" Tactical Warfare Robot with Gyroscope Technology"

Project Phase - I

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Under the guidance of
Ms.Srishti Parandiyal
(Assistant Professor, Dept. Of ECE)

Submitted by
Hitesh Kumar(2013815)
Aman Raj (2013807)
Anish Raj(2013808)

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Introduction

Aim to develop a robot with improved technology, high-speed precision, and with advanced features. The robot is remote-controlled. For this ESP8266 wifi module is used which will be connected to the Blynk server and operated through a mobile device.[1] Blynk is open-source software that is available for android users and as well as for iso users. Through this server, Robot will be connected and operated. Earlier robots were equipped with a camera which had a micro-sd card, memory of this micro-sd card was limited, to overcome this problem a wireless camera is mounted that will transmit real-time video to the one operating it. The robot is controlled by Arduino ATmega328P which is a 14 pin microcontroller.[2] For the motion of the robot two DC Servo motors are used interfaced through L293D IC which is connected to Arduino. Servo motors offer a high angular torque which will help the robot to turn effortlessly. A metal detector is used to sense land mines. The robot will be on the harsh terrain and lots of obstacles will come by, the robot should not fall upside down, to overcome this a gyroscope is installed so that the robot do not fall on its back or on one side.

Objective

Focused on developing a robot with a gyroscope sensor so it balances itself on the harsh terrain. It will be able to transmit real-time video to the one operating it. A remote-controlled robot using IoT applications.

