

# MULTI FUNCTIONALITY ROBOT NAVIGATION WITH IMPROVED PERFORMANCES

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**ABSTRACT:** The land mines are a risky thing for soldiers and different specialists working in mining zones. The proposed robot will be valuable and supportive to minimize the risk condition. The robot can likewise be constrained by versatile or PC utilizing Bluetooth and Wi-Fi advancements. It is increasingly protected while identifying the land mines. These multi highlights features of the proposed robot servers its motivation as a multi-useful in a challenging environment. The purpose of this task is to fabricate a robot that can precisely navigate the area by staying away from deterrents and by maintaining a strategic distance from light, with the goal that it very well may be utilized in military applications, for example, to surveillance. The one increasingly a target of the robot is to identify metal because of that it can recognize land mines.

**KEYWORDS**—Arduino, DC motors, EC, Motor Driver, Robotic, RSS, Smart Phones.

## I. INTRODUCTION

In recent, it's has been a huge field right now to the mechanical world to the arrangement, improvement, action, and utilization of the robot. Before twentieth century, the region wasn't developed adequately. Presently, the investigation, structure, working of a new robot used in different private, business, soldierly portions are developing employments of mechanical innovation bit by bit. A Robot, when everything is said to be done as electromechanical and PC programming using power and control mechanical assembly devices able to perform tasks, therefore, depending upon sensors. This undertaking is planned to gather catch avoidance the identical time light after robotized vehicle using an ultrasonic sensor for the advancement and module named LDR to pick the best approach to pursue as exhibited by the light dives on it. A module named Arduino Uno R3 is responsible to achieve the perfect movement. A sensor called Ultrasonic is introduced to perceive any obstruction before it and sends a solicitation to the Arduino. LDR is used to such a degree, a particular proportion of light descending on it, against each heading would be resolved and thereafter it would find a course against the light source with utmost outrageous power falls on it. By then it pushes toward a particular way so to speak. L298N engines operator is being used to grow a force so that it would be able to drive the DC engines.

Enhancement like obstruction maintaining a strategic distance from robot model is required as a principal step towards a greater objective, for example, the advancement of a self-governing vehicle. A deterrent staying away from a robot utilizes a closeness sensor module, other than different parts. Right now, the robot utilizes a vicinity sensor created without anyone else. The robot is constrained by a program that is implanted into a microcontroller. The rationales delivered by the microcontroller are additionally prepared by an interface module, right now, created without anyone else. The interface module interprets microcontroller's rationales into voltage and current that can drive two motors. This article reports on the task motion, comprising of a rundown of structure, the outline of the improvement procedure and a report on the running trial of the robot. Following the test and program tweaking, it has been exhibited that the robot model worked well similarly as modified. File Terms—impediment sustaining a strategic distance from, obstruction shirking, closeness sensor, versatile robot, interface module for a robot.

Snag shirking and light after robot can be utilized for Industrial reason and Military activity. The significant segments incorporate the Arduino Uno R3, Battery and battery holder, BO motor, Chassis body, LDR module, L298N motor driver, Servo motor, Ultrasonic HCSR-04 sensor, and holder. A framework is constrained along

the module named Arduino Uno R3 that is a development rendition of a micro-controller and a piece of installed framework. Right now, the structured robot, which is minimal, self-governing and completely utilitarian. It's one the model proposed that can be utilized in a domain that would be powerless and hazardous for an individual. It holds four sorts of capacities. The capacities such as light after, hindrance discovery and operating with an android gadget like Wi-Fi module or Bluetooth and catch the tapped clips of the region. Obstruction avoider light source devotees the robot to recognize a light source, for instance, the light source of an electric lamp and follow the light source on a voyaging way. Likewise, it can recognize deterrents at the same it is moving and making the passes along the impediments. The robot has two light source recognition sensors that are set up with an infrared snag recognizing sensor and LDRs. The affectability from the light sensor may be set by making use of the trimming pots. In addition, the robot utilizes metal indicators to identify metal segments on description of which it can recognize landmines and it serves value in military applications.

