



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 5, May 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

[ijrset@gmail.com](mailto:ijrset@gmail.com)

[www.ijrset.com](http://www.ijrset.com)

# Military Robot Using Arduino

Prasiddu V<sup>1</sup>, Dhanraj CH<sup>1</sup>, Abhishek BC<sup>1</sup>, Harsha HJ<sup>1</sup>, Tousif Pasha<sup>1</sup>, Harsha CH<sup>1</sup>,

Premakumari P<sup>2</sup>

Polytechnic Students, Department of ECE, Government Polytechnic, Turuvekere, Karnataka, India<sup>1</sup>

Lecturer, Department of ECE, Government Polytechnic Turuvekere, Karnataka, India<sup>2</sup>

**ABSTRACT:** In this era of political instability, there is a growing need to use military robots to help soldiers perform dangerous tasks. The program focuses on the design and construction of semi-autonomous unmanned robotic systems for use in various military and rescue operations. Military robots can effectively perform dangerous tasks such as bomb disposal, guarding enemy areas, and search and rescue. This reduces the risk of soldiers and civilians being killed. With real-time feedback from ultrasonic sensors and data analysis of the environmental composition of the area being monitored by various sensors, soldiers can be better prepared to execute the mission. By using Arduino, the above tasks can be achieved. Various sensors and a robotic arm are connected to the Arduino. This prototyping makes it possible to overcome the weaknesses of existing models to better support military operations

**KEYWORDS :** Military Robot, Arduino, Ultrasonic Sensor, Bluetooth, Unmanned Robot

## I. INTRODUCTION

The Military rescue and support robot discussed during this project is an unmanned ground vehicle. The robots already existing have bomb disposal, enemy territory surveillance, search and rescue features in separate robots, but the military support robot described in this project has all the main features installed together with better technology. This robot will provide aid and support to the military by performing intelligence, surveillance and reconnaissance, search and rescue and removal of explosives. This robot is expected to reduce casualties and help the military work more efficiently. The main aim of this project is to design and build of a semiautonomous, unmanned robotic system used for various military and rescue operations by assisting the soldiers in the battlefields.

Military Robotics is that particular field of Robotics that makes use of various technologies related to the Internet and the Cloud Network. Examples of these technologies are Cloud Computing, Cloud Storage and so on. Military Robotics bases itself on using shared resources and uses similar infrastructure that is also converged for Robots. By establishing a connection to the Cloud Network successfully, the Robot systems are able to make use of the various features of the Cloud Network's Data Centre. A few of these features are efficient communication resources, high computation and processing power and more than ample storage space. The processing and sharing of information from various robots or agents is made possible by connecting to a Cloud Network

## II. RELATED WORK

Rakshana Mohamed Ismail[2020] described In this era of a politically unstable world, there is a growing demand for the use of military robots to aid the soldiers to perform perilous missions. This paper focuses on the design and build of a semi-autonomous, unmanned robotic system used for various military and rescue operations. In today's technologically proficient world, technology plays an important role in drastically changing warfare tactics. More than advancement in weaponry, the advancement in technology gives a country superiority and the capability to counter an enemy attack in the most effective manner. Nowadays, robots are used in places which are dangerous for humans and thus, carry out the missions more effectively and obediently than human soldiers[1].

They have been in use for some times for the demining and rescue operations but now they are under research for combat or spy missions. Today's modern military forces are using different kinds of Robots for different applications ranging from mine detection, surveillance, logistics and rescue operations. In future they will be used for reconnaissance and surveillance,

logistics and support, communications infrastructure, forward-deployed offensive operations, and as tactical decoys to conceal maneuver by manned assets[2].

Basically, two gear motors are sufficient to produce the movement of spy robot and the motor driver module is used to supply enough current to drive two gear motors which protects the Raspberry-pi module from the damage. The major advantages of using the minimum number of the gear motor is minimizing the power consumption. Robot has two infrared sensors which are used to sense the obstacles coming on the both sides of the robot path. It will move in particular direction and when the obstacle coming its path, it will turn to the opposite direction[3].

The monitoring and controlling of the mobile robot via internet using Raspberry pi board through the use of creating the webpage is done successfully. It needs only the Internet connection which can be obtained by wireless communication network. There is no interrupt can be occurred during the commands to the robot from the user and the response from the robot to user. The robot can be easily controlled through using the personal computer or a smart phone[4].

In this research, an internet controlled-open source mobile robot design and application has been created. Mobile robot can be controlled through a web page, and immediate image transfer can be done by a camera on the robot. All these operations are controlled by Raspberry Pi, which is installed on the mobile robot. Second chapter will focus on hardware and software features of the mobile robot, while third chapter is a general review and suggestions about the research[5].

