Raspberry PI based Home Automation System

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Abstract

Raspberry PI Based Home Automation System (RHAS) has been designed for Raspberry PI, having Linux platform to automate an 8 bit GPRS interfaced micro-controller which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This approach presents the automated approach of controlling the devices in a household. The algorithm is developed in Python language, the most famous and efficient technology for wireless communication- GPRS is used here to automate the system.

Keywords: Raspberry Pi, LAN, Home Automation, Display, Sensors, Relay

I. INTRODUCTION

The Internet of Things (IoT) are often represented as connecting everyday objects like smart-phones, net TVs, sensors and actuators to the net wherever the devices are showing intelligence coupled sanctioning new varieties of communication between things and other people, and between things themselves. Building IoT has advanced considerably within the last number of years since it's additional a brand new dimension to the globe of knowledge and communication technologies. the net has return a protracted far more than the last thirty years. old school scientific disciplinev4 is giving thanks to IPv6 in order that each device on the net will have its own IP address. Machine-to-machine (M2M) communication is on the increase, sanctioning devices to exchange and affect info while not someone ever being concerned. The scope and scale of the net have modified as well: business leaders that the quantity of connected devices can surpass 15 billion nodes by 2015 and reach over fifty billion by 2020. The challenge for the embedded business is to unlock the worth of this growing interconnected net of devices, usually mentioned because the net of Things (IoT), describing it because the final tool in our future police investigation. This network has the ability to reshape our cities. At the sting of the IoT are the appliances and instrumentation we tend to use on a daily basis. These “things” are interconnected across associate infrastructure or backbone victimisation combos of ZigBee, sub-GHz, Wi-Fi or power cable communications (PLC)

II. EXISTING SYSTEM

In previous system device is controlled by Bluetooth, zigbee, IR waves

A. Disadvantage

- Minimum area is controlled by Bluetooth
- Operation is to Complicated
- Limited Range of communication
- An Ir Wave Does Not Pass Through Doors And Walls So Appliances In Room Are Not Supposed To Control From Any Other Room Of Home.
- High Intensity Of Florescent Light May disconnect Communication Between Remote Control And Home devices’

III. PROPOSED SYSTEM

Proposed system could be a fine combination of Raspberry PI technology and embedded system. AN application ought to be put in on Raspberry PI to regulate varied home appliances. User will send commands victimisation that application. Wireless dominant technique utilized in this project is GPRS technology. This project consists of a GPRS receiver. This device is connected to the circuit that incorporates a decoder. This decoder sends code for several command sent by user. Then the several device connected to the circuit are turned on or off reckoning on the command given.

A. Advantages

1) Faster operation and economical
2) No got to carry separate remote or the other dominant unit
3) We can able to management this technique anyplace within the world
Raspberry PI based Smart home automation system consists of AVR based Microcontroller unit model is ATMEL ATMEGA32. ATMEGA32 having 1 Kbytes of RAM and 32Kbytes of ROM. 8 Bit LCD mode for 16*2 LCD Display the Data pin DB0-DB7 is connected with Port 1 of microcontroller. GPRS Module is connected to UART protocol of Microcontroller unit. The common pin of relay unit is connected with 230 volt AC supply. When the system receives the character by the help of GPRS module ‘a’ the relay one is ON. If it receives character ‘b’ Relay 1 goes OFF. This Status is displayed in the LCD Display. We can able to control this system anywhere in the world.

### A. ATMEL Microcontroller

![ATMEL Microcontroller Diagram](image)

### B. LCD Display

![LCD Display Diagram](image)
Liquid Crystal show that is usually referred to as {alphanumeric show digital display display} will display Alphabets, Numbers yet as special symbols so alphabets. Graphic show has embedded controller for dominant totally different modes. Controller accepts commands and knowledge bytes from small controller. LCD show have total sixteen pins for interface with processor. RS is instruction or knowledge choose line. This pin is unbroken high or low by microcontroller to point command instruction or knowledge bytes on knowledge bus db0-db7. Special feature of this LCD module is it permits reading of knowledge bytes hold on in RAM. Pin no. 5 i.e. R/W is employed for deciding scan operation or write operation. Graphic show has RAM memory for storing characters codes to be displayed on LCD. we've used sixteen x two {alphanumeric show digital display] which implies on this display we will display 2 lines with most of sixteen characters in one line.

C. GPRS Module

The SIM900 may be a complete Quad-band GSM/GPRS resolution in a very SMT module which may be embedded within the client applications. that includes associate industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a very little type issue and with low power consumption. With a little configuration of 24mm x 24mm x three millimeters, SIM900 will work most the area needs in your M2M application, particularly for slender and compact demand of style.

D. 4-Channel Relay

Channel Relay Controller offers a handily tiny size with the integrated power of our standardized professional relay command set. Quad relay area unit ideal for laptop control applications wherever tiny size and high practicality area unit needed. we provide an outsized choice of four Relay Drivers for applications starting from low power signal shift to high voltage, high current applications and four channel relay.

