

Students Attendance Monitoring and Access Control Using Embedded Linux OS based Single Board Computer Raspberry Pi



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ABSTRACT:

A real time handheld system design: Raspberry Pi, is a credit card sized single board computer, which was introduced with the intention of promoting the teaching of basic computer science in schools. It is built using ARM11 processor. This project deals with Radio Frequency Identification card for an attendance recorder system for the purpose of maintaining attendance details of the employee and Global Positioning System for setting up a clock for raspberry pi without an internet connection. It incorporates protocol named Network protocol, which is a networking protocol for clock synchronization during the availability of internet. Raspberry pi uses Raspbian operating system with supporting tools python or PHP. Using an application included in Raspbian, users can browse through several categories and download what is necessary.

Keywords:

Raspberry Pi processor, GSM technology, RFID module, Camera module, RFID tags.

I. INTRODUCTION:

This project deals with face detection and Radio Frequency Identification card for an attendance recorder system for the purpose of maintaining attendance details of the students. Students faces are pre stored in class databases. Raspberry pi camera capture the student face and compared to database image if it is matched means that student attendance register with time.

And Radio Frequency Identification card used for access control in the authorized area. The Raspberry Pi is a credit card sized single computer or SoC uses ARM1176JZF-S core. System on a Chip is a method of placing all necessary electronics for running a computer on a single chip. Raspberry Pi needs an Operating system to start up. In the aim of cost reduction, the Raspberry Pi omits any on-board non-volatile memory used to store the boot loaders, Linux Kernels and file systems as seen in more traditional embedded systems. Rather, a SD/MMC card slot is provided for this purpose. After boot load, as per the application program Raspberry Pi will get execute.

II. RELATED WORK:

2.1 BLOCK DIAGRAM:

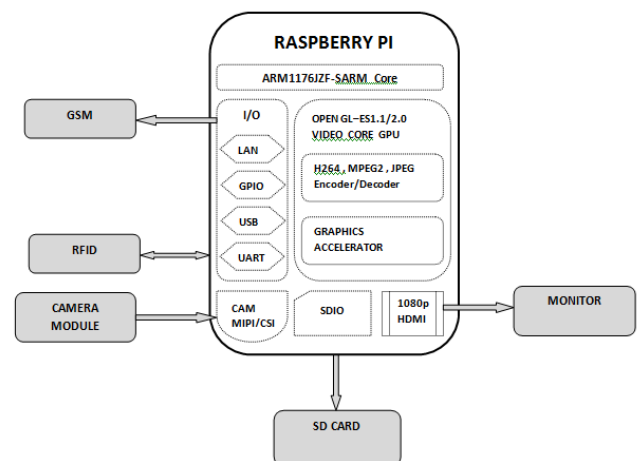


Figure-1: Block Diagram of project

2.2 EXISTING METHOD:

In the existing system students attendance monitored by Radio Frequency Identification card method. For registering attendance students need to show his personal RF ID.

2.3 PROPOSED METHOD:

In our proposed system with face detection and Radio Frequency Identification card for an attendance recorder system along with Raspberry pi.

III. HARDWARE COMPONENTS:

3.1 RASPBERRY PI PROCESSOR:



Figure-2: Raspberry Pi diagram

The Raspberry Pi board involves a processor and snap shots chip, Random Access Memory (RAM) and more than a few interfaces and connectors for external devices. Some of these instruments are main others are optional. It operates in the identical method as a ordinary pc, requiring a keyboard for command entry, a show unit and a vigor give. considering that raspberry Pi board operates like pc it requires ‘mass-storage’, but a tough disk pressure of the variety observed in a ordinary pc is not relatively in maintaining with the miniature dimension of Raspberry Pi.

3.2 GSM TECHNOLOGY:

GSM (Global System for Mobile communications: originally from Groupe Spécial Mobile) is the most popular standard for mobile phones in the world.