### III. METHODOLOGY

Systems engineering methodology is a structured approach to developing complex systems, such as military robots, that emphasizes the development of a system that is optimized for the needs of the end-user. Here are the steps that could be involved in applying systems engineering methodology to the development of a military robot. Process flow of the project is depicted in Fig 3.2.

1. **Define the requirements:** The first step is to define the requirements of the military robot. This involves gathering information about the specific needs of the military, including the environments in which the robot will be deployed and the tasks it will need to perform. The requirements should be specific, measurable, and achievable.
2. **Design the system:** Once the requirements have been defined, the next step is to design the system. This involves identifying the various subsystems that make up the robot, including the mechanical, electrical, and software components. The design should be optimized to meet the requirements identified in step 1
3. **Develop and integrate the subsystems:** The subsystems should be developed and integrated into the overall system. This involves designing the mechanical components, developing the software, and integrating the various subsystems into a cohesive system.

#### Components used:

**3.1 ) Arduino :** The Arduino is a significant part of this framework which is customized Utilizing the Arduino programming language in Arduino programming variant 1.8.7. The Arduino is fuelled by means of the Mini- B USB association. It is bolstered over a separable, double inline-bundle ATmega328 AVR microcontroller and set up by Arduino.cc. This component has been given arrangements of computerized and simple information/yield (I/O) ports which are assembled to fluctuated development sheets (or shields) and different circuits[5,6].

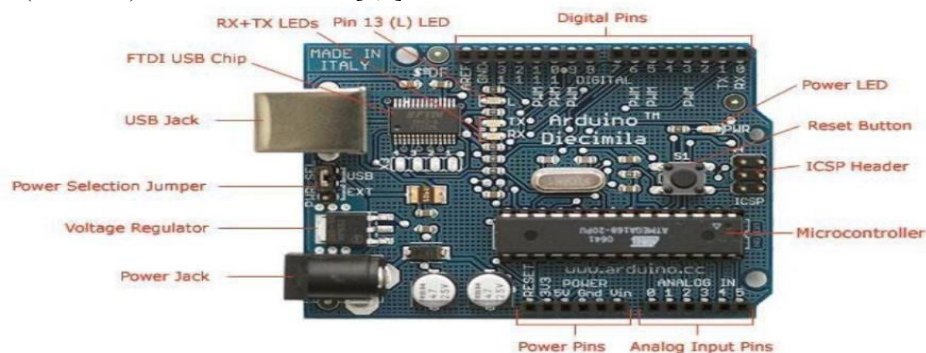


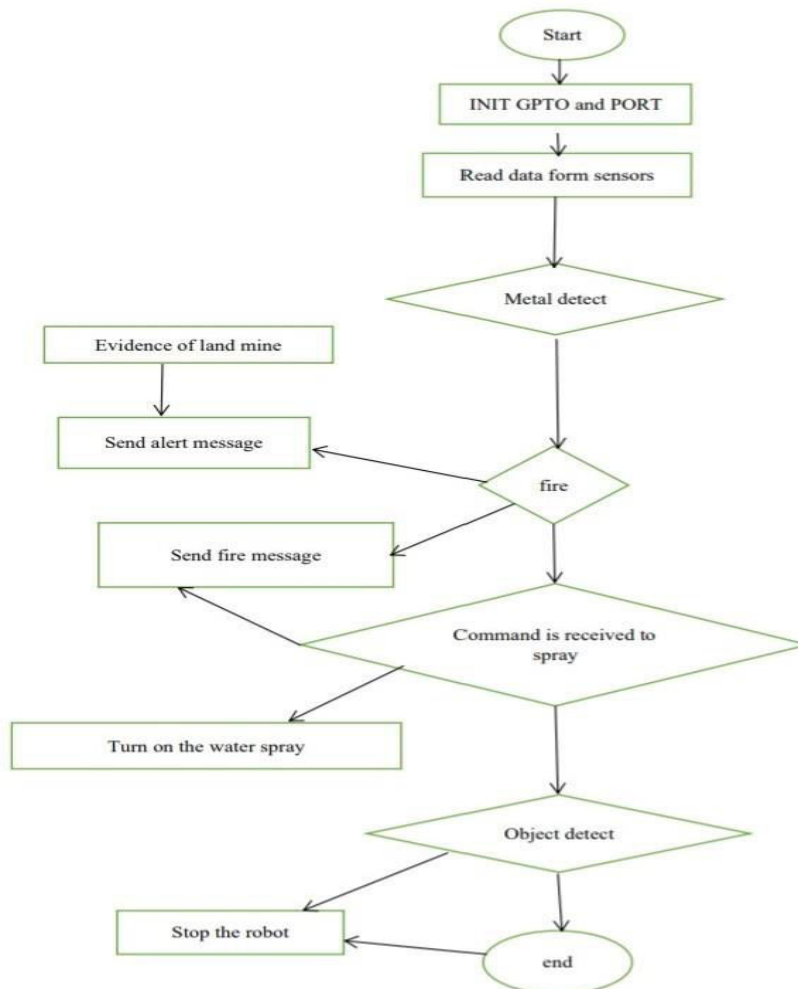
Fig 3.1 Arduino UNO board

2. **)Dc gear motor:** Each of the Military Robotics’s four wheels is attached to a DC Gear Motor for the purpose of movement. These motors produce high torque and will maintain a low speed, motor output.



