest micrprocessor, the operation performance is single at a time. The latency is very low and responses quicker in time. These processor are deisgned in such way that the ARM performs processing in Multiple way. The Pi in running process of comparable to computer is similiar at a very low cost.It also calls for the extra components, those are mouse with keyboard, display Unit, Supply , SD Card with OS booted for the operation. For Connectivity to internet , USB Ports are Provided.No internal storage devices. One of the main disadvantage of uaing the ARM is ,it is not Suitable with X86, so cannot have windows GUI uses the Linux version.

The Raspberry Pi-a single board computer credit card raised by the Raspberry Pi Foundation, UK. The board is a diminutive surprise, packs apex computing electricity and successful to expand first rate initiatives. The laptop prices among $5 and $ 35 and is best for wearing out all forms of computer tasks and interfacing one-of-a-kind types of devices via GPIO. It was first developed to promote teaching and learning of basic computer science.

RASPBERRY PI Zero

There are many Pi from past few decades starting from A, B,B+, etc , now the zero version is latest and pocket friendly. The Raspberry Pi ero version is shown in Figure.1. is a smaller form of single board computer (SBC). An entire computer has embedded, it consists of onboard Wi-Fi module. Raspberry Pi 0 (and pi zero w) and the Raspberry Pi 3 forums are equal except that the w is constructed in Wi-Fi and bluethooth. The Zero uses a HDMI mini connector on a monitor or TV and saves space. One company, Ciseco, is using the Pi as the computing brains of a home-automation system, linking many different devices in the home using low-power radio communications . Raspberry Pi allows linux-based open source working structures. Till date extra 30 operating systems based on extraordinary flavors of linux is being released.The Raspberry Pi foundation has additionally released some of add-ons including digicam, gert board and compute model kit for hardware add-on modules. The Raspberry Pi is used as a web server.

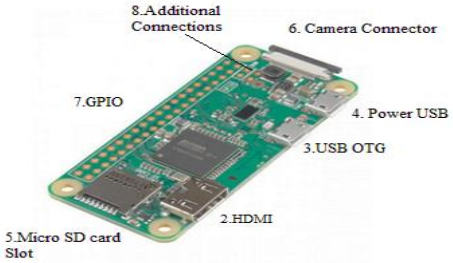

Figure.1. *Raspberry Pi Zero with Main Components*

A.Mini HDMI

In evaluation to preceding Raspberry Pi fashions the zero use a mini HDMI connector in Fig.1. to store the gap. To attach 0 to a display or television a mini HDMI to a HDMI adapter or cable is needed.

B.USB On-the-Go

A 2-4 widespread USB connectors, mice, keyboards and Wi-Fi dongles, that historically all Raspberry Pi models have. That allows you to keep space once more, the zero opted for an on-the-pass (OTG) USB connection. The pi 0 have identical Broadcom IC same as the unique fashions of Raspberry Pi A and A+. Where as the pi B, B+, 2 and 3 fashions, which use an onboard USB hub to permit multiple USB connections, this IC connects directly to the USB port and allows OTG capability. USB On the Go slot is shown in Fig.1.

C. Power

Power is supplied via a Raspberry Pi zero micro-USB connector shown in Fig.1. The Raspberry Pi need 5V,2.5A electricity deliver.

D. MicroSD Card Slot

The microSD card slot shown in Fig 1 is another familiar interface. Insert your microSD cards containing image files of Raspberry Pi.

E. Wi-Fi and Bluetooth

The Raspberry Pi 0 offers wireless LAN connectivity for both 802.11n and Bluetooth 4.0. This makes connection through USB, consisting of a Wi-Fi dongle, a USB, keyboard and a mouse.

F. Camera Connector

A camera connector is on board on Raspberry Pi Zero V1.3+ and all Zero Ws. The connector is, however, a0.5mm 22pin and distinct from the Pi fashionable. A different cable is used to connect the digital camera to the Pi 0 W.

G. GPIO

These are for communicate with input and output of digital gadgets. Those pins are to be activated or deactivated, depends upon the programming [17]. Like all other Raspberry Pi models, a plethora of GPIO pins are broken out. To have GPIO header soldering headers are considered which are shown in Fig.1.

H. Additional Connections

Finally, you can see two-hole pads on Fig.1 labelled TV and Run. A RCA jack is connected in place of HDMI on the board. The run pins connect with the reset pin of the chips and both flip off the board or turn it back on while it is shut. Connecting a button here is a great way to energy your panel.

The components required for the connections are: HDMI cable, Wireless mouse and keyboard, SD card of memory 32GB and Charger cable. The keyboard and mouse are related to the provided ports of the Raspberry Pi.SD card is connected on the back side of the pi. Connect the desktop and Raspberry Pi using the HDMI cable shown in Fig.2.

Figure.2 Assembled Components for installation

I Commands Used For Installatıon

After turning ON the Raspberry Pi on desktop, localization must be done. Localization is done in the local settings which assures the completion of the process by correct time on right side, top of the desktop. In the terminal the commands must be given for the complete installation of pi. Command for update: “sudo apt-get update”.Command for upgrading: “sudo apt-get dist upgrade”. The whole process may take a couple of hours and then rebooting is done. Now, Raspberry Pi is ready for operation.