Its promoter, the GSM Association, estimates that 80% of the global mobile market uses the standard.[1] GSM is used by over 3 billion people across more than 212 countries and territories.[2][3] Its ubiquity makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. GSM differs from its predecessors in that both signaling and speech channels are digital, and thus is considered a second generation (2G) mobile phone system. This has also meant that data communication was easy to build into the system. GSM EDGE is a 3G version of the protocol. The ubiquity of the GSM standard has been an advantage to both consumers (who benefit from the ability to roam and switch carriers without switching phones) and also to network operators (who can choose equipment from any of the many vendors implementing GSM[4]). GSM also pioneered a low-cost (to the network carrier) alternative to voice calls, the short message service (SMS, also called "text messaging"), which is now supported on other mobile standards as well. Another advantage is that the standard includes one worldwide emergency telephone number, 112.[5] This makes it easier for international travellers to connect to emergency services without knowing the local emergency number.

3.3. RFID MODULE:

Radio frequency identification is a powerful emerging technology that enables companies to achieve total business visibility. By knowing the identity, location and conditions of assets, tools, inventory, people and more, companies can optimize business processes and reduce operational costs. Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly, using radio waves. RFID reader module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be pressed on to controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate.

RFID systems use many different frequencies, but the most common and widely used and supported by our Reader 125 KHz. An RFID reader typically contains a module (transmitter and receiver), a control unit and a coupling element (antenna). The reader has three main functions: energizing, demodulating and decoding. In addition, readers can be fitted with an additional interface that converts the radio waves returned from the RFID tag into a form that can then be passed on to another system, like a computer or any programmable logic controller. Anti-Collision algorithms permit the simultaneous reading of large numbers of tagged objects, while ensuring that each tag is read only once.



Figure-3: RFID module

3.4. CAMERA MODULE:

A UVC (or Universal Video Class) driver is a USB-category driver. A driver enables a device, such as your webcam, to communicate with your computer's operating system. And USB (or Universal Serial Bus) is a common type of connection that allows for high-speed data transfer.

Devices that are equipped with a UVC driver, such as the Logitech Quick Cam Pro 9000 for Business, are capable of streaming video. In other words, with a UVC driver, you can simply plug your webcam into your computer and it'll be ready to use. It is the UVC driver that enables the webcam to be plug and play. A webcam with a UVC driver does not need any additional software to work.

IV. RESULTS:

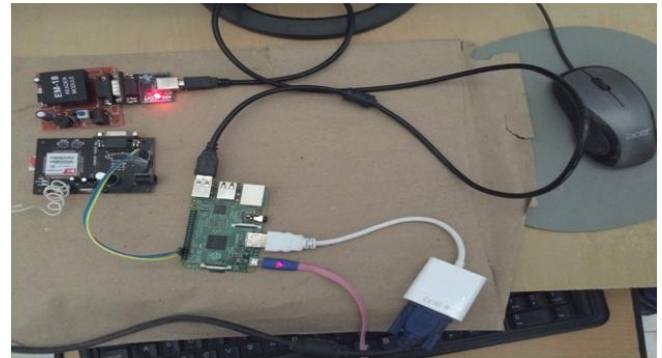


Figure-4: Hardware of the project

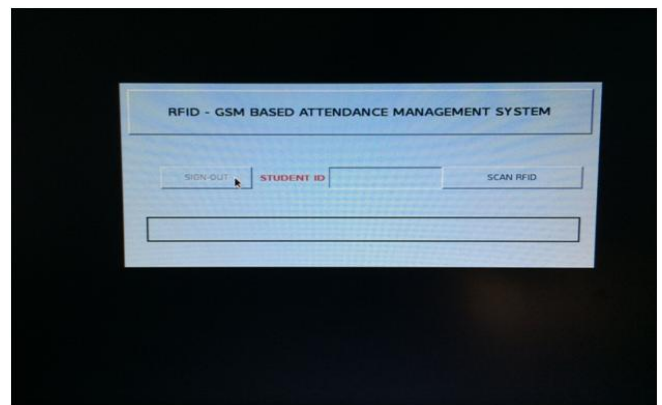


Figure-5: Output on monitor

V. CONCLUSION:

The project "Students attendance monitoring and access control using embedded linux os based single board computer raspberry pi" has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM11 board and with the help of growing technology the project has been successfully implemented.

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