## II. RELATED WORKS

DonyHutabarat et al. [1] proposed a self-sufficient portable robot has been created furnished with Light Detection and Ranging (LiDAR) sensors to maintain a strategic distance from hindrance. Eric J. Tzeng et al. [2] proposed Braitenberg vehicle methodology to explore the evolution of the robot. Sensor information assortment and control calculations are actualized on a solitary PC leading body of Raspberry Pi3. MugahedGhaleb et al. [3] introduced the formation and management of self-governing obstruction - staying distant from robot vehicle making use of ultrasonic wave sensor right now. By beats, the interference shirking segregation can be predicted. Together, it's possible to control the guiding apparatus to figure out the deterrent dodging work. Solomon Oluwole Akinola et al. [4] proposed methodology for the utilization of self-governing frameworks on the planet to perform significant and sensitive err and is quickly developing. Be that as it may, its application in different fields can't be overstressed. This paper presents obstruction recognition and shirking framework to an altered Lawnmower. The framework includes two (Infrared & Ultrasonic) sensors, a rigging DC engine, and an Arduino microcontroller. Harshith Nadella et al. [5] constrained by an ultrasonic sensor the robot is steered from an Arduino board. The impediment is identified by a way off of 15 cm while it detects the correct way to act along the degree of separation for the following snag. The hazard factor of mishaps and the quantity of automobiles is massively expanding often likewise increments along it. The module Bluetooth goes about as an interface to speak with the gadget utilizing android applications. A precision of impediment location of 92.5percent is being accomplished, while propulsive the framework with 77.93cm/s speed. Angelo Vera et al. [6] designed a robot which is a little portable machine that maintains a strategic distance from impediments and it does as such through an ultrasonic sensor that will identify the separation of the articles before it and settle on a choice about its direction. When moving toward a specific separation, the Arduino UNO will impart a sign and from the assistance of a scaffold H would make the motors swing the vehicle and thoroughly maintain a strategic interval from the obstruction. ThurayaNasserIbrahim Alrumaihet et al. [7] proposed the framework to be utilized at current antiquarianism destinations to look through an unpleasant landscape, subsequently the requirement for the dependable robot and formation of a free that can work on a territory and can convey a sensor payload fit for recognizing focuses with an elevated height of accuracy and certainty. The robot automobile comprises a robotized running metal indicator circuit that works with BFO (Beat Frequency Oscillator) standard to signals the client while an objective is recognized. Raza Hasan et al. [8] proposed robot configuration is tied in with inquiring about and researching perilous situations, investigation, remote help and Military managements. In the given framework plan, a robot framework is worked to screen and differentiate the movement in accomplishing better security and observation of indoor conditions. This independent framework is worked by utilizing an inserted framework to perform explicit undertakings and capacity as characterized. Yutian Liu et al. [9] proposed obstacle evasion is notable issues in the field of applied autonomy. In this paper, development patterns of hindrances are proposed to be considered to improve the traditional obstacle shirking technique. As per the development laws of the dynamic obstruction, the development patterns of the deterrent are anticipated to assist the robot with planning the course and the method of evasion. E Amareswari et al. [10] has been planned that utilizing an application running on an android telephone a robot can be supervised. The controller can be interfaced to the Bluetooth module however UART convention. It sends control orders through Bluetooth which is interfaced to the controller. As stipulated by orders got from android the robot motion can be controlled. Dekuil et al. [11] proposed LIDAR (Light Detection and Ranging) as another high goal earth space data innovation, has the attributes of short information creation cycle, little impact by various climate, high level of robotization, and so forth. Focusing on conversations on making DEM, DOM, and the point cloud preparing, this paper quickly depicts the LIDAR information handling innovation, expresses the current circumstance of this application in parts of national monetary development and military discovery. Arnab Saha et al. [12] have structured a robot, which is conservative, independent, and completely useful. It is a proposed model that can be utilized in such a domain, which might be defenseless and unsafe to the person. It has four sorts of capacities. The capacities are light after, deterrent discovery, and controlling from an android

