International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, February 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

AUTOMATIC REMOTE CONTROL MATERIAL HANDLING TROLLY ROBOT

Jay M Sutar[1],AjitSMadane[2],Navnit R Shinde[3],
Shivdatta SPatil[4] ,Anuja D. Kanase[5]

Student, Department of Electrical Engineering, NMCOE, Peth, India [1,2,3,4]
Assistant Professor, Department of Electrical Engineering, NMCOE, Peth, India[5]
(NanasahebMahadik College of engineering, peth, Department of Electrical engineering)

ABSTRACT

This paper introduces an " Automatic remote control material handling trolley robot" is to developed by to carry any book's and parcel in collage library or other places from one to another place easily no damage to the parcels and materials.The robot is basically works on the principle of line follower robot and relay logic system.The robot is to be control the motor rotation via remote control. Firstly we press number button of remote control the relay will be RF based remote control circuit operated .The circuit are classified as one transmitter and receiver, in transmitter circuit 1to 8number of remote control are used to transmit particular signal through wireless,then operate receiver sidereceive signal and operate particular relay in receiver.In receiver circuit relay provide supply line follower or obstacle circuit are fitted to robot body and can be driven any of four directionslike left, right, forward, back. and the robot trace black line on ground surface and also detect obstacle in front direction thane after robot stop and give the alarm.This robot will be installed in collage library for books are traveling one place to another easily and robot also applicable for the industry, shopping mall to travel small weight up to 25kg.

Keyword:- IR Sensor Module, RF Based Infrared relay circuit, Relay Driver circuit.

I. INTRODUCTION

In the research paper studied the earlier invention of material handling trolley system in collage library, small industry and shopping malls. Early we are use the method formaterial transportation for man power and crane. This method is not economical, costly and risk for material damage. Now automatic material handling robot are used reduce risk to material damage and it is economical. This system is newly launched and removes all methods of material handling as, manually, cranes etc. up to 25kg weight.In the collage library no. of book racks, In between the rack space we draw the black line, the diameter of the line 25mm to 30mm and total length of the library. The robot is followline and traveling the book at particular rack location. Than after get book in trolley and put in rack. This robot handling with help of RF based remote control circuit range up to 15m. The RF based remote control are two parttransmitter and receiver, we fit the remote control receiver part on the robot body. The 8 channel RF based remote control circuit are used, than remote control are operate corresponding

relay operate on the receiver board i.e. press key 1 operate relay one as same as particular button press to operate particular relay up to key 8,at particular key to provide exact operation of robot. The robot trace line and do action we give signal with remote to robot and travel material or books inward/ outward desk to particular rack automatically.

II.AUTOMATIC REMOTE CONTROL MATERIAL HANDLING TROLLY ROBOT

The aim of this robot is to design and built a work as in multipurpose robot uses in material handling in one part to another automatically and no risk damage of materials. The idea behind this robot is to be control by remote as motor rotation and obstacle sensing by robot .the using long range (15m) infraredRF based 8 channel remote control circuitsusing to control robot at any direction. The robot can be travel at four direction when we command signal are given by remote control unit. The built fabricated robot which is light weight to carry upto 25 kg (neglected body weight of robot) to travel weight one place to another. The making robot is less expensive as possible to try to largest weight travel by robot using high torque motor to carry weightthe robot must be capable of following a line. It should be capable of taking various degrees of turns. The robot must be insensitive to environmental factors such as lighting and noise.

