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SELF PATH MAP REGISTERING USING INDUSTRIAL GOODS CARRIER

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ABSTRACT

This paper is designed to build a AGV self map robot and obstacle avoidance bot using IR sensor and ultrasonic sensor for industrial weight carrying purpose. The IR sensor is meant to trace a particular line and ultrasonic sensors are meant to detect obstacles which it encounters. ROBOT has sufficient intelligence to cover the maximum area of space provided. It will move in a particular direction specified by the user and avoids the obstacle which is coming in its path. Autonomous Intelligent Robots are robots that can perform desired tasks in unstructured environments without continuous human guidance. The path can be visible like a black line on the white surface (or vice-verse).This project is having a major role on industries. This project we can implements in the storage yard, otherwise used in tools handling.

INTRODUCTION

We proposed a bot that follow a path and avoids the obstacle which comes in its Path this bot is introduced because in many of the industries we have seen that many heavy components which they have to move for one place to another place which is not possible without the help of machines. With this we got idea and we introduce the bot named as Self map robot and obstacle avoidance AGV. Self map robot is a system which traces white line on a black surface. Obstacle avoidance robot is design to allow robot to navigate in unknown environment by avoiding collisions. Obstacle avoiding robot senses obstacles in the path, avoids it and resumes its running. In this paper a line tracer or follower has been presented which will trace a white line on a black surface. We have make use of sensors to achieve this objective. We have used two B.O.MOTORS i.e battery operated motors. The reason behind using BO motors is it consumes less power supply and can work properly on 9 volt battery. The construction of the robot circuit is easy and small. The main component behind this robot is ATmega328p micro controller which is a brain of this robot. The idea proposed in this paper is by using machine vision to guide the robot. The field of machine vision has growing at a fast pace. Machine vision applications can be divided into four types from a technical point of view. They can be used to locate, measure, inspect and identify. The robot proposed in this paper is guided with the help of machine vision. The best part of our project is that if any obstacle is encountered by the robot the robot automatically stops.

HEADINGS

3.COMPONENT DESCRIPTION

3.1. MICROCONTROLLER

The PIC12F508/509/16F505 devices from Microchip Technology are low-cost, high-performance, 8-bit, fully static, Flash-based CMOS microcontrollers. They employ a RISC architecture with only 33 single-word/single-cycle instructions. All instructions are single cycle (200 µs) except for program branches, which take two cycles. The PIC12F508/509/16F505 devices deliver performance an order of magnitude higher than their competitors in the same price category. The 12-bit wide instructions are highly symmetrical, resulting in a typical 2:1 code compression over other 8-bit microcontrollers in its class. The easy-to-use and easy to remember instruction set reduces development time significantly.

High-Performance RISC CPU:

- Only 33 Single-Word Instructions to Learn
- All Single-Cycle Instructions Except for Program Branches, which are Two-Cycle
- 12-Bit Wide Instructions
- 2-Level Deep Hardware Stack
- Direct, Indirect and Relative Addressing modes for Data and Instructions

Special Microcontroller Features:

- 4 MHz Precision Internal Oscillator:- Factory calibrated to ±1%
- In-Circuit Serial Programming™ (ICSP™)
- In-Circuit Debugging (ICD) Support
- Power-On Reset (POR)

Peripheral Features (PIC12F508/509):

- 6 I/O Pins:

- 5 I/O pins with individual direction control

3.2 .POWER SUPPLY UNIT

Battery

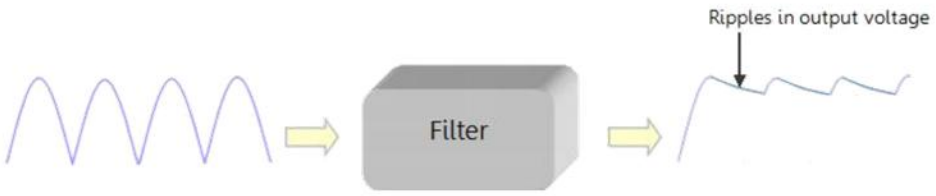
An electric **battery** is a collection of one or more electrochemical cells in which stored chemical energy is converted into electrical energy. The principles of operation haven't changed much since the time of Volta. Each cell consists of two half cells connected in series through an electrolytic solution. One half cell houses the **Anode** to which the positive ions migrate from the **Electrolyte** and the other houses the **Cathode** to which the negative ones drift. The two cells are may be connected via a semi permeable membranous structure allowing ions to flow but not the mixing of electrolytes as in the case of most primary cells or in the same solution as in secondary cells.