This is a straightforward to use four channel relay board that works on 12V. Use it to regulate four 240V power appliances directly from micro controllers or low voltage circuits. excellent for shift 240V appliances - lights, fans, etc, and even high power motors at lower voltages The board uses prime quality relays, which might handle a most of 7A/240 V AC or 7A/24V DC. every relay has all 3 connections - Common, usually Open, usually Closed brought bent three pin screw terminals that makes it simple to create and take away connections. The board incorporates a power indication and a relay standing diode to ease debugging. The board will settle for inputs among a large vary of voltages from 4V to 12 Power input and relay management signals area unit delivered to header pins on the board. Hence, the board will be simply interface with our development boards exploitation our feminine to feminine jumper wires. the ability input for this board also can be provided through the aboard DC Barrel Jack. Hence, our SMPS sort power adapters also can be accustomed directly power this board.

E. Microcontroller

The AVR core combines a fashionable instruction set with thirty two general purpose operating registers. All the thirty two registers square measure directly connected to the Arithmetic Logic Unit (ALU), permitting 2 freelance registers to be accessed in one single instruction dead in one clock cycle. The ensuing design is a lot of code economical whereas achieving throughputs up to 10 times quicker than standard CISC microcontrollers. The ATmega32 provides the subsequent features: 32K bytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 1024 bytes EEPROM, 2K computer memory unit SRAM, thirty two general purpose I/O lines, thirty two general purpose operating registers, a JTAG interface for Boundary-scan, On-chip Debugging support and programming, 3 versatile Timer/Counters with difference modes, Internal and External Interrupts, a serial programmable USART, a computer memory unit minded .

The ADC Noise Reduction mode stops the electronic equipment and every one I/O modules except Asynchronous Timer and ADC, to reduce switch noise throughout ADC conversions. In Standby mode, the crystal/resonator generator is running whereas the remainder of the device is sleeping. this enables in no time start-up combined with low-power consumption. In Extended Standby mode, each the most generator and also the Asynchronous Timer still run.. The boot program will use any interface to transfer the applying program within the Application non-volatile storage. computer code within the Boot Flash section can still run whereas the applying Flash section is updated., 8-bit reduced instruction set computing electronic equipment with ,the Atmel ATmega32 could be a powerful microcontroller that gives a highly-flexible and efficient resolution

1) Port A (PA7..PA0)

Port A is the analog inputs to the A/D convetor. Port A conjointly is associate degree 8-bit bi-directional I/O port, if the A/D convetor isn't used. Port pins will give internal pull-up resistors (selected for every bit). The Port A output buffers with each high sink and supply capability, once pins PA0 to PA7 square measurement used as inputs and square measure outwardly force low, they'll supply current if the interior pull-up resistors square measure activated. The Port A pins square measure tri-stated once a reset condition becomes active, even though the clock isn't running

2) Port B(PB7..PB0)

Port B is associate degree 8-bit bi-directional I/O port with internal pull-up resistors (selected for every bit). The Port B output buffers have symmetrical drive characteristics with each high sink and supply capability. As inputs, Port B pins that square measure outwardly force low can supply current if the pull-up resistors square measure activated. The Port B pins square measure tri-stated once a reset condition becomes active, even though the clock isn't running.
3) **Port C (PC7..PC0)**

Port C is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for every bit). The Port C output buffers have symmetrical drive characteristics with each high sink and supply capability. As inputs, Port C pins that square measure outwardly force low can supply current if the pull-up resistors square measure activated. The Port C pins square measure tri-stated once a reset condition becomes active, though the clock isn't running. If the JTAG interface is enabled, the pull-up resistors on pins PC5 (TDI), PC3 (TMS) and PC2 (TCK) are going to be activated though a reset happens. The TD0 pin is tri-stated unless fault states that shift out knowledge square measure entered. Port C conjointly serves the functions of the JTAG interface and different special options of the ATmega32.

4) **Port D(PD7..PD0)**

Port D is Associate in Nursing 8-bit bi-directional I/O port with internal pull-up resistors (selected for every bit). The Port D output buffers have symmetrical drive characteristics with each high sink and supply capability. As inputs, Port D pins that outwardly force low can supply current if the pull-up resistors are activated. The Port D pins tri-stated once a reset condition becomes active, albeit the clock isn't running. Port D conjointly serves the functions of assorted special options of the ATmega32.

V. CONCLUSION

In this method the look and implementation of an impact and monitor system for Raspberry PI based mostly sensible house has been established. Raspberry PI based mostly sensible home system consists of the many sub-systems that controlled by Microcontroller package as a main dominant system. Also, RHAS was supported by remote system as a sub-controlling system. The system is additionally connected to a wireless technique to observe and management the electronic house equipments from any place within the outlined region exploitation each arduino and small controller and causing commands by means that of Wireless method via GPRS and Raspberry PI.

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