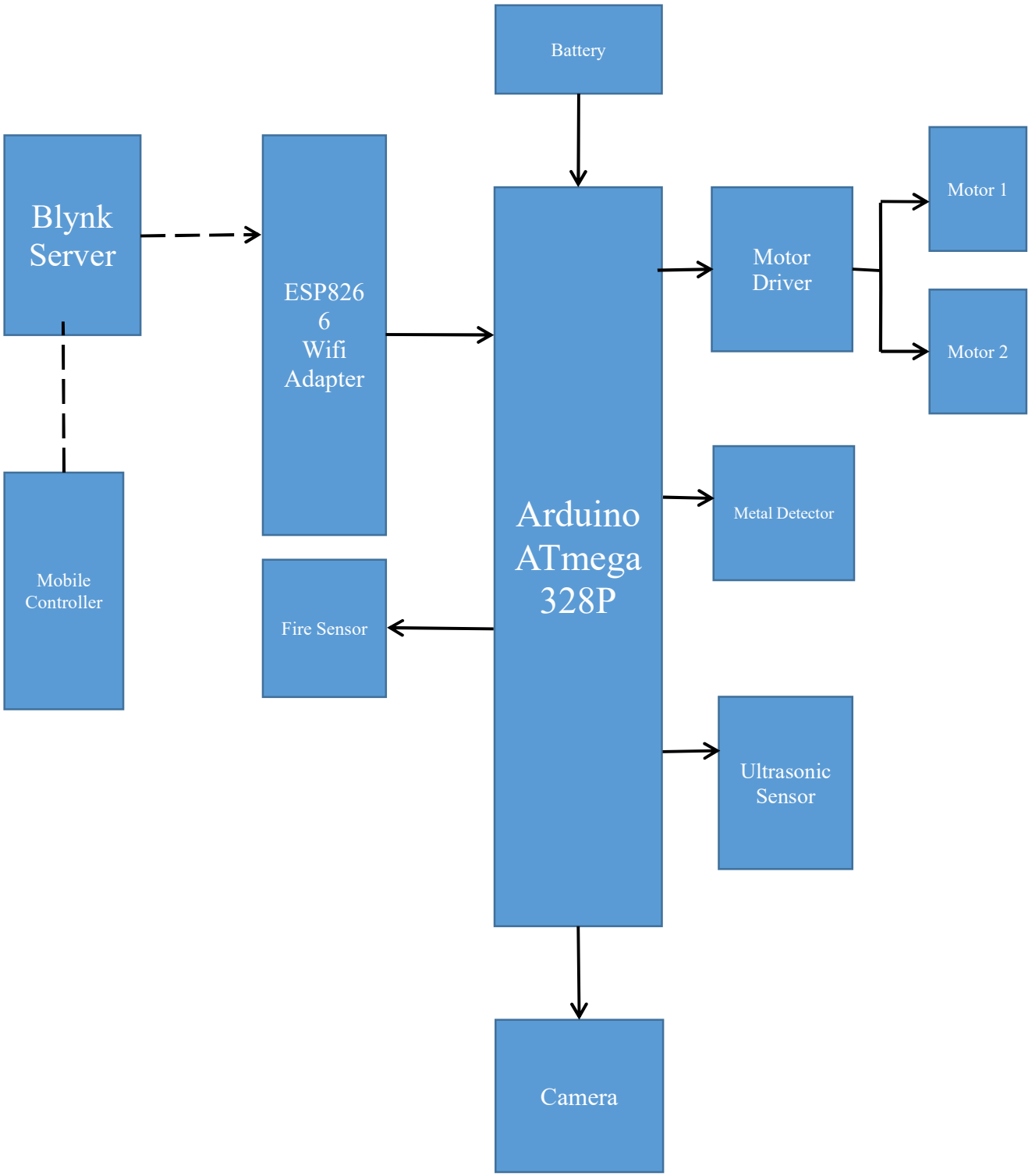
Components Required

1. Arduino ATmega 328P
2. Metal Sensor
3. Fire Sensor(MQ-2)
4. Motor Driver(L293D)Servo Motor
5. Gyroscope
6. Wifi-Adapter(ESP8266)
7. Ultrasonic Sensor
8. Camera(OV7670)