gadget through Bluetooth or Wi-Fi module & catch the video clips of that region. Obstacle avoider light follower robot recognizes the light, (for example, the light of the electric lamp) and follows light on the voyaging way. Kirti Bhagat et al. [13] proposed a mechanical automobile that has an insight working in it with the end goal that it guides itself at whatever point a deterrent comes in its way. An ultrasonic sensor is made use to identify any obstacle in front of it and sends an order to the microcontroller. Contingent upon the information signal got, the small-scale controller diverts the robot to move a substitute way by activating the engines which are linked to it through an engine driver. This mechanical vehicle is developed, utilizing a smaller scale controller of the AT uber 8 family. Ahmed Abdelgawad et al. [14] presented utilization upon the exceptionally favorable circumstances of precision in both the ultrasonic sensor and a Kinect sensor for close field and far-fields individually. This is finished by a combination of effective sensor approach to recognize the size and area of obstacle and explore the versatile robot with high precision. Chen Guorong et al. [15] presented an obstacle detection and navigation of dynamic conditions is a test in portable mechanical autonomy. To address this test, this paper presents a proficient sensor combination procedure to identify the size and area of obstacles and explore the versatile robot with high exactness. This is finished by utilizing upon the special points of interest of exactness in both an ultrasonic sensor and a Kinect sensor for close field and far-fields separately. Further, a productive Kalman channel is actualized to decrease the methodical mistakes in encoder information to follow the robot posture of the robot progressively and arrive at the goal with high precision. Hasan U. Zaman et al. [16] depicted the plan and usage of an electronic metal detector prepared remote-controlled robot that can be utilized in land mine discovery without placing people in danger. The metal detector can recognize secured metals and the robot can be controlled remotely from a separation. Gaurav Verma et al. [17] brought an advancement of independent versatile robot utilized for the remote position following utilizing GPS and sending that exact data on to a gadget, for example, portable or tablet utilizing GSM. The multifunctional robot is furnished with GPS (for identification of area), GSM (for remote information move), DTMF (for controlling a robot with portable or tab), sonar sensor (for obstruction discovery), and glimmer light (for night vision). This portable robot has a wide assortment of utilization in businesses like protection, aviation, horticulture, and security, and so on.

### III. MOTIVATION FOR MULTIFUNCTIONAL ROBOT

#### 3.1 Problem Identification and our approach

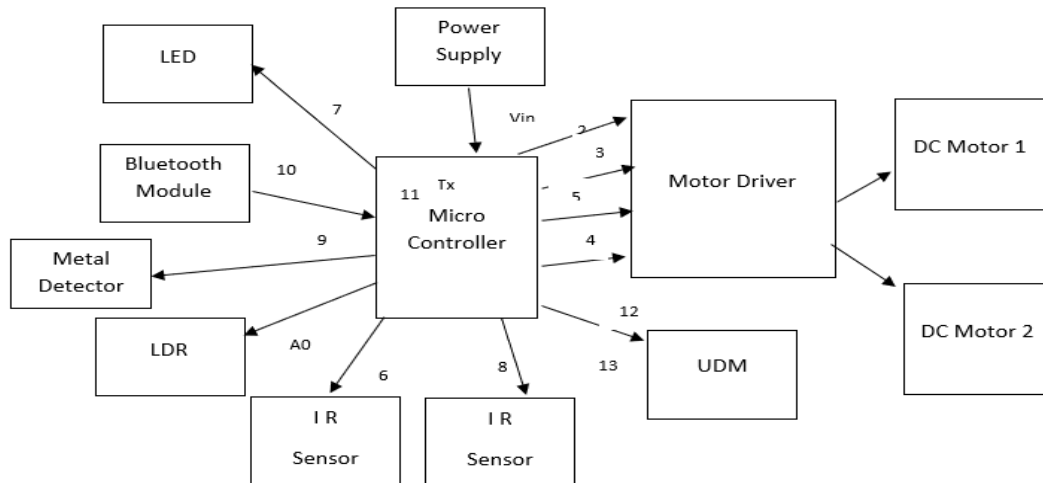
There are many issue statements for this work since, it is a multi-useful robot. Improvement of the snag evasion framework has various inconveniences along with troubles in the calculation plan. The challenges included in unseen condition and to evade contact or slam into objects inside a field. The calculation is built up where, it can evade more than one obstruction and those will choose the course of versatile robot to heading. Simulation of a snag evasion portable robot to keep away from impact are rely upon the bearing of x-axis and y-axis heading and position in time area and the location of the hindrance around the x-axis and y-axis. Angle of heading is required likewise to decide in time space so it is appropriate for deterrent shirking. The landmine emergency is internationally disturbing since there are presently 500 million unexploded, covered mines in around 70 nations. Governments are investigating this circumstance genuinely since landmines are asserting the appendages and lives of regular folks consistently. Clandestine vehicle of military hardware and supplies through a mine plagued, adversary locale is troublesome and normally causes the death toll. Controlling a robot vehicle utilizing an advanced mobilephone. Design a framework that performs explicit capacities. Develop an android application. Dealing with sensor interface with microcontroller. Dealing with module interface with microcontroller.