III.BLOCK DIAGRAM

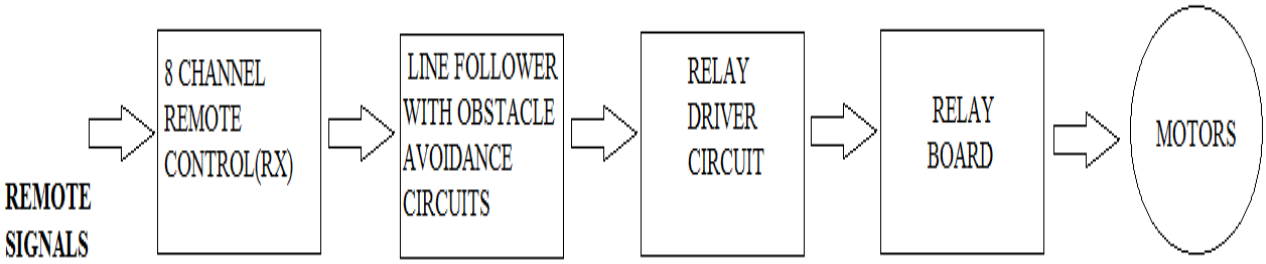

Fig.1:-Block Diagram of Robot

For the robot operation remote control circuit are used, the remote control circuit has two part transmitter and receiver it's range is 15 meter and frequency is 432MHz's.and this transmitter have 1 to 8 key for particular receiver side relay operation .The 8 channel remote send signal to receiver and operate relay on receiver side provide supply to line follower block andmotor driver IC take output relay driver circuit to operate IC ULN2803 .The output of the relay driver give to the relay board and relay board operate the motor direction (forward,back,left,right).The content details following as,

- Remote Control circuit
- IR Sensor Module
- Relay logic system
- Obstacle detector circuit

- Line following Robot
- Relay driver circuit
- Power supply

3.1 Remote Control circuit

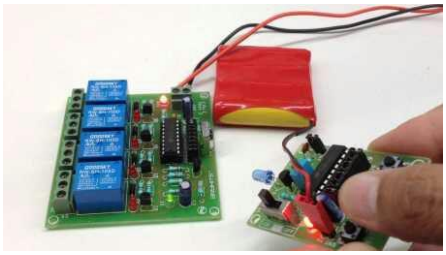

Fig.2:-RF Based Wireless Remote control using RX-TX MODULES (434MHz.)

This radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter/receiver (TX/RX) pair operating at 434 MHz's. The transmitter module are takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission.The system allows one way communication between two nodes, namely, transmission and reception. The RF module has been used in conjunction with a set of four channel encoder/decoder ICs. Here HT12E & HT12D have been used as encoder and decoder respectively. The encoder converts the parallel inputs (from the remote switches) into serial set of signals. These signals are serially transferred through RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. These outputs can be observed on corresponding LEDs and operate relay with particular pressing key of remote as key-1: operate relay 1for same all remote key's.

3.2.IR Sensor Module

Fig.3:-IR Transmitter and IR receiver sensors working

The basic principle of IR emitter and IR receiver are IR emitter will emit infrared continuously when power is supplied to it. On the other hand, the IR receiver will be connected and perform the task of a voltage divider. IR receiver can be imagined as a transistor with its base current determine by the intensity of IR light cause higher resistance between collector – emitter terminal of transistor ,and limiting current from collector to emitter. This change of resistance will further change the voltage at the output of voltage divider in other word, the greater the

intensity of IR light hitting IR receiver, the lower the resistance of IR receiver and hence the output voltage of voltage divider will decreased. Usually the IR emitter and IR receiver will be mounted side by side, pointing to a reflective surface. Since the output voltage from voltage divider varies with the intensity of IR light, this given to comparator IC LM358 is used to provide output to IC L293D motor driver circuit.

3.3.Relay logic system

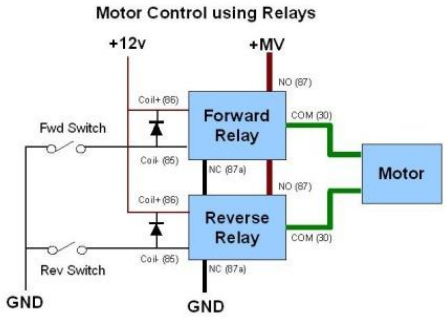

Fig.4:- Two relay logic principle

A relay is a simple electromechanical switch made up of an electromagnet and set of contacts. Relays are found hidden in all sorts of devices. Relay is used for many control function and is essentially an electromechanical switch .The construction of a typical relay essentially contains a coil of wire wound around an iron core. The relay has set of two contacts, one of which is spring loaded and movable and other is fixed. These contacts are electrically isolated from the coil and are used to make or break another circuit, the motor control using relay logic system as shown in figure. In this figure two relay logic principle as shown .Here two relays are used to control the motor rotation in any direction. When we press the forward switch forward relay will be operated motor runs at forward direction. When we press reverse switch reverse relay is operated and motor will start to reverse direction. This logic can be used to control motor using relay board are used more than two relays. The input is given by relay driver IC ULN2803 and operates relays.

