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Design and Implementation of WIFI Controlled Robotic Rover Based on Raspberry-Pi and Arduino

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Abstract*: The present manuscript deals with controlling a robot over Wi-Fi and maintaining an economical management over a machine. Basically we've got an Arduino (Atmega 8) that we have a tendency to use to attach to 2 motors and manage them. The Raspberry Pi will be used as a mobile or Personal computer controlled device. The required data is passed from the employed device to Arduino. The Pi is causing the info through the Wi-Fi electronic device and therefore the management is maintained by a pc running Putty or Telnet.

***Index Terms*: Arduino, WI-Fi, Raspberry-Pi, Robotic Rover.**

I. INTRODUCTION

The automatic device is developed to perform various activities independently or under the supervision of humans. Robot comes under this category.

Generally, a robot falls under the category of programming by means of personal computer or by electronic means. The controllability of Robots may be fully controllable [1-5], semi-controllable or it may be controlled from remote places. Robots are used at interval gaps and in many of family appliances like vacuuming floors, mowing lawns, improvement drains, building cars, in warfare, and also in tasks that are too high-priced or too dangerous that can be done by human beings like exploring location and underwater studies[6-9]. In the implementation part, the codes in the computer has the commands to manage the actions of the robot and give the related information to needed tasks [10-11]. Once a program is written the robot is ready to implement commands and execute it. Programming of robots can be confusing and troublesome, bu it is getting simpler over the years, and the dearth of cross-platform business concepts has caused the event of computer code tools for robots compared to alternative machine-driven management systems like programmable logic controllers (PLCs).

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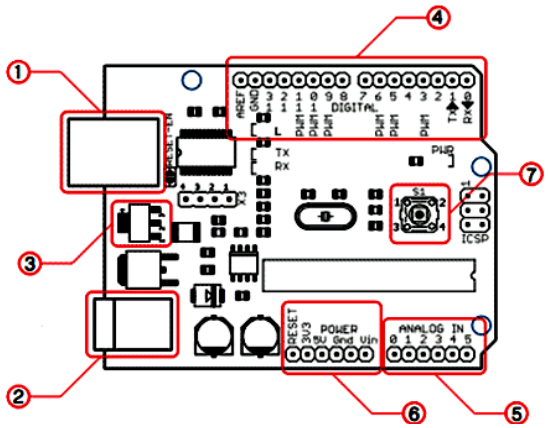
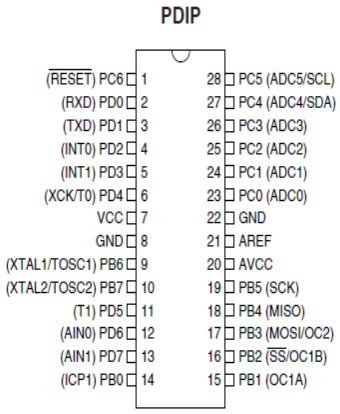
II. DESIGN OF THE ROBOTIC STRUCTURE

The robot is designed using a Raspberry Pi mounted on a Chassis. The Pi gives directions to the Arduino having ATMEL Atmega 8. The wireless communication is setup through the Wireless fidelity network and the control is established using Putty running on pc or Ethernet app on an iphone.

A. ARDUINO (ATMEL ATMEGA 8)

Arduino is a recognized ASCII text file sole circuit board microcontroller, successor other ASCII text file wiring platform designed to create the method of electronics in interdisciplinary platform. An open hardware style for the Arduino board with an Atmel AVR processor or an on-board I/O support is employed within the h/w part of the planning process. On the alternative way, programming [12-17] language compiler, that may be a customary one and therefore the boot loader included with the computer code that executed on the board. With the assistance of the wiring-based language (syntax and libraries) almost like C++, some simplifications and modifications are done in arduino h/w and a process based mostly IDE.





B. RASPBERRY PI:

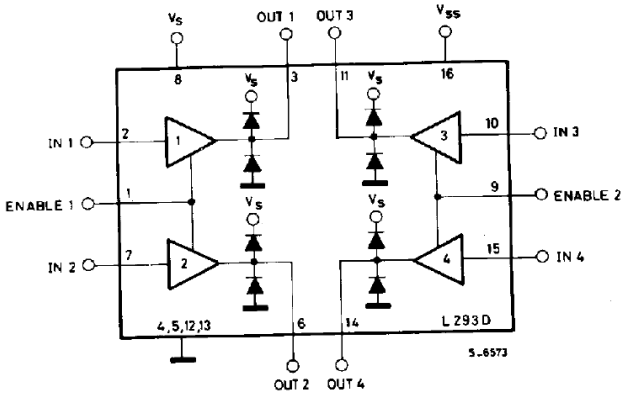
The Raspberry Pi features a Broadcom BCM2835 system on a chip (SoC), which has associated ARM1176JZF-S 700 megacycle per second processor, VideoCore IVGPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It doesn't embrace a integral hard disc or solid-state drive, however uses associate degree South Dakota card for booting and chronic storage. the inspiration provides Debian and Arch Linux ARM distributions for transfer. Tools are there for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the John Barleycorn Basic clone for Linux), C, Java and Perl[18-26].