#### 3.2 Requirements of Multifunctional Robot

The proposed Robot can avoid the Obstructions and capable to Sense close by objects. The robot is helpful for Ought not to collide with an item and Prevent at 10 cm away from the article. The robot ought to maintain a strategic distance from light and escapes into dull territories regardless of whether it is blinded by the evacuation of the two-sided predominant arm. The getaway conduct was increasingly apparent for short-frequency light. A land mine location robot is suitable to utilize in harmony bolster tasks and the leeway of tainted zones. The multi-functional robot will have the option to distinguish 80-90% of landmines and imprint the areas of the mines inside a resilience of 5-10 cm. For the security of the administrator, the planned robot must have the option to work remotely and must be furnished with remote information transmitting capabilities. The robot will not explode the mines while filtering the territory and denoting the areas of the mines.

**IV. DESIGN AND IMPLEMENTATION OF MULTI-FUNCTIONAL ROBOT FOR IMPROVED PERFORMANCE**

Figure 1 describes the design and implementation of the multifunctional robot with the various sensor's connectivity. The power supply is associated with the microcontroller which is having the program coded. The microcontroller is additionally associated with a motor driver and is utilized to control the Dc engines to make the robot move. It is having a setup association with UDM. Two IR sensors are being utilized to the robot in order to identify obstructions. LDR and LED's are utilized to maintain a strategic distance from light and ready when something turns out badly. A Bluetooth module is being used to control the robot remotely. Metal identifier is used to identify metals securely from a specific separation. The BOE board and Basic Stamp 2 program are being utilized to multifunctional robot functionality.



**Figure 1: Block Diagram of the Multifunctional Robot.**

**4.1. Methodology of Multifunctional Robot:**

Step 1: If the robot is dealt with physically, at that point when the robot is given particular guidance to move it will begin moving toward that path. else there is a deterrent before it yet

to same time on the off chance that it is given the guidance to move, at that point it won't move. This way the robot can even maintain a strategic distance from pointless impacts.

Step 2. The robot is having light evasion module to keep away from light this component is valuable while doing observation.

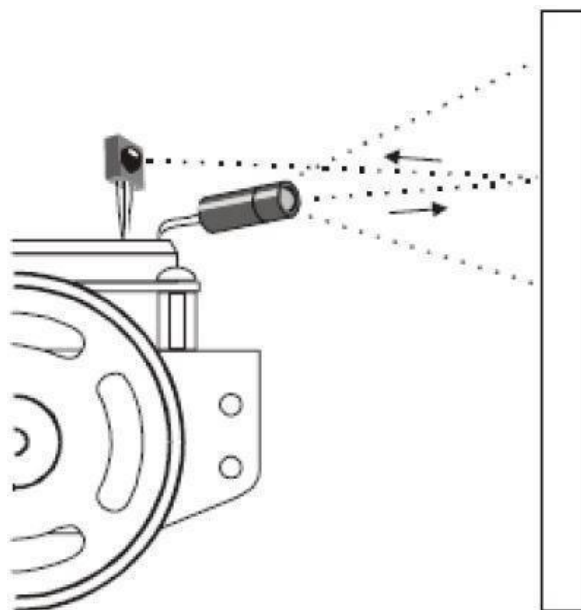
Step 3. The metal indicator is actualized on the robot to distinguish land mines without detonating the mines.