3.4.Obstacle detector circuit

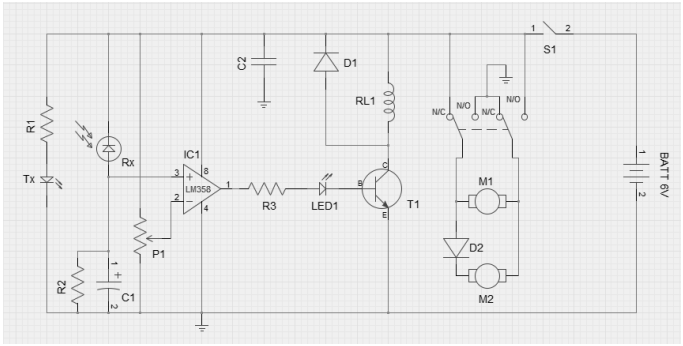

Fig.5:-Obstacle avoidance circuit

The fig shows obstacle avoidance circuit diagram. In this diagram first circuit will be operated as obstacle is detected by IR sensors and provide input signal to LM358N comparator (IC1).This IC1 output is connected to transistor T1 tooperated relay. When obstacle is present front of sensors (TX, RX) is provide signal to comparator and output of comparator is provide base current to transistor will be on and operated relay and motor will be stop. When no any obstacle present in front of sensors the relay is not operated and motor will be start. The output is providing to line follower circuit.

3.5. Line following Robot

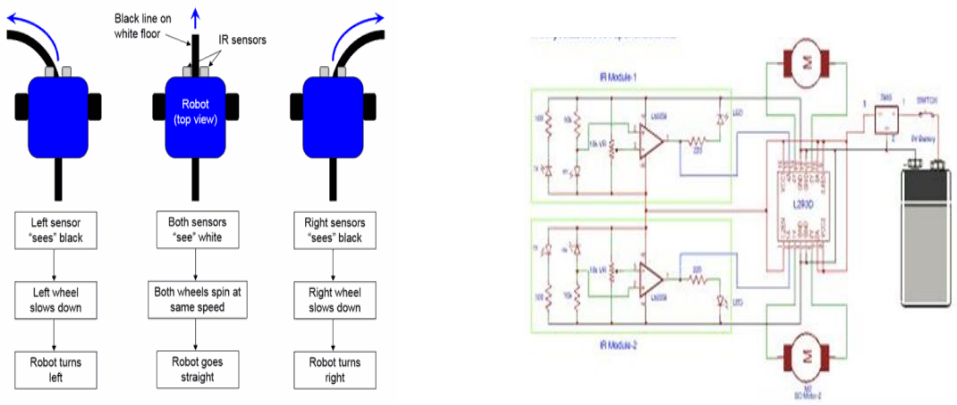

Fig. 6 :- Line follower robot working diagram

Line follower is a machine that can follow a path. The path can be visible like a black line on a white surface (or vice-versa) or it can be invisible like a magnetic field.The using IR we make IR module .here in this project we are using two IR sensor modules namely left sensor and right sensor module. When both left and right sensor senses white then robot move forward .if left sensor comes on black line then robot turn left side. If right sensor sense black line then robot turn right side until both sensor comes at white surface. When white surface comes robot starts moving on forward again. If both sensors comes on black line, robot stops as shown in fig .This IR transmitter and IR receiver sensor are placed in robot to control motor direction via sensorsand provide supply to relay driver circuit.