NOMINAL VOLTAGE	12V	
INTERNAL IMPEDANCE	0.25 Ω	
CHARGING CUT OFF VOLTAGE	13.3 V	
DISCHARGING CUT OFF VOLTAGE	10.5	
OPERATING TEMPERATURE	charging	0°C ~ 45°C
	discharging	-0°C ~ 55°C
Chemistry	Lead Acid	
Capacity	7Ah	
Rating whr	84	
Length	5.95 inches	
Width	2.56 inches	
Height	3.7 inches	
Weight	1 Kg	

Filter

The output after being processed by full wave rectifier is not a pure DC. The output is a pulsating DC. The output contains large fluctuations in voltages. This is quite apparent from the block of full wave rectifier shown above. The power supply that we intend to design must not have any variation in output voltage. The voltage that we get from full wave rectifier fluctuates between 0 V and V_{peak}, and hence it contains AC components. These AC components needs to be *filtered out* so as to obtain DC voltage. This is where filters come into picture. Filters, as the name suggests, *filters out* any AC component present and provides DC as the output. However, the output from the filter is still not a pure DC but filters removes the AC component in the voltage to a considerable extent. This increases the average DC value of the output voltage. Now a question must arise as to how we can make a filter and which components are required to make a filter. Although it not the goal of this section to study filters in detail, it must suffice to know that filters used in power supplies can be made simply by using

capacitors. We leave the design of capacitive filter to some other section. Typical input and output voltage of filters used in power supply is shown below.

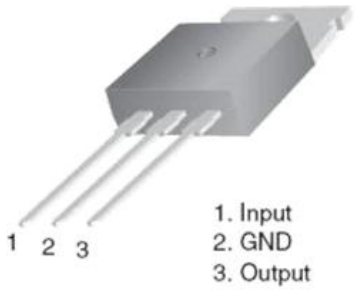


Filter Block Diagram

As shown in the figure above, the output voltage from the filter contains voltage ripples. This output is not a pure DC, however considerable amount of AC component is filtered out by the filter. The effectiveness of the filter to remove the AC component is indicated by the ripple factor. Smaller the ripple factor, better the filter.

IC Voltage Regulators:

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. Although the internal construction of the IC is somewhat different from that described for discrete voltage regulator circuits, the external operation is much the same. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage.



3.3.IR Sensor Circuit (object detection sensor)

An infrared sensor is an electronic device that emits and/or detects infrared radiation in order to sense some aspect of its surroundings. Infrared sensors can measure the heat of an object, as well as detect motion. Many of these types of sensors only measure infrared radiation, rather than emitting it, and thus are known as passive infrared (PIR) sensors.

All objects emit some form of thermal radiation, usually in the infrared spectrum. This radiation is invisible to our eyes, but can be detected by an infrared sensor that accepts and interprets it. In a typical infrared sensor like a motion detector, radiation enters the front and reaches the sensor itself at the center of the device. This part may be composed of more than one individual sensor, each of them being made from piezoelectric materials, whether natural or artificial.

IR Sensor includes photodiode and IR LED which play the role of receiver and transmitter respectively.

IR LED

An IR LED, also known as IR transmitter, is a special purpose LED that transmits infrared rays in the range of 760 nm wavelength. Such LEDs are usually made of gallium arsenide or aluminum gallium arsenide. They, along with IR receivers, are commonly used as sensors.

The appearance is same as a common LED. Since the human eye cannot see the infrared radiations, it is not possible for a person to identify whether the IR LED is working or not, unlike a common LED. To overcome this problem, the camera on a cell phone can be used. The camera can show us the IR rays being emanated from the IR LED in a circuit.

Photodiode

A photodiode is a type of photo detector capable of converting light into either current or voltage, depending upon the mode of operation. The common, traditional solar cell used to generate electric solar power is a large area photodiode. It is use to sense the reflected IR rays which reflect due to presence of obstacle and due to it robot change its path. This sensor uses IR (Infra Red) sensors and two IR transmitting circuitry. When the obstacle comes in path of robot IR beam is reflected from the obstacle then sensor gives zero voltage to µc. This zero voltage is detected then µc decides to avoid the obstacle by taking left or right turn. If the sensor gives +5v to µc that means there is no obstacle present in its path so it goes straight until any obstacle is detected.

