AUTONOMOUS ROBOTIC VEHICLE USING ARDUINO

B. Ravalika*[1], K. Venkata Sandeep*[2], A. Sai Mahesh*[3], S. Sri Ramani*[4], V. Anupama*[5]

[1-4] B.Tech Students, [5] Associate Professor, LIET

[1,2,3,4,5] Computer Science and Information Technology, Lendi Institute of Engineering and Technology, Vizianagaram

Baswaravalika23@gmail.com [1]

Venkatasandeepkolluru@gmail.com [2]

Saimaheshattada49@gmail.com [3]

Anushasunkara94@gmail.com [4]

Anup0983@gmail.com [5]

---***---

ABSTRACT

In the current period robots play an important role. The purpose of this project is to design a military robot that will detect enemies. A robot is controlled through an Android Application using a Bluetooth module. To detect the status of the robot, the hardware Arduino UNO microcontroller board is used. This microcontroller will sense and control the object. Arduino is very easy to use, and the program is erasable and allows reprogramming from which multifunctional applications can be designed in a robot. Arduino UNO is interfaced with Bluetooth module through UART protocol. An ultrasonic sensor is employed to detect the space of the thing. For example, Bluetooth, Wi-fi and ZigBee innovation to control other gadgets with the help of improved of present-day innovation and Android Smartphone.

Bluetooth innovation means to trade information remotely over a short distance utilizing radio wave transmission including highlights to make straightforwardness, insight, and controllability. In this paper we have planned a robot that can be controlled utilizing an application running on an android smartphone, it sends control by means of Bluetooth which is interfaced to the regulator. The regulator can be interfaced to the Bluetooth module however UART convention and shows movements as per the commands received by android application.

Key Words: Arduino, Obstacle Avoidance, Infrared Sensors, Ultrasonic Sensors and Metal Detector

1.INTRODUCTION

In the technology World Robotics plays a vital role. Robotics is designed for manufacturing work purposes to reduce Manpower efforts. There are many applications of Industrial Robots. It includes Assembly, packaging, & labeling, product inspection, etc. Similarly, there are many applications of robots that are designed in different fields for different purposes. In this current period robots are also used in computers to do manual work. Robots are mostly used for military application robot which can provide the following functionality: Design a robot that will help to seek the enemy. The design of the robot is in such a way that it will ease the development with low cost and will reduce the complexity. The robot is controlled using an application on android device.

This application will communicate with the robot via a Bluetooth module which will be fixed on a robot. Since most robots use square measure these days designed for specific tasks, our goal is to someday build universal robots that square measure versatile enough to try to just about something an individual's will and a lot of. Humanoid may be a software stack for mobile devices that features associate in operation system and key applications. Humanoid applications give access to a good variety of helpful libraries and tools which will be accustomed to building wealthy applications. Humanoid conjointly includes a full set of tools that has developers with high productivity and deep insight into their applications. Bluetooth may be a technology with associate open normal specification for a frequency (RF)- based short vary property technology that changes the face of computing and wireless communication. The data received by the Blue-tooth module from humanoid sensible phone is fed as input to the controller. Thereby, the controller acts accordingly on the DC motors to

maneuver within the entire golem all told the four directions victimization the humanoid phone.

## 2. Body of Paper

POWER SUPPLY

The input to the circuit is applied from the regulated power supply.

The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier.

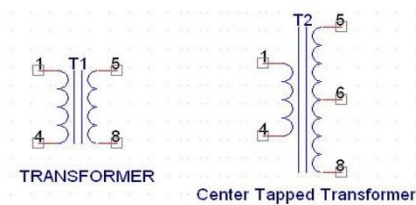The output obtained from the rectifier is a pulsating d.c voltage.

So, to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification.

Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.
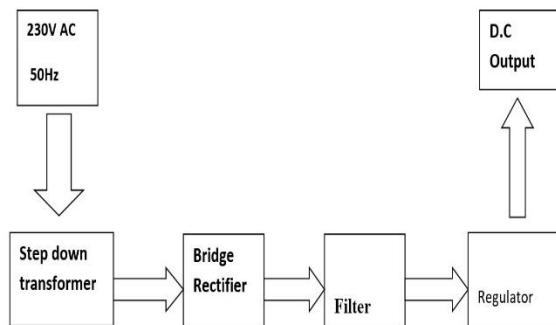
Block diagram of power supply

TRANSFORMER:

Transformer

A transformer consists of two coils also called "WINDINGS" namely PRIMARY & SECONDARY.