Step 4. When the mines are recognized it will alarm the client that a metal surface has been identified.

Step 5. This way the robot utilizing all the segments referenced before will give a multi usefulness highlight.

Step 6. The robot will go to the rest state when the client provides a shutdown order.

Step 7. The framework utilizes power supply to give the capacity to the robot, subsequently, it ought to be kept up appropriately by charging it at whatever point the battery is low.



**Figure 2: IR Sensor (left) and IR LED (right)**

IR sensor is introduced to detect and identify obstacles while IR LED is used to emit infrared light which helps in detecting obstacles.

## V. IMPLEMENTATION AND DISCUSSION ON MULTIPLE FUNCTIONS OF THE ROBOT

### 5.1 Hardware Requirements:

- Arduino Uno microcontroller
- UDM Sensor
- Buzzer
- Jumper Wires
- B Type cable
- LDR Sensor
- Motor Driver
- DC Motors
- Power Supply board
- Bluetooth Module
- Soldering gun, led, Flux
- PC / Laptop
- IR Sensor
- LED's
- Metal Detector

### 5.2 Software Requirements:

- Embedded C
- Arduino IDE TOOL
- Basic Stamp Editor



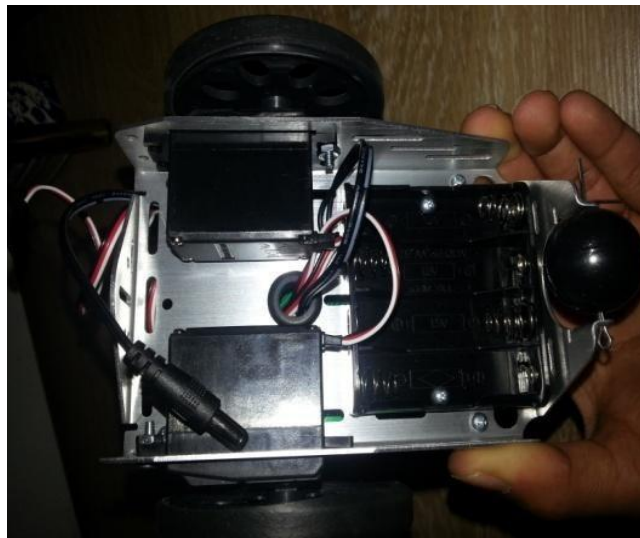
**Figure 3: Chassis.**

A Chassis is a load-bearing component that is used to hold and structurally support the other components during the construction and functioning of the robot.



**Figure 4: After mounting servos on the chassis.**

Fig, 4 shows how servos is mounted on the chassis for the rotatory or linear action of the robot and it allows precise control of the robot.



**Figure 5: Battery holder.**

A battery holder is fixed above the servos in order to provide power supply for functioning of the robot as shown in fig. 5.



**Figure 6: Connected board.**

Once the power supply is fixed a programming board along with bread board is fixed on the robot where other components can be fixed to it as shown in above fig 6.