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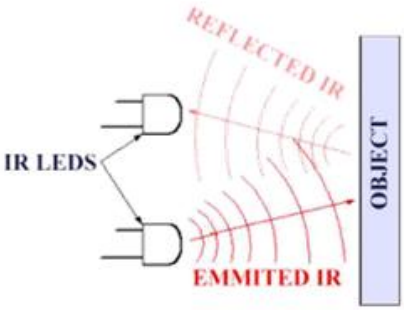
The two IR transmitter circuits are fitted on front and left side of robot. The two IR sensors are placed near to transmitters' IR LEDs. The connections can be given from main circuit to sensors using simple twisted pair cables.

WORKING PRINCIPLE

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.



IR SENSOR MODULE

Design:

Frequency f = 1.45/ (R1+2R2)C

Required f = 38000Hz

R1 = 1.2k

R2 = 4.7k pot

C = 10 nF

3.4 . LIGHT SENSOR

A ***light sensor*** is a mechanical or electronic device that detects light. An LDR (Light dependent resistor), as its name suggests, offers resistance in response to the ambient light. The resistance decreases as the intensity of incident light increases, and vice versa. In the absence of light, LDR exhibits a resistance of the order of mega-ohms which decreases to few hundred ohms in the presence of light. It can act as a sensor, since a varying voltage drop can be obtained.

WORKING PRINCIPLE

Light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials reduce when light is absorbed by the material.When light falls i.e. when the

photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band.

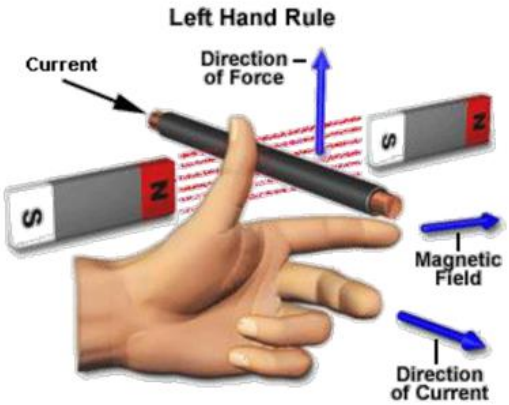
LIGHT SENSOR MODULE

3.5. DC MOTOR

Electrical motors are everywhere around us. Almost all the electro-mechanical movements we see around us are caused either by an A.C. or a **DC motor**. Here we will be exploring this kind of motors. This is a device that converts DC electrical energy to a mechanical energy.

WORKING PRINCIPLE

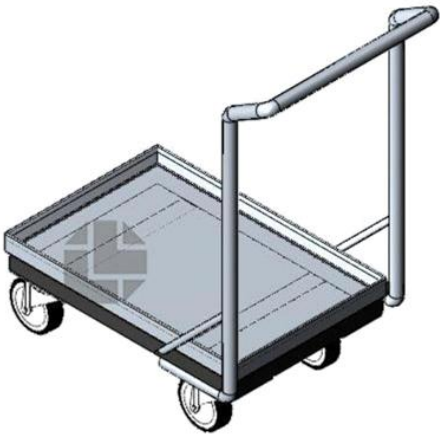
This DC or direct electric current motor works on the principal, when a electric current carrying conductor is placed in amagnetic field, it experiences a torque and has a tendency to move. This is known as motoring action. If the direction of electric current in the wire is reversed, the direction of rotation also reverses. When magnetic field and electric field interact they produce a mechanical force, and based on that the working principle of dc motor established.



The direction of rotation of a this motor is given by Fleming's left hand rule, which states that if the index finger, middle finger and thumb of your left hand are extended mutually perpendicular to each other and if the index finger represents the direction ofmagnetic field, middle finger indicates the direction of electric current, then the thumb represents the direction in which force is experienced by the shaft of the **dc motor**.

TROLLEY ARRANGEMENT

A hand trolley is a small transport device used to move heavy loads from one place to another. It is a very common tool used by a large number of industries that transport physical products. Also called a hand truck or a dolly, the hand trolley is often used by stock persons who arrange and restock merchandise in retail stores. When used properly, trolleys can protect people from back injuries and other health problems that can result from lifting heavy loads.



