WWW.IJRPR.COM

**International Journal of Research Publication and Reviews**

Journal homepage: www.ijrpr.com ISSN 2582-7421

# DESIGN AND IMPLEMENTATION OF LINE FOLLOWING ROBOT USING ARDUINO

***Naveen Kumar Reddy V [1], Ravindra Reddy V[2], Priya S [3]***

*UG Scholar[123], Department of Electronics and Communication Engineering Muthayammal Engineering College – Rasipuram, Namakkal(D.t), Tamilnadu - INDIA*

*Asst. Prof. [4], Department of Electronics and Communication Engineering Muthayammal Engineering College – Rasipuram, Namakkal(D.t), Tamilnadu - INDIA*

**ABSTRACT**

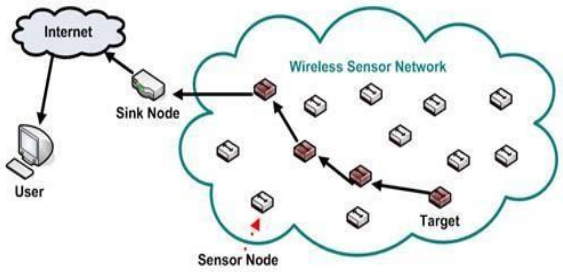
This paper describes the basic architecture, operation of individual components, basic algorithm, working principle and applications of a line follower robot. A line follower robot is a device that detects and follows back and forth a specified line with a contrasted color drawn on the floor. The line can also be normal. It uses one or more sensors in the IR array to detect the line and keep the robot strictly on the track. DC motors controls the move-ment of the wheels of the robot. Arduino Uno R3 interface has been used to perform and implement algorithms to control the speed and direction of the robot. It can be used industrial automated equipment carriers, small household applications, tour guides in museums and other similar applications, etc. In this paper, the authors explain about the robot design, implementation, coding and relevant problems they faced along with their possible solutions.

## 1. INTRODUCTION

**WIRELESS SENSOR NETWORK:**

A **wireless sensor network** (WSN)is a computer network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. The development of wireless sensor networks was originally motivated by military applications such as battlefield surveillance. However, wireless sensor networks are now used in many civilian application areas, including environment and habitat monitoring, healthcare applications, home automation, and traffic control.

In addition to one or more sensors, each node in a sensor network is typically equipped with a radio transceiver or other wireless communications device, a small microcontroller, and an energy source, usually a battery. The size a single sensor node can vary from shoebox-sized nodes down to devices the size of grain of dust. The cost of sensor nodes is similarly variable, ranging from hundreds of dollars to a few cents, depending on the size of the sensor network and the complexity required of individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and bandwidth. In computer science, wireless sensor networks are an active research area with numerous workshops and conferences arranged each year.




## 2. LITERATURE SURVEY

**Rahee Walambe., Aditya Prakash. "Military Surveillance Robot Implementation Using Robot Operating System." IEEE Transactions on 2018,vol. 30.no 2**

Robots are becoming more and more prevalent in many real world scenarios. Housekeeping, medical aid, human assistance are a few common implementations of robots. Military and Security are also major areas where robotics is being researched and implemented. Robots with the purpose of

surveillance in war zones and terrorist scenarios need specific functionalities to perform their tasks with precision and efficiency. In this paper, we present a model of Military Surveillance Robot developed using Robot Operating System. The map generation based on Kinect sensor is presented and some test case scenarios are discussed with results.

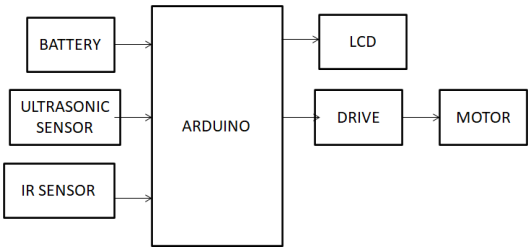
## 3. EXISTING SYSTEM

In existing system all the sensors data will be stored send send to the doctor using Zigbee.A Wireless Sensor Network (WSN) for monitoring patient's physiological conditions continuously using Zigbee. Here the physiological conditions of the patient's are monitored by sensors and the output of these sensors is transmitted via Zigbee and the same has to be sent to the remote wireless monitor for acquiring the observed patient's physiological signal Infusion pump is a medical device. It is healthcare facilities used worldwide in hospitals, and at home. It can deliver fluids both in medicines and nutrients such as pain relievers chemotherapy drugs, hormones or insulin, and antibiotics into a patient's body in any amounts. There are many types of pumps including insulin pumps, syringe, large volume, elastomeric, patient-controlled analgesia (PCA), and enteral pump. Enteral pump is a pump that is used to deliver medications and liquid nutrients to a patient's digestive tract. Patient-controlled analgesia (PCA) pump is a pump that is used to deliver pain medication. Insulin pump is a pump that is used to deliver insulin to patients with diabetes which is frequently used in home. These devices are very important for nurses because they can show status of liquid that they give to patients. So, the devices are very popular in hospitals for checking status of medicine.