3.6Relay drive circuit

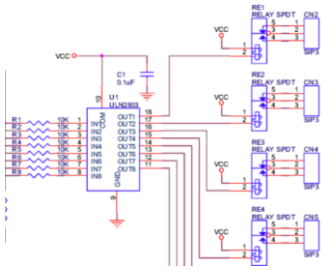

Fig.7:- Relay Driver Circuit Diagram

The signal from line follower circuit to relaydriver IC ULN2803 as diagram is shown fig. The IC have 18 pin DIP package 1 to 7 are input pin's and 11 to 18 are output pin's. When provide pin 1 is high input respective pin 18 is ON as same all pin's respectively.Then through output relay take input to motor.The fig relay1,2is operate robot motor M1 ,M2 in forward direction and relay 3,4,5,6 are operate motor M1 , M2 in reverse direction operate.

3.7 Power supply

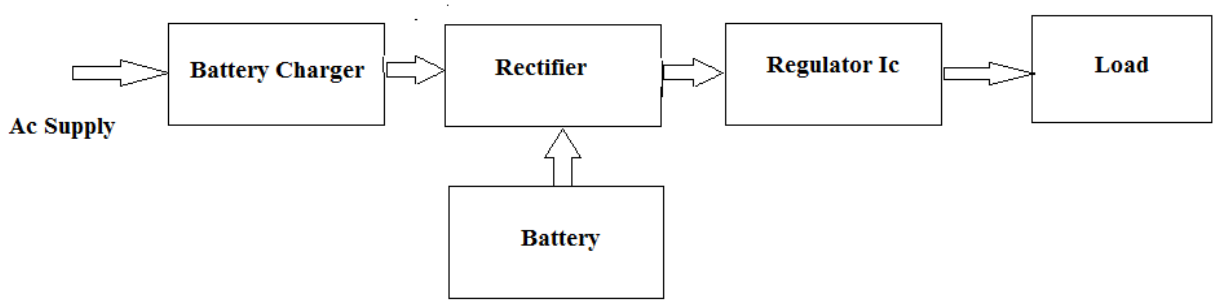

Fig.8:- Block Diagram Of Power Supply

In power supply no. of unit are used like battery charger, rectification unit, power regulator. First give the ac supply 230v, 5A to the transformer, This transformer are step down the supply 12v, 3A, In battery charger give supply to bridge rectifier this supply are convert AC to DC and give the supply to battery tocharge and directly give to the regulatorICas 7805 and 7812. Now the regulator regulatedoutput the supply as5v and 12v respectively.

IV.DC MOTOR SPECIFICATION

Fig.9:- High torque Dc gear motor,

Specification:-

1)60 rpm,12V dc motor with metal gear box.
2)18000 rpm base motors.
3)Shaft diameter:-6mm
4) Gear box diameter:-37mm
5) Length :-63mm (without shaft)

6) Shaft length:- 25mm

7) Weight:- 170gm.

8) Stall torque:-25kgcm.

9) No load current:-800mA,load current:- up to (7.5A)max.

Motor Torque and power calculation

Given data:-

Required speed= 60Rpm.

Diameter of wheel=70mm or 7cm.

Maximum load(Mass) =40kg.

Calculation:-

1)RPS =Rpm/60=1Rps.

2)Circumference=π*Diameter of wheel=0.2199m.

3)Linear velocity=RPS* Circumference =0.2199m/s.

4) Acceleration= final velocity-initial velocity/time =0.2199m/s^2.

5)Force = Mass*Acceleration = 40*0.2199 = 8.796 Neuton.

6)Torque = Force*Radius of wheel = 8.796*0.035 = 0.30789N-m = 3.1382 Kg-cm.

7) Power = 2πNT/60 = 1.934 ~ 2 watts.

V.PROPOSED SYSTEM

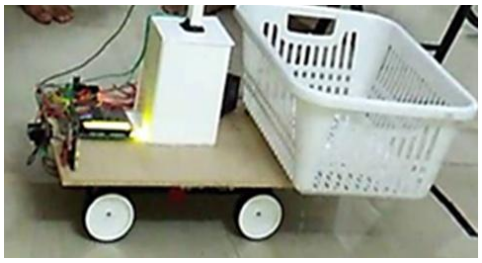

Fig.10:-Demo Model of thasis

Figure 10 shows the demo model of trolley robot which contains D.C motor, sensors, battery, microcontroller 8051.It can used for material handling and sustain weight up to 6kg.