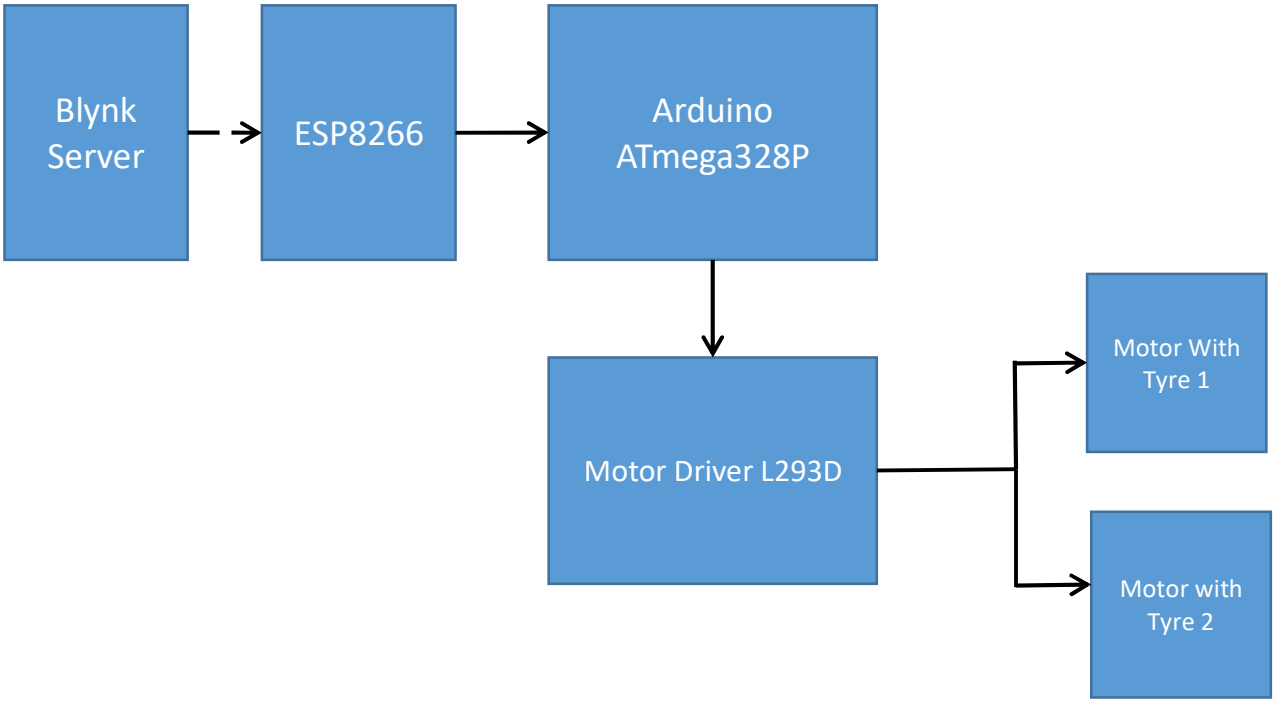
Software used

1. Blynk
2. Arduino IDE

Block Diagram



Robot Controlling Methodology

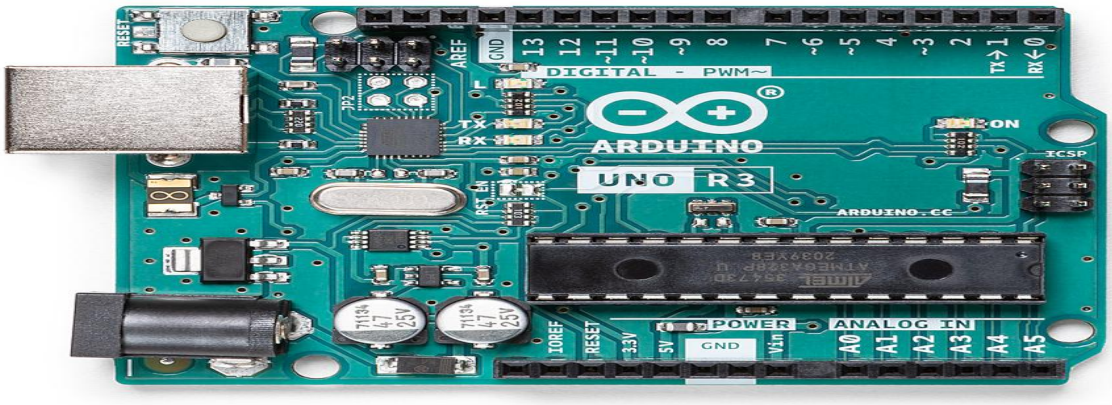


Servo Motor

1. Closd loop.
2. lt has an internalfeedback system. So less prone to error.
3. High Speed.
4. Low heat produced.
5. Servo motor employed in cameras, controlling devices.

Components Required

1. ARDUINO Uno:

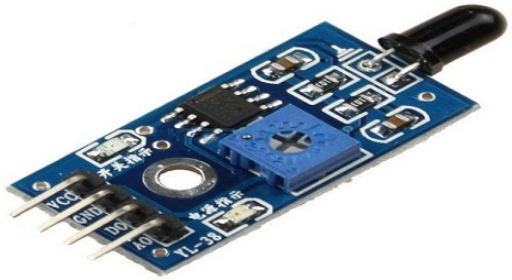


Arduino is open source microcontroller used for computing all the sensors and components of the machine. It makes sure that all the components of the machine are in sync. Arduino Uno is used in the robot which is an ATmega328P microcontroller with 14 I/O digital pins with a 16MHz frequency, a USB connection, a power jack, an ICSP header and a reset button.

2. Metal Sensor:

A Metal Sensor Is An Electronic Instrument Which Detects The Presence Of Metal Nearby. Metal Detectors Are Useful For Finding Metal Inclusions Hidden Within Objects, Or Metal Objects Buried Underground.Metal detectors work by transmitting an electromagnetic field from the search coil into the ground. Any metal objects within the electromagnetic field will become energised and retransmit an electromagnetic field of their own. The detector's search coil receives the retransmitted field and alerts the user by producing a target response.

3. Fire Sensor:



This sensor detects flame otherwise wavelength within the range of 760 nm – 1100 nm from the light source. This sensor can be easily damaged to high temperature. So this sensor can be placed at a certain distance from the flame. The flame detection can be done from a 100cm distance. The output of this sensor is an analog signal or digital signal. These sensors are used in fire fighting robots like as a flame alarm,etc.

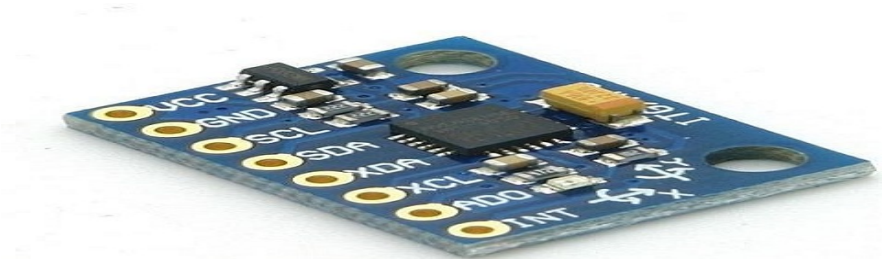
4. Motor Driver:

The L293D is a dual-channel H-Bridge motor driver capable of driving a pair of DC motors or single stepper motor. As the shield comes with two L293D motor driver chipsets, that means it can individually drive up to four DC motors making it ideal for building four-wheel robot platforms.

