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### Remote control Scrap collecting vehicle

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#### ABSTRACT

Scrap is one of the leading wastes generated in manufacturing industries. Collection of scrap is a tedious work and requires more labor work and is also a time consuming one. Thus this project emphasis the importance of scrap collection and an automated vehicle is designed to eliminate the manual scrap collection. In our project we are eliminating the need of manually collecting the scrap in heavy industries. For this purpose we are designing an automated magnetic collector. Of the available methods of scrap collection techniques, manpowered and fuel powered vehicles are used. In the near future, the fuel deposits in the world will be completely depleted. To avoid this situation of problems and to reduce manpower requirements we are in need of other type of technique called as 'battery operated automated electromagnetic scrap collecting vehicle. The rechargeable battery is supplying power to the automatic scrap collecting. The Vehicle is having the one electromagnetic arm which is used to collect the scrap automatically.

**Keywords:** Belt Drive Attachment, Gripper, Scrap, Vacuum cleaner, Conveyor belt, Motor, Battery

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#### INTRODUCTION

The scrap collecting machine is used for making scrap out of any place. We make a machine which collects the whole scrap into a place. This robot is 4 wheeled. Though this project may sometimes look simple. In this project we will control this machine or vehicle with infrared sensor remote. We will control different functions of moving robot. As we know the value of robotics it can be used in biomedical industry, domestic, food, leather, auto parts etc. In this