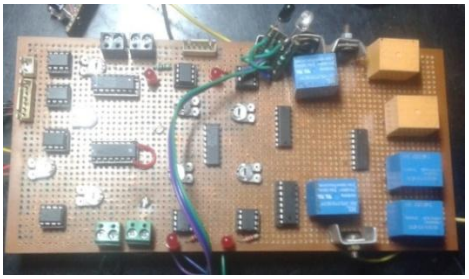

Fig11:-Motor Control Board

Figure 11 shows the Mounting of components on PCB. The component specifications which used for making model are listed in following table:

Component list table

Sr.no	Component Name	Quantity
1	DC 12 V,60RPM Gear Motor	4
2	Transformer 12v,3amp	1
3	Battery 12v,1.2amp	2
4	ICULN 2803	2
5	LC 7805	4
6	IC 7404	2
7	ICL 293D	6
8	Diode IN 4007	4
9	Capacitor 1000uf,50v	1
10	IR TX&RX Pairs	8
11	AC card	1
12	Robot wheel (7cm x 4cm)	4
13	Battery Plate 6mm	2
14	8 Channel remote circuit	1
15	Flange	1
16	4mm conduit pipe	5 meter
17	Control panel box (1feet x1feet)	1
18	0.5 copper wire 300v	20 meter
19	PCB (8" X 8")	1
20	Robot chassis	1
21	DC 12V Lamp	2
22	DC Connecter	6
23	Relay 12v	8
24	Relay 5v	2

VI. CONCLUSION

The line following robot work successfully to track on black line .above the surface there are same black line in different direction the robot stillgood enough to sense the line and follow the track also the robot is capable to carry same load likely 25Kg.

VII. ACKNOWLEDGEMENT

First of all we are thankful to principal, Dr. J. A. Tamboli Head Of Electrical Department and our to guide Prof. A.D.KanaseFor their financial and logistical support and for providing necessary guidance concerning project implementation. Without their superior knowledge and experience, the project would like in quality of outcome and thus there support has been essential we would like to express above sincere thanks towards volunteer researches that devoted their time and knowledge in the implementation of this project.Nevertheless we express our gratitude towards our family and collages for their kind co-operation and encouragement which help us incompletionof this project.

REFERENCES

[1]T. Braun, "Embedded Robotics:Mobile Robot DesignAnd Applications with Embedded Systems". Springer-Verlag, 2nd edition, 2006.

[2]M.S.Islam&M.A.Rahman"Design and Fabrication of Line Follower Robot" Department of Electrical and ElectronicEngineering, Rajshahi University of Engineering and Technology, Rajshahi-6204, BANGLADESH.

[3]S. Akash1 ,Bibek Kabi2 , Mr.S.Karthick3 "Implementing a Line Tracing Robot as an effective Sensor and Closed Loop system"1 Comp. Science & Engineering, 2 Electrical & Electronics Engineering, 3 Lecturer, Comp Science&

Engg.SRM University, Chennai – 603203.

[4]Deepak Punetha,Neeraj Kumar, VartikaMehta."Development and Applications of Line Following Robot Based Health Care Management System".

[5] Ramshetty K Sure , Savita Patil2 "Android Based AutonomousColoured Line Follower Robot", ECE AMC Engineering College Bangalore, Karnataka, India 2Assoc. Prof, ECE Dept, AMC Engineering College Bangalore.

[6]DheepakMohanraj"MicrocontrollerBasedAn Autonomous Wireless Line TrackingRobot"Correspondence Assistant Professor, Department of EEE, AMET University, Chennai, India.

[7]J. Dupuis, and M. Parizeau, "Evolving a Vision-BasedLine-Following Robot Controller" In Proceedings ofThe 3rd

Canadian Conference on Computer andRobot Vision, IEEE Computer Society,pp. 75-79.Washington, DC, USA 2006.

[8]Abhijit Pathak**1,** Refat Khan Pathan**2,** AmazUddin Tutul**3,** NishatTahsin Tousi**4,**Afsari Sultana Rubaba**5,** NahidaYeasmin Bithi**6 "**Line Follower Robot for Industrial Manufacturing Process" *Department of Computer Science and Engineering, BGC Trust University Bangladesh.*