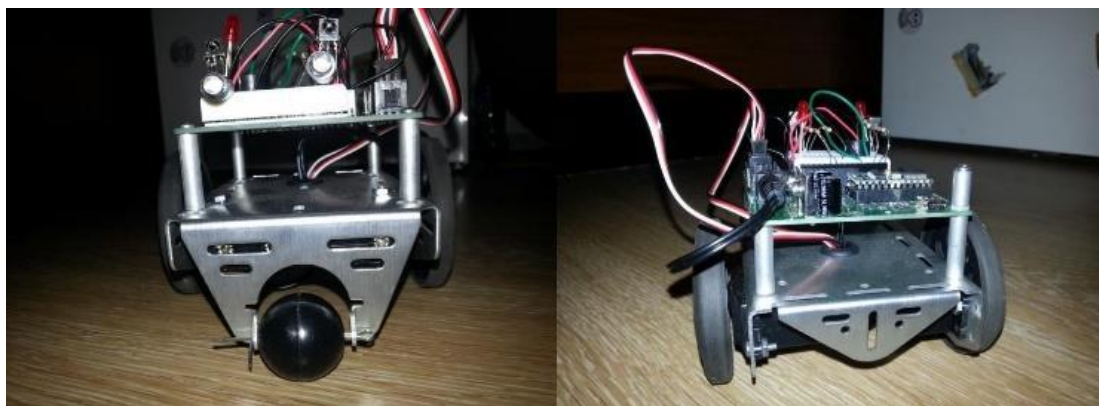
**Figure 7: RobotForemost View.**

After all the boards are connected, the above fig. 7 is the foremost view of the proposed multifunctional robot.



**Figure 8: Robot Side view.**

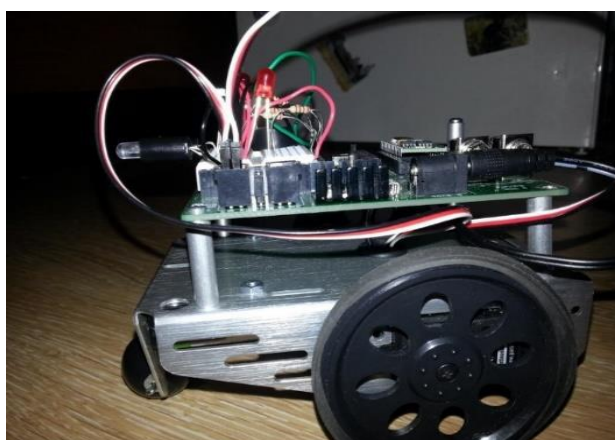
Fig. 8 shows the side view of the robot where the wheels, chassis and boards are shown. After all, above connections are made then resistors, IR led sensors and metal detectors are added to the robot. The final connection of the robot is as shown in the below figures.



(a) (b)

**Figure 9: Robot's Front view (a) and Robot's rear view (b)**

Fig. 9 shows the Front and rear view of the robot, once all the resistors, sensors and detectors are been fixed to model.



**Figure 10: Robot Side view.**

Following connection is done it is followed by the installment of the required software (BASIC Stamp Editor V2.5.3), the final robot is ready to be coded for testing. The final robot is presented in the below figure.



**Figure 11: Prototype of the robot.**

In this research analysis, all the case studies that have been referred are combined together to obtain better results.

**VI. CONCLUSION**

The Multi functionality robot is designed and implemented so that it can do different capacities one after another on the grounds. Since it is the cutting-edge period of science and reorganization so it is major to reduce the labor and addition to the vocations of the component. Through this equipment venture, it is found out about numerous



new activities and it additionally builds one's expertise in programming. This task can be utilized in military applications to recognize mine and keep away from impediments while doing the surveillance. It was an incredible breadth to make the innovation a tad far. The research study and analysis can be further improvised by adding more advanced equipment and upcoming technologies.

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Neha Singhal is a specialist in the area microservice. Her interest lies in setting the seal on Information Technology is systematically developed through the use of appropriate technical support and are well aligned with the business needs that they address. She has about 10 years of work experience. Neha Singhal has completed M.Tech.(CSE) from Banasthali University, India and pursuing PhD (CSE) from VTU, India. She had delivered guest lecturers related to computer science in various colleges. She had presented and published various papers on micro services in reputed journals. she is a life time member of ISTE and IEEE professional society She had delivered a webinar series on stress management. She has received project funding for technical projects from VTU and KSCST in 2018 and 2019. Currently, Neha Singhal is doing research on Big-Data, IoT, Software Engineering, DWDM, Information System and web services. Neha Singhal is working as a assistant professor in Rajarajeswari College of Engineering in the department of Information Science and Engineering, Bangalore, India.



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