5. Servo Motor:

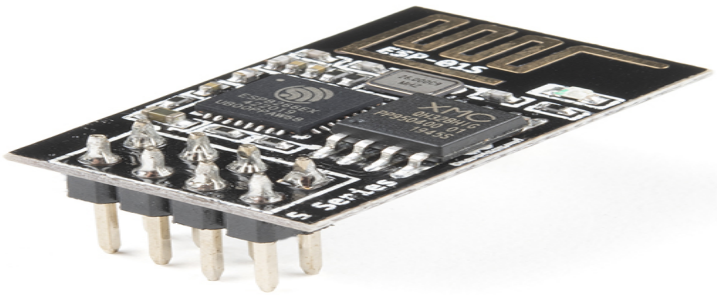
A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.[1] It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.
Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.
Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.

6. Gyroscope Sensor:



Gyroscope sensor is a device that can measure and maintain the orientation and angular velocity of an object. These can measure the tilt and lateral orientation of the object. Gyroscope sensors are also called as Angular Rate Sensor or Angular Velocity Sensors. These sensors are installed in the applications where the orientation of the object is difficult to sense by humans. Measured in degrees per second, angular velocity is the change in the rotational angle of the object per unit of time.

7. Wi-Fi Adapter (ESP8266):

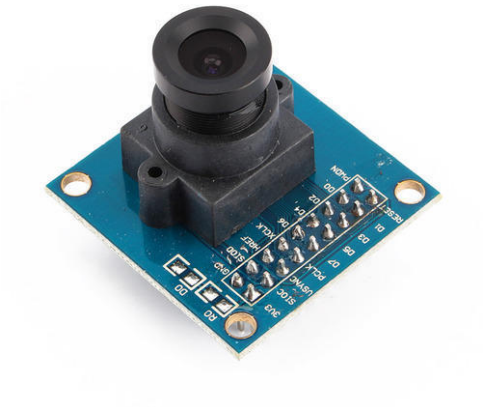


The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all WiFi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers.This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.The ESP8266 supports APSD for VoIP applications and Bluetooth.

8. Ultrasonic Sensor:

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves.An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns. Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse.

9. Camera OV7670:



OV7670 640X480 VGA CMOS CAMERA IMAGE SENSOR MODULE is a low-cost image sensor, DSP that can operate at a maximum of 30 fps and 640 x 480 ("VGA") resolutions, equivalent to 0.3 Megapixels.Image Processing, Simple Machine Vision, Object Detection, Color detection, etc. 2×10 0.1″ Output Connector will be easy to plug into any prototype board or breadboard which will make your project/product implementation fast. Technical parameters: High sensitivity for low-light operation Low operating voltage for embedded portable apps Lens shading correction Flicker (50/60 Hz) auto-detection Saturation level auto adjust (UV adjust) Edge enhancement level auto-adjust.

Software Required

1. Arduino IDE:

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. Plug the arduino board with the laptop, write the code in c or c++ language, and upload the code on the board. It is a open source software and is used to write and upload the code in all the arduino boards.

2. Blynk:

it is open-source software available on both android and iso platforms. It is an IoT-based software that can store sensor data, visualize sensor data and control the motion of the robot.

Blynk Server - Responsible for all the communications between the Smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. Its open-source could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

References

[1] Ashwini V, AsmaSadia M, SherishaN ,Mr.Ronald Lawrence J,Mrs. Jillian Rufus J.,"War Field Spying Robot with Night Vision Wireless Camera using Android Application", International Journal of Current Engineering and Scientific Research, vol. 6, issue 6, pp. 113-117, 2019.

[2] Suniksha B S, Shubhanchal Priya, Varshini M, Deepthi Raj, "Warfield Spy Robot with Night Vision Wireless Camera". International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS), Volume IX, Issue VII, July 2020.