Android Smart and Raspberry Pi interfacing over Bluetooth Serial Protocol

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ABSTRACT: The project aims in designing a system which makes operating of electrical appliances in home through Android mobile phone possible. The controlling of electrical appliances is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in this project the Android smart phone is used as a remote control for operating the electrical appliances using Raspberry Pi processor. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android boasts a healthy array of connectivity options, including Wi-Fi, Bluetooth, and wireless data over a cellular connection (for example, GPRS, EDGE (Enhanced Data rates for GSM Evolution), and 3G). Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications. Bluetooth is an open standard specification for a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable devices, such as laptops, PDAs (personal digital assistants), and mobile phones. It also will enable wireless connections for desktop computers, making connections between monitors, printers, keyboards, and the CPU cable-free. The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage. The controlling device of the whole system is a Raspberry Pi processor. Bluetooth module, 4-Relays board are interfaced to the ARM1176JZF-S 700 MHz processor Raspberry Pi. The data received by the Bluetooth module from Android smart phone is fed as input to the ARM1176JZF-S 700 MHz processor. The

processor acts accordingly on the Relays to switch connected electrical appliances. In achieving the task the controller is loaded with a program written using Embedded Linux programming language.

INTRODUCTION:

Today the technological world's centralized principle is to automate each conceivable factor for simplicity in lifestyles, providing protection, saving electrical energy and time. In that home automation is without doubt one of the principal matters to robotically on and off the house appliances. Residence automation can be characterised as a process for doing whatever with out human inclusion. It's going to include introduced together to manage of lighting fixtures, heating, ventilation, air-conditioning, machines, security door locking and special techniques, to provide extended convenience, comfort, vigour efficiency and safety. The notion of automate every appliances in dwelling is accomplished from a long time ago, it began with connecting two electric wires to the battery and shut the circuit via connecting load as a gentle. Later it can be developed by using one-of-a-kind businesses, creates its possess automation methods with special instruments like sensors, controllers, actuators, buses, and interfaces. There are few approaches for controlling residence automation programs. These may also be separated into two

major buildings:

i) wi-fi techniques and

ii) Hardwired systems.

Wireless programs: With wi-fi routines, that you may make use of amazing media, like Bluetooth, infrared, or radio frequencies, to control the automation approach. Hardwired programs: With hardwired routines, that you may utilize Ethernet hyperlinks, like fiber optic links, electrical wirings, phone lines, and even coaxial links are generally utilized as part of residence security method. In present days many of the automation methods utilizes the blend of hardwired and wi-fi methods for control the appliances. It should have each apparatus and programming established for proficient programs. The occurrence of dwelling automation has been increasing totally on account that of a lot larger reasonableness and ease through Smartphone's and wi-fi networks. Internet of things (IoT) is interlinked through these networks; in view that of the status of the dwelling automation is increased by the first-rate of carrier provided by using the instruments. One of a kind home automation methods are proposed through unique authors for routinely on and off the home equipment with distinct functions. In that, [1] ―Design

and development of Activation and Controlling of HomeAutomationSystem throughSMS utilizing Microcontroller‖. It predominantly concentrates on the manage ofdwelling-appliances remotely when the person is a ways from the house. On this approach GSM module is used for sending message, from in the course of the arena and 8051 microcontroller as a processing unit. Drawbacks: highly-priced structure, reliability, price. [2] ―Bluetooth far off HomeAutomation SystemUsing Android software‖. The principle control approach executes faraway Bluetooth innovation to present faraway access from computer/transportable pc or developed mobile with design of low cost, consumer friendly –interface and set up is convenient in manner. Drawbacks: Distance, bendy and security. [3] ―Design and implem-entation of homeautomation approach utilizing raspberrypi‖. This paper is specially worried with the programmed manipulate of light or whatever different house machines via internet making use of

raspberry pi, microcontroller and sensors. Drawbacks: intricate and expensive structure and high cost. [4] ―manage of Door and HomeSecurity by way of RaspberryPi by means of web‖. This paper intends to work a procedure is being created to become a member of any entryway with the web, in

order that the entrance manipulate that approach can also be controlled from at any place on the earth. Drawbacks: extremely expensive and elaborate to function. [5] ―Android situated HomeAutomation using RaspberryPi‖. This paper pursuits at controlling house appliances by means of Android mobiles making use of Wi-Fi as verbal exchange protocol interfaces and Raspberry Pi as processing unit. The server is interfaced with relay board that controls the appliances which can be walking within the home. Drawbacks: pricey, flexibility