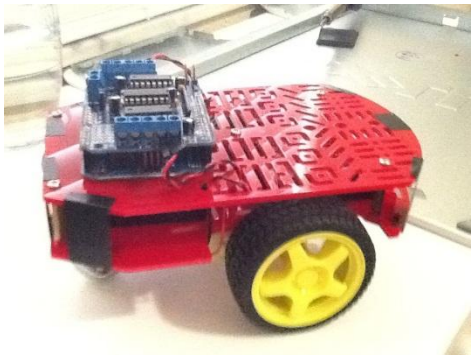
C. MOTOR DRIVER PROTECTS:

The chip used for Motor driver protect is L293D. It homes two H-Bridge layouts for dominant two motors at a time. The protect is interfaced to the Arduino. Arduino Digital data pins are used for connecting the Input pins of motor driver protect.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	36	V
V_{SS}	Logic Supply voltage	36	V
V_i	Input voltage	7	V
V_{en}	Enable voltage	7	V
I_o	Peak output current (100µs non repetitive)	1.2	A
P_{tot}	Total power dissipation at $T_{ground\text{-}pins}$ = 80°C	5	W
T_{stg}, Tj	Storage and junction temperature	-40 to 150	°C

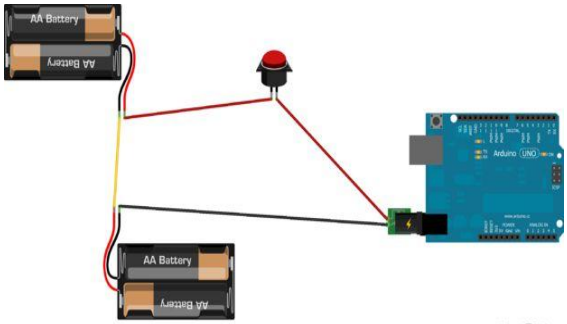


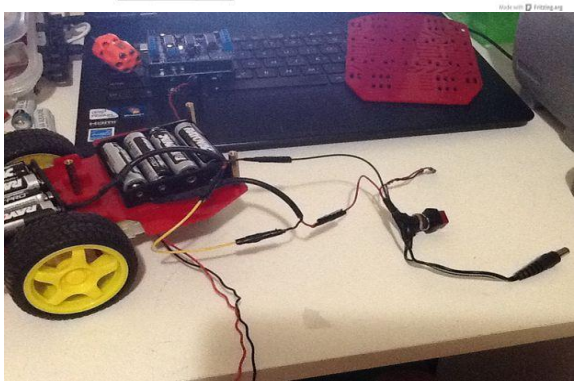


III. IMPLEMENTATION PROCESS

A. POWERING ARDUINO

The power is distributed by connecting the batteries in series and then soldering the left over two ends to the DC adapter head which will be connected into the arduino[27-31].





Yellow pin: Connecting the +ve and -ve leads of the two battery packs.Black pin: Connecting the ground lead of one of the battery packs.

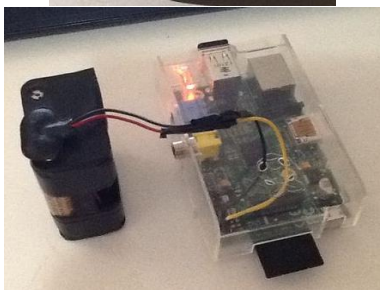
Red pin: Connecting the power of one of the battery packs.
Switch: Controling the current flow to power onArduino
Plug: To plug into the Arduino

B. POWERING RASPBERRY Pi

Pi is powered on by a 9V battery clip holding 6 AA batteries. To keep the power at a lower range,2 batteries are taken out and wire is connected in that place[32-39] ,so that the Raspberry Pi is not burned down.

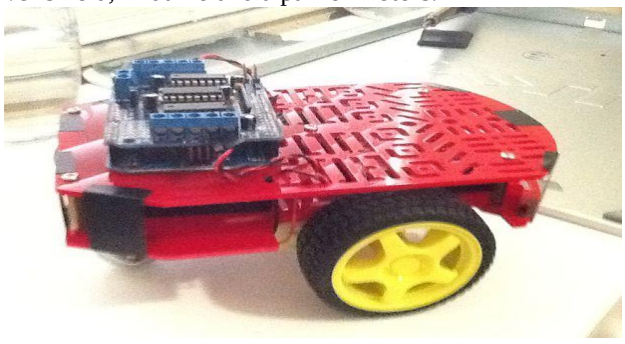
GPIO Pins

3.3V	1	2	5V
I2C0 SDA	3	4	DNC
I2C0 SCL	5	6	GROUND
GPIO4	7	8	UART TXD
DNC	9	10	UART RXD
GPIO 17	11	12	GPIO 18
GPIO 21	13	14	DNC
GPIO 22	15	16	GPIO 23
DNC	17	18	GPIO 24
SP10 MOSI	19	20	DNC
SP10 MISO	21	22	GPIO 25
SP10 SCLK	23	24	SP10 CE0 N
DNC	25	26	SP10 CE1 N



C. WIRING THE ARDUINO BATTERIES & MOTORS

The Motors are Connected to the Motor Shield Having the terminals MOUT1 and MOUT2 for motors and the output/ Instruction for the Motor Driver circuit, given by the Arduino through digital pins which are connected at MIN1 and MIN2 terminals. The setup for running the motors includes Motor driver shield, Arduino and a pair of motors.



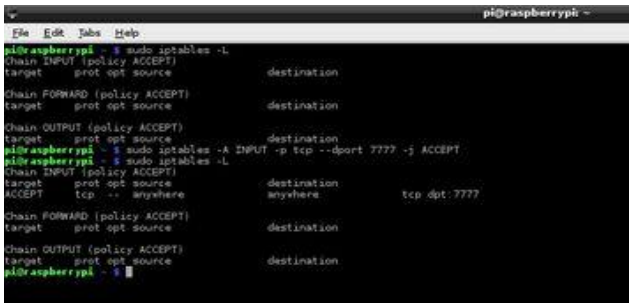
D. PROGRAMMING THE ARDUINO AND RASPBERRY Pi:

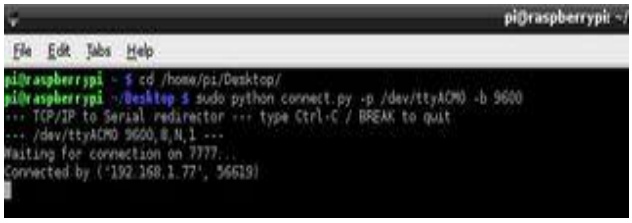
To handle the telnet connection to Pi, python script is used. It converts the code to Serial data to be used by arduino. USB cable is used to transfer data, or can be downloaded from Pi browser or FileZIlla application and can be transferred using SSH.

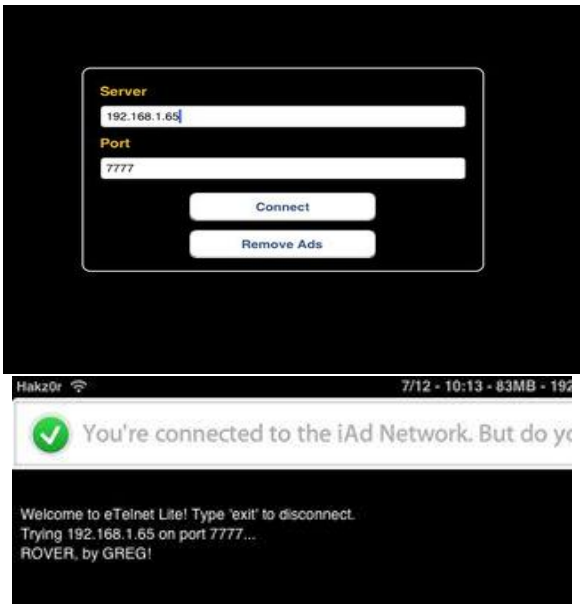
Arduino Code is written to control the Motor Driving Shields. Arcuino Code uses commands like digital Write() for dealing with the motors and an external library was included for interfacing with the Raspberry Pi and Shield.

Connect.py file is used to connect Arduino from Raspberry Pi using special commands .

E. TOSET UP RASPBERRYPI SERIAL/TELNET COMMUNICATION:







A port has to opened up to Set up the connection for transferring the Serial Data from the Pi to the Arduino. We start off by opening Putty. We connected to Pi using it's IP address. The connection is established through ssh. We have to the type the below command once connected through ssh

file ->**sudoiptables -A INPUT -p tcp --dport 7777 -j ACCEPT**

The port 7777 is opened up by this command. (used for telnet communication port.

Once the Arduino is connected to Pi. We opened the python script with help of this command (It should be the directory ofthe file “connect.py”)

” **python connect.py -p /dev/ttyACM0 -b 9600 ”**

The command writtern above is used to connect the Arduino and allow Telnet communication to it. The Arduino "/dev/ttyACM0" (It directs the Pi the device to be connected)
The "-b 9600" is baud rate. Once a connection was established we moved to Putty to communicate to the RaspberryPi.

IV. CONCLUSION

The Rover designed is being controlled over a Wi-Fi routers vary. The management is precise and clad to be expeditiously operating. The project is more being increased for a additional versatile vary that works below GSM management and Wi-Fi. A special video footage transfer unit is mounted on the highest to look at direct video footage which is able to be transmitted through the Pi.

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