## 4. PROPOSED SYSTEM

In this proposed system, Arduino Uno R3 interface has been used to perform and implement algorithms to control the speed and direction of the robot. It can be used industrial automated equipment carriers, small household applications, tour guides in museums and other similar applications, etc. In this paper, the authors explain about the robot design, implementation, coding and relevant problems they faced along withtheir possible solutions. In the circuit diagram, the Arduino UNO R3 microcontroller receives the approximate location of the line on surface from the signals received from IR array and ultrasonic array. As the IR array consists of five sensors, the location of the line is specified from the intensity of responses from the five sensors. At the same time, the voltage regulator circuit maintains a constant 9V input in the microcontroller. The current location, motion speed and other parameters are constantly and updated in LCD display. Based on responses of IR and ultrasonic sensors, the programmable microcontroller generates an output which is driven to motor driver circuit. The motor driver circuit controls the direction of rotation of motor according to the inputs received from the Arduino UNO R3 microcontroller.

## 5. BLOCK DIAGRAM




## 6. SYSTEM REQUIREMENTS

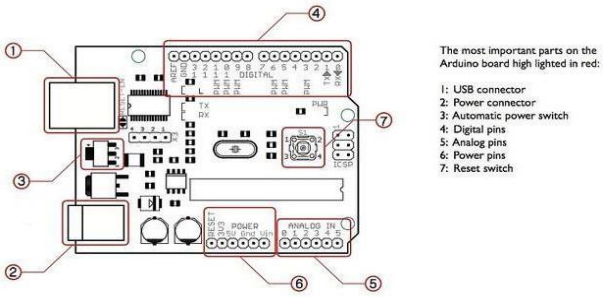
**HARDWARE DESCRIPTION:**

**ARDUINO UNO R3 MICROCONTROLLER**

The Arduino Uno R3 is a microcontroller board based on the ATmega328. 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.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2(Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Revision 2 of the Uno board (A000046) has a resistor pulling the 8U2 HWB line toground, making it easier to put into DFU mode.




Revision 3 of the board (A000066) has the following new features:

**16x2 LCD:**

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

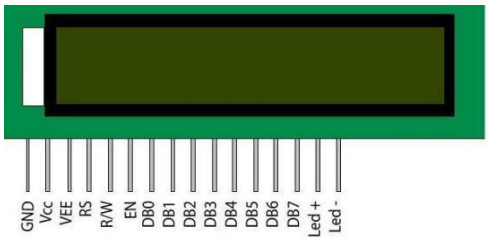



**Fig 9 LCD pin details**

**ARDUINO**

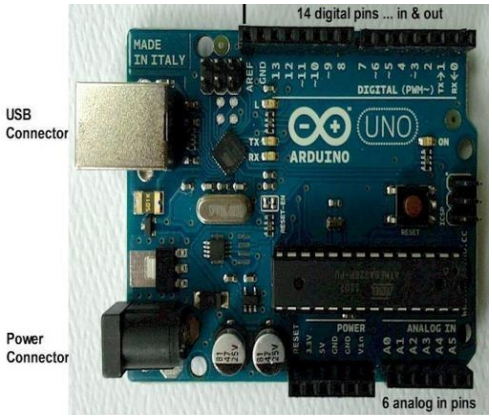
**Arduino** is a computer hardware and software company, project, and user community that designs and manufactures

microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open- source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits.

The project's board designs use a variety of microprocessors and controllers. These systems provide sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ("shields") and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. The microcontrollers are mainly programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2005 as a program for students at the Interaction

Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors




**DC MOTOR**

A **DC motor** is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor.

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

## 7. CONCLUSION

The robot is capable of following any curve or cycle. Highly effi-cient stepper motors can be used to control the speed of line fol-lower robot. For better detection of obstacles along the line.. And by using Arduino based solider unit it becomes less complex and portable.

This system can be helpful to provide the accurate location of missing soldier in critical condition and overcome the drawback of soldiers missing in action. The proposed system is also helpful to improve the communication between soldier to soldier in emergency situation and provide proper navigation to control room.