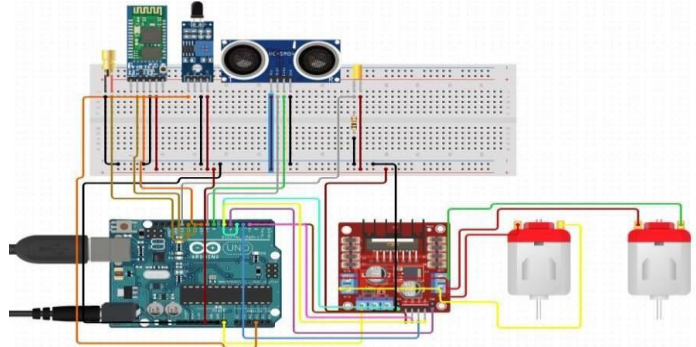
1. **Ultrasonic Sensor:** Ultrasonic sensor is non-contact distance measurement module, which is also compatible with electronic brick. It's designed for easy modular project usage with industrial performance. HC-SR04 Ultrasonic (US) sensor is a 4 pin module, whose pin names are VCC, Trigger, Echo and Ground respectively.
2. **HC-05 Bluetooth Module:** The HC-05 Bluetooth module supports two-way wireless communication. Hence, it is utilized to communicate with any Bluetooth-enabled device, such as a phone or laptop. The module has a range of around 100m and uses UART to communicate at a 9600 baud rate. It features an internal 5V to 3.3V regulator and runs on 3.3V.
3. **L293D Motor Driver:** The Military Robotics uses the L293D Motor Driver IC which utilizes two H- Bridges to control the speed and motion of the respective motors.
4. **Relay:** A relay is an electrically powered switch that can be turned on or off, allowing current to flow or not, and can be controlled with a low voltage, such as the 5V provided by an Arduino pin.
5. **Test and validate the system:** Once the system has been developed, it should be tested and validated to ensure that it meets the requirements identified in step 1. This involves testing the robot in a range of different environments and scenarios to ensure that it performs as expected.
6. **Deploy and maintain the system:** The final step is to deploy the robot and maintain it over time. This involves ensuring that the robot remains operational and meets the needs of the military, as well as updating the system as needed to incorporate new technologies and capabilities

**Military Robot process flow**



**Fig 3.2 Process flow of military robot**

**CIRCUITS DESIGN METHODOLOGY**



**Fig 3.3 circuit design methodology**

Circuit design methodology is a structured approach to designing electronic circuits that ensures that the circuit meets the required specifications and operates correctly. Fig 3.3 shows the circuit design methodology. Here are the steps involved in circuit design methodology:

1. **Define the requirements:** The first step is to define the requirements of the circuit, including its function, operating conditions, and specifications such as voltage, current, and frequency.
2. **Design the circuit:** Once the requirements have been defined, the next step is to design the circuit. This involves selecting the appropriate components, such as resistors, capacitors, and transistors, and determining how they will be connected to create the desired circuit. The design should take into account factors such as signal integrity, noise immunity, and power consumption.
3. **Simulate the circuit:** After the circuit has been designed, it should be simulated using software tools such as SPICE (Simulation Program with Integrated Circuit Emphasis) to verify that it meets the required specifications and operates correctly.
4. **Build the prototype:** Once the circuit has been simulated and verified, the next step is to build a prototype of the circuit. This involves selecting the appropriate PCB (printed circuit board) layout, and assembling the components on the board.
5. **Test the prototype:** After the prototype has been built, it should be tested to ensure that it meets the required specifications and operates correctly. Testing can include measuring the circuit's performance using oscilloscopes and other test equipment, as well as performing functional tests to ensure that the circuit performs its intended function.
6. **Optimize and refine the design:** Based on the results of the testing, the circuit design may need to be optimized or refined. This can involve adjusting component values, modifying the circuit layout, or making other changes to improve the circuit's performance.
7. **Finalize the design:** Once the circuit design has been optimized and refined, the final circuit can be designed and manufactured. This involves creating the final PCB layout and assembling the components on the board.