J Working Procedure

Once the Raspberry Pi is installed, it is ready to operate as a mini computer. First, a pen drive is connected in which desired files are casted without a desktop. A wireless mouse and keyboard are the helping hands of this minicomputer, which are operated by connecting a USB to the pi. The connection of the USB is indicated on the screen of the pi. Open the files, to play a video a command must be given to the pi “omxplayer o-HDMI /media /pi/folder name/video name.mp4”.

OUTPUT AND DISCUSSIONS

Small or Mini Computers are very transportable, smooth to carry, speedy, easy to use and they can bold charge for a longer time. But they don’t have USB ports, CD/DVD drive, smaller keyboard, not much storage

and smaller to do certain projects. The below picture in Figure 3 shows is a result of the power point presentation as a virtual desktop. That is, it shows the PPT in the pi using libre office which is an installed app in Pi store. There are various uses in Pi Zero, not only the Class Room Education for professional and Elementary school, which is of low cost. Every class room can have equipped with one Pi Zero for the online education at low cost and can be bounded in room. It also has various software's in built in it. Some are Python, Mathematica, the wolfram, Scratch etc by which many hardware projects can be operated.

Boppana and James M. Conrad *Bluetooth Communication using a Touchscreen Interface with the Raspberry Pi* jmconrad@uncc.edu Electrical and Computer Engineering, University of North Carolina, Charlotte, NC, USA 28223-0001

References:

1. Murat Ali, Jozef H.Vlaskamp, N, Eddiny, Ben Falconer, Colin Technical Development and Socioeconomic Implications of the Raspberry Pi as a Learning Tool inDeveloping Countries Oram__School of Engineering, The University of Warwick
2. Md Saifudaullah Bin Bahrudin Rosni Abu Kassim, Norlida Buniyamin Development of Fire Alarm System using Raspberry Pi and Arduino Uno Faculty of Electrical Engineering University Teknologi , MARA
3. Sheikh Ferdoush, Xinrong Li Wireless Sensor Network System Design using Raspberry Pi and Arduino for Environmental Monitoring Applications ∗ Department of Electrical Engineering, University of North Texas, Denton, Texas, 76203, USA.
4. Nikhil Agrawal, Smita Singhal (ICCCA2015) Smart Drip Irrigation System using Raspberry Pi and Arduino International Conference on Computing, Communication and Automation ISBN:978-1-4799-8890-7/15/$31.00 ©2015 IEEE 928.
5. Carlo N. Cabaccan, Febus Reidj G. Cruz, Ireneo C. (2017) Wireless Sensor Network for Agricultural Environment using Raspberry Pi based Sensor Nodes Agulto , IEEE.
6. H.-Q. Nguyen, T. T. K. Loan, B. D. Mao, and E.-N. Huh, (2015)"Low cost real-time system monitoring using Raspberry Pi," in Ubiquitous and Future Networks (ICUFN), 2015 Seventh International Conference on.IEEE, pp. 857–859.
7. Bhavkanwal Kaur Pushpendra Kumar Pateriya Mritunjay Kumar Rai(2018) An Illustration of Making a Home Automation System Using Raspberry Pi and PIR Sensor 2018 InternationalConference on Intelligent Circuits and Systems IEEE
8. Vamsikrishna Patchava, Hari Babu Kandala, P Ravi Babu (2015) A Smart Home Automation Technique with Raspberry Pi using IoT International Conference on Smart Sensors and Systems (IC-SSS) IEEE.
9. Charalampous Doukas, "Building Internet of Things With The Arduino," CreateSpace Independent Publishing Platform, vol.1,2012.
10. Kiruthika.R A.Umamakeswari (2016)Intelligent Appliances Controller Using Raspberry Pi Through Android Application & Browser ,IEEE.

11. Vikas Kumawat, Shubham Jain, Vikram Vashisth, Neha Mittal, Bhupendra Kumar Jangir,(2017) Design of Controlling Home Appliance Remotely Using Raspberry Pi 2nd International Conference for Convergence in Technology IEEE
12. BoardDhiraj Sunehra,B. Harish Kumar(2017) WSN based Automatic Irrigation and Security System using Raspberry Pi International Conference on Current Trends in Computer, Electrical, Electronics and Communications (IEEE-ICCTCEEC).
13. Dhiraj Sunehra, J. Nikhila "Web based Environmental Monitoring System using Raspberry Pi" International Conference on Current Trends in Computer, Electrical, Electronics and Communication (ICCTCEE-2017) IEEE.
14. www.EandTmagazine.com April 2013 Engineering & Technology NOT--SO—HUMBBLLEE RASPBERRY PIGETS BIG IDEAS
15. M Narayana Murthy, P.Ajay Sai Kiran A Smart Office Automation System Using Raspberry Pi (Model-B),Proceeding of 2018 IEEE International Conference on Current Trends toward ConvergingTechnologies, Coimbatore, IEEE.