PROPOSED SYSTEM:
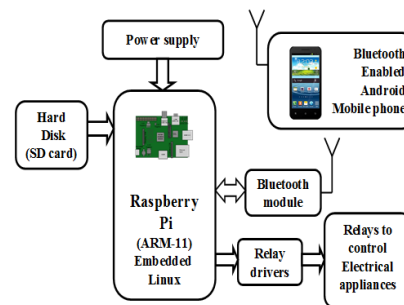
Raspberry Pi: Raspberry Pi is a processing unit, developed by Raspberry Pi foundation in UK is of size equal to the debit card. It has Broadcom BCM2835 System on Chip (SoC) module with ARM1176JZF-S processor. It having internal storage of 512 MB, 1- ethernet port, 2-USB ports, 26 GPIO pins for peripheral connections suported by raspberry pi, external storage suported upto 32 GB, DSI display connector, CSI camera connector, HDMI connector for display,

RCA video and audio jackies as shown in the below figure

Figure1: Raspberry Pi model-B board

The Raspberry Pi model-B CPU is of ARM 11 family, operates at 700 MHz. The GPU having broadcom Video core-IV, open GLES 2.0, 1080p30, H.264/MPEG-4, AVC high profile decoder and capable of 1Gpixel/s, 1.5 Gtexel/s (or) 24 GFLOPs of general-purpose (GPIO) compute. It operates, 1mA at 5V power supply. The GPIO pin configuration is shown in below figure.

Fig: pin configuration of Raspberry Pi

• 8 --- GPIO pins for external periperal connections suported by raspberry pi. • 2 --- UART, 2 --- I2C, 5 --- SPI Bus pins for transmitting and receiving data from one source to another source. • 2 --- 3.3V, 2 --- 5V pins for power supply connected to the external devices. Python is a default programming language for the raspberry pi with support of BBC BASIC, C, C++, Java, Perl and Ruby. We are considering Python as a main Programming language, for its benefits and features. It is suitable for real world applications with the addition of NumPy, SciPy, Matplotlib, IPython, and PyLab

Relay board: Relay is an electrically controllable switch widely used in industrial controls, automobiles and appliances. Here we are using 8-channel relay for switching and controlling the devices, having 8 independently-controlled SPDT relays. The Control signals use +5V logic levels and is of TTL compatible.

Key board and mouse: Key board and mouse are used to operate the Raspberry Pi, just like our normal computer (PC).

INTERFACING:

[1] First write the Raspbian OS in to a SD card by using ―Win32Disk Imager‖, and put it on Raspberry Pi board, and then give power to the Raspberry Pi.

[2] Connect card to the laptop to view the display of the Raspberry Pi operation, and it will show like below figure
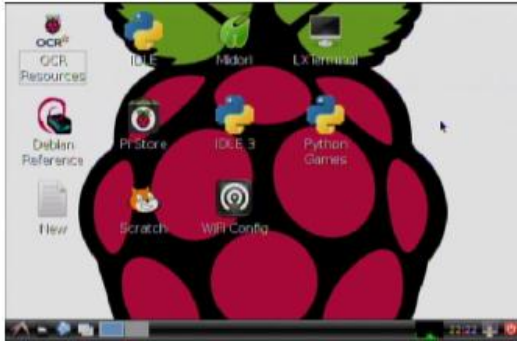
Fig : Desktop of Raspberry Pi

[3] connect kay board and mouse to the Raspberry Pi USB ports for operating the raspberr pi and change the keyboard settings by typing —sudo nano /etc/default/keyboard‖ on LX terminal from ‚UK' to ‚US', then reboot it by —sudo reboot‖.

[4] Configure the Raspberry Pi with the command —raspiconfig‖ according to need of the project requirements, then reboot it.

[5] Connect WI-FI dongle to one of the Raspberry Pi USB port for internet access and sending mails. Then configure that dongle to support the Raspberry Pi

[6] write the code for corresponding application in python IDLE. The flow chart of reading BODY of E-mail is shown below.

Conclusion and Future Scope

This mission introduces Android based home Automation approach utilizing Raspberry Pi. We analyzed other existing applied sciences what are their benefits and drawbacks and how our proposed procedure might be better than them. It additionally involves the design analysis section which include the scope of the venture, feasibility evaluation, use case diagrams. The design and plan analysis part would support us in setting up the project more efficaciously.

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