Description

A typical hand trolley consists of two small wheels located beneath a load-bearing platform, the hand trolley usually has two handles on its support frame. These handles are used to push, pull and maneuver the device. The handles may extend from the top rear of the frame, or one handle may curve from the back. An empty hand trolley usually stands upright in an L-shape, and products are usually stacked on top of the platform. When the goods are in place, it is tilted backward so that the load is balanced between the platform and the support frame. Especially if heavy or fragile materials are moved, the person operating the trolley should return it to an upright position carefully, to insure nothing falls off the platform. The front of the frame may be squared off for boxes or curved for drums and barrels. Sometimes, a hand truck also has straps for securing loose freight during transport. Professional material handlers prefer to use a hand truck when moving stackable items such as boxes, crates or packages. Heavier items are usually stacked on the bottom of the hand truck, with lighter objects saved for the top.

Chapter 5

FABRICATION PROCESS

5.1. WORK PLAN

SHEDULE	WORK PROCESS
WEEK1	CONCEPT DISCUSSED WITH GUIDE
WEEK2	CONCEPT DISCUSSED WITH HOD
WEEK3	PROJECT MATERIALS PROCUREMENT
WEEK4	FABRICACTION OF FRAME
WEEK5	FABRICATION OF MAIN UNIT PART1
WEEK6	FABRICATION OF MAIN UNIT PART2
WEEK7	ASSEMBLING
WEEK8	TESTING
WEEK9	ON FIELD TESTING
WEEK10	DEMO
WEEK11	REPORT PREPRATION
WEEK12	DRAFT COPY CHECK1
WEEK13	DRAFT COPY CHECK2
WEEK`14	REPORT PRINTING AND BINDING
WEEK15	PROJECT SUBMISSION

5.2.FACTORS DETERMINING THE CHOICE OF MATERIALS

Properties

The material selected must posses the necessary properties for the proposed application. The various requirements to be satisfied can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc

The various physical properties concerned are melting point, Thermal Conductivity, Specific heat, coefficient of thermal expansion, specific gravity, electrical Conductivity, Magnetic purposes etc.

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The various Mechanical properties Concerned are strength in tensile, compressive shear, bending, torsional and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

Manufacturing Case

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

Quality Required

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go for casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

Availability of Material

Some materials may be scarce or in short supply. It then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed.

5.3.MATERIAL USED

S.NO	ITEM	QTY	DIMENSION	MATERIAL
1	Dc Motor	2	100RPM	Plastic
2	Agv Unit	1	12''X6''	Ms And Plastic
3	Trolley	1	22"X18"14"	Mild steel
4	Control unit	1	-	Semiconductor

IV. FIGURES:

Figure 1

Figure 2

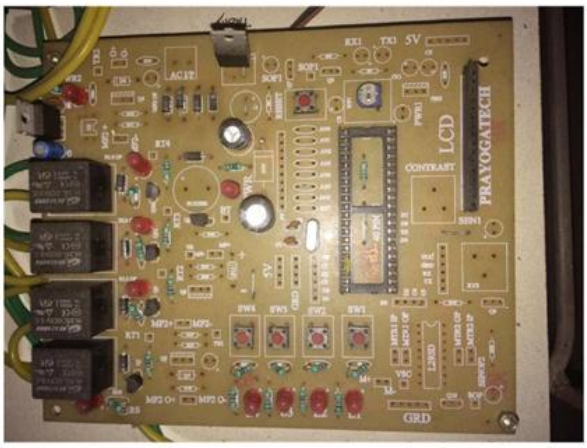

Figure 3

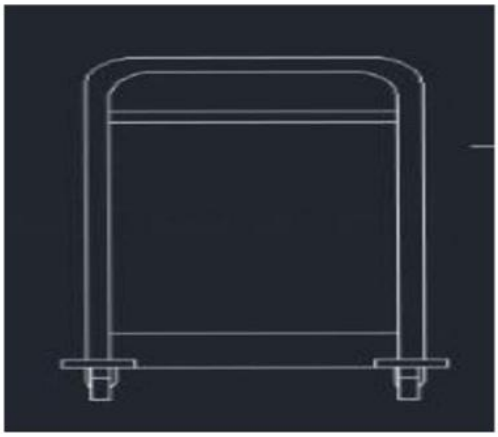

Figure 4

V. CONCLUSION

In this project we have studied and implemented a Auto AGV using a Microcontroller for industrial weight carrying purpose. The programming and interfacing of microcontroller has been mastered during the implementation.

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