**IV. EXPERIMENTAL RESULTS**

Experimental result of the project is shown in the Fig 4.1 which is the top view



**Fig 4.1 Top View of the Military robot**



|| Volume 12, Issue 5, May 2023 ||

| DOI:10.15680/IJIRSET.2023.1205397 |

Experimental result of the project is showed in side view (fig4.2)

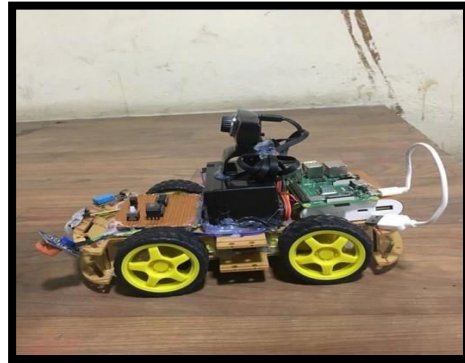


Fig4.2SideViewoftheMilitaryRobotics

The different components are used in the project are clearly seen in the top view and side of the Figures.

**Military Robot process flow – Algorithm**

- Military Robot initialization
- Initialize GP IO and ports
- Achieve communication with Bluetooth
- Read the data from RX pin
  - Check for metal detect – if true check for evidence of land mine & send alert message – if false go for fire detection
  - Check for fire detect – if true send a signal to water sprayer
  - Check for object detect – if true stop the robot
  - If Data received is 6 – drive the robot to left
- If Data received is other this value / false value – stop the robot
- End the program

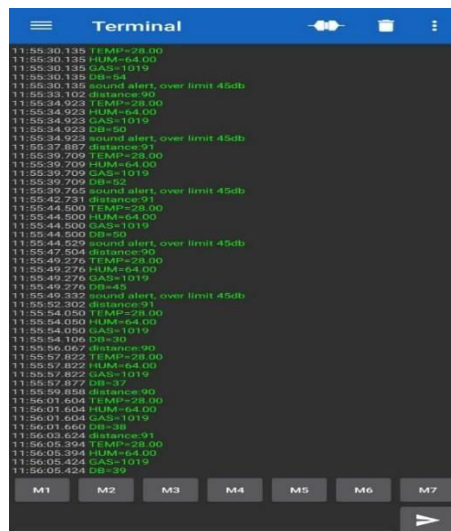


Fig 4.3 Graphical User interface to control military robot via Bluetooth

**Commands for controlling military robot**

- 8-drive the robot to forward
- 2-drive the robot to backward



- 4-drive the robot to right
- 6-drive the robot to left
- 5-stop the robot

## V. CONCLUSION

The Military robot is successfully designed and developed for the purpose of surveillance which uses the Internet as a medium to control the system. This was inspired by the larger surveillance Robots used by the military. A literature review of existing systems was done so as to understand the tasks that we had to accomplish and the problems that may occur during design and assembly of such systems. The system was designed according to the electrical components used and the sensors selected. Assembly of the Robot was done after selection of the electrical components followed by wiring and soldering of the components. A control algorithm was developed using Python coding language in the Raspberry Pi platform. In order to control the Military Robotics wirelessly, a webpage and a web server were created. The sensors were then calibrated and interfaced with the Raspberry Pi 3 B+ to display the environmental parameters. The assembled prototype was tested in various environments to check the accuracy of the sensor data and to test the mobility of the system.

## REFERENCES

1. R. M. Ismail, S. Muthukumaraswamy and A. Sasikala, "Military Support and Rescue Robot," 2020 4th International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2020, pp. 156-162, doi: 10.1109/ICICCS48265.2020.9121041.
2. J. Khurshid and Hong Bing-rong, "Military robots - a glimpse from today and tomorrow," ICARCV 2004 8th Control, Automation, Robotics and Vision Conference, 2004., Kunming, China, 2004, pp. 771-777 Vol. 1, doi: 10.1109/ICARCV.2004.1468925.
3. M. Vanitha; M. Selvalakshmi ; R. Selvarasu, "Monitoring and controlling of Military Robotics via internet through raspberry Pi board", 2016 Second International Conference on Science Technology Engineering and Management (ICONSTEM).
4. Ghanem Osman Elhaj Abdalla ; T. Veeramanikandasamy, "Implementation of spy robot for a surveillance system using Internet protocol of Raspberry Pi", 2017 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT).
5. Prof. Dr. Nabeel Kadim Abid Al-Sahib Mohammed Zuhair Azeez, "Build and Interface Internet Military Robotics using Raspberry Pi and Arduino ", Innovative Systems Design and Engineering [www.iiste.org](http://www.iiste.org) ISSN 2222-1727 (Paper) ISSN 2222-2871 (Online) Vol.6, No.1, 2015.
6. Warren ,J -D.,Adams,J.,& Molle,H.(2011). Arduino robotics.New York,NY: Apress



SJIF Scientific Journal Impact Factor

Impact Factor: 8.423



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details