They are linked together through inductively coupled electrical conductors also called CORE. A changing current in the primary causes a change in the Magnetic Field in the core & this in turn induces an alternating voltage in the secondary coil. If load is applied to the secondary, then an alternating current will flow through the load. If we consider an ideal condition, then all the energy from the primary circuit will be transferred to the secondary circuit through the magnetic field.
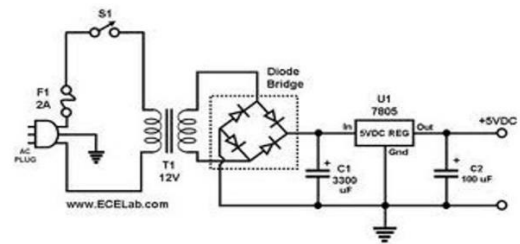
$P_{primary} = P_{secondary}$

So,

$$I_p V_p = I_s V_s$$

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

Circuit diagram

Circuit Diagram of power supply

• IC 7805

7805 is an integrated three-terminal positive fixed linear voltage regulator. It supports an input voltage of 10 volts to 35 volts and output voltage of 5 volts. It has a current rating of 1 amp although lower current models are available. Its output voltage is fixed at 5.0V. The 7805 also has a built-in current limiter as a safety feature. 7805 is manufactured by many companies, including National Semiconductors and Fairchild Semiconductors. The 7805 will automatically reduce output current if it gets too hot. The last two digits represent the voltage; for instance, the 7812 is a 12-volt regulator. The 78xx series of regulators is designed to work in complement with the 79xx series of negative voltage regulators in systems that provide both positive and negative regulated voltages, since the 78xx series can't regulate negative voltages in such a system.

The 7805 & 78 is one of the most common and well-known of the 78xx series regulators, as its small component count and medium-power regulated 5V make it useful for powering TTL devices.

| SPECIFICATIONS	IC 7805
V_{out}	5V
V_{ein} - V_{out} Difference	5V - 20V
Operation Ambient Temp	0 - 125°C
Output I_{max}	1A

Specifications of IC7805

Pin diagram of 7805

• IC7812

Here is a 7812-voltage regulator circuit, but this is not a power supply with a 12V output voltage and load current 1A. IC LM7812 only serves as the input voltage

of an LM723 regulator IC. So, these power supply circuits with a larger load current capability with a variable voltage at the maximum voltage of 6V.

The output voltage range of the 7812-voltage regulator circuit is 2.5V-6V with 6A-8A load current. Increasing load current through the transistor BD139 and TIP142 are sourced from the DC voltage of a transformer 10A.
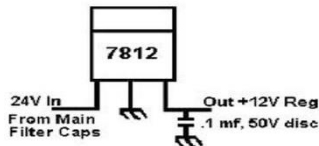
7812 Pin Connection

ARDUINO UNO

The Arduino Uno R3 is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
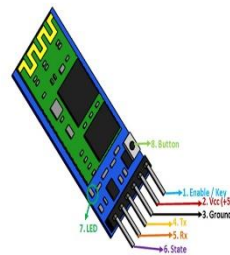
USB over current Protection

The Arduino Uno has a resettable polyfused that protects your computer's USB ports from shorts and over current. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.


HC-05 - Bluetooth Module

NEO-6MV2GPS Module

The NEO-6MV2 is a GPS (Global Positioning System) module and is used for courses. The module basically checks its zone on earth and gives yield data which is longitude and extent of its position. It is from a gathering of stay single GPS authorities including the predominant u-blox 6 arranging engines. These versatile and viable beneficiaries offer different accessibility choices in a little (16 x 12.2 x 2.4 mm) pack. The littler designing, power and memory decisions make NEO-6 modules ideal for battery worked PDAs with serious cost and space prerequisites. Its Innovative arrangement gives NEO-6MV2 splendid course execution even in the most testing conditions.

How to use the NEO-6MV2 GPS Module

Getting this module to work is exceptionally simple. For the application circuit beneath we have associated the ability to board and interfaced the yield to the microcontroller UART to complete it.
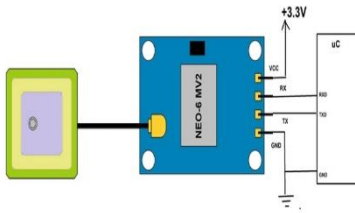
After equipment you need to set the baud rate of the controller organizing the module, if it's not facilitated you will get botch. With baud rate setting done you can examine the consecutive data genuinely from the module. This data will be longitude and extension regard and the customer can play with them as needed. The crude qualities given by the module are unwieldy to peruse legitimately thus a straightforward decimal computation should be possible in programming for getting simple to peruse esteems.

Algorithm to send data to LCD:

1. Make R/W low
2. Make RS=0; if data byte is command RS= 1; if data byte is data (ASCII value)
3. Place data byte on data register
4. Pulse E (HIGH to LOW)
5. Repeat the steps to send another data byte

TABLES

Bluetooth Pin Configuration

Pin Number	Pin Name	Description
1	Enable / Key	This pin is used to toggle between Data Mode (set low) and AT command mode (set high). By default, it is in Data mode
2	V_{cc}	Powers the module. Connect to +5V Supply voltage
3	Ground	Ground pin of module, connect to system ground.
4	TX – Transmitter	Transmits Serial Data. Everything received via Bluetooth will be given out by this pin as serial data.
5	RX – Receiver	Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth
6	State	The state pin is connected to on board LED, it can be used as feedback to check if Bluetooth is working properly
7	LED	Indicates the status of Module • Blink once in 2 sec: Module has entered Command Mode • Repeated Blinking: Waiting for connection in Data Mode • Blink twice in 1 sec: Connection successful in Data Mode

NEO-6MV2 GPS Module Pin Configuration

Pin Name	Description
VCC	Positive power pin
RX	UART receive pin
TX	UART transmit pin
GND	Ground

EXISTING METHOD:

This Arduino code implements an object avoidance mechanism using an ultrasonic sensor and a four-wheeled robot with individual motors. When an object is detected within a given radius, the robot performs a predefined sequence: it moves backward, turns right, turns left, and then moves forward. Motor control is facilitated through the AFMotor library, while the

distance calculation relies on the pulse duration from the ultrasonic sensor.

PROPOSED METHOD:

Hardware:

Arduino UNO: Controls the robot's movements and processes sensor data. Bluetooth Module: Allows wireless communication between the robot and an Android smartphone. Ultrasonic Sensor: Detects obstacles and enemies in the robot's path. Metal Detector: Detects metals and sends GPS latitude and longitude values to Smartphone.

Software:

Arduino Code: Programmed onto the Arduino UNO to read commands from the Bluetooth module and control the robot's movements based on sensor data. Android App: Installed on a smartphone to send commands to the robot via Bluetooth.

Operation:

User opens the Android app and selects commands (e.g., move forward, turn left, etc.). The app sends these commands to the robot via Bluetooth. The Arduino UNO receives the commands and controls the robot's motors accordingly. The ultrasonic sensor continuously scans for obstacles or enemies, sending data to the Arduino. Based on sensor data and received commands, the robot moves and navigates its environment autonomously. This simplified system allows users to control the robot wirelessly using a smartphone app, while the robot autonomously detects and navigates around obstacles or enemies using its sensors. It also detects metal objects and sends the latitude and longitude values to our smartphone via Bluetooth.

CONCLUSION

Android is a mobile phone system that can build a strong remote-control system. While developing such a system we need to communicate with the robot, this software requires a Bluetooth link. The Multi-Purpose Military Service Robot is built to facilitate secure two-way communication between the Android phone and the robot in such a way that its needs can be fulfilled by the military, police, and armed forces. It has numerous implementations which can be found in diverse situations and environments. It can, for instance, be used for military purposes by the armed forces in one region, while it can be used for surveillance purposes in another. The mines can also be disposed of once detected by the robot.

FUTURE SCOPE

This project can be enhanced in the future by implementing new and advanced technologies. By adding the suspension to the robot will help in traveling through an uneven surface. We can add new sensors e.g., a gas sensor (MQ2 Gas Sensor) and a robotic arm that will easily pick and move the object from one place to another. Also, solar cells can be added instead of the regular battery for continuous power production.

REFERENCES

[1] The Working Principle of an Arduino by Yusuf Abdullahi Badamasi (2014).

[2] Smart Phone-Based Robotic Control for Surveillance Application by M Selvam (Mar2014).

[3] Arduino controlled war field spy robot using night vision wireless camera and Android application by Hitesh Patel (Nov 2015).

[4] Bluetooth-controlled spy robot by Manish Korde (2017).

[5] Multi-purpose Military Service Robot by E Amareswar (2017).

[6] Bluetooth Controlled Metal Detector Robot by Ananya Bhattacharya (May 2017).

[7] SMART SPY ROBOT by 1Ankit Yadav,2Anshul Tiwari, 3Divya Sharma, 4Ratnesh Srivastava, 5Sachin Kumar (April 2016).

[8] Military Spying and Bomb Disposal Robot Using IOT by 1CHAITRALI JADHAV, 2SHAMLI GIBILE, 3SNEHAL GAIKWAD, 4NEELUM DAVE (April 2018)

[9] Bluetooth controlled Metal detecting robot with message alert by M. Sirisha1, P. Nagalakshmi2, Y. Leela Brahmeswari3 (May 2018).

[10] Wi-Fi ROBOT FOR VIDEO MONITORING & SURVEILLANCE SYSTEM by Pavan .C, Dr. B. Sivakumar (August 2017)

[11] Cell Phone Operated Robotic Car by Awab Fakih, Jovita Serrao (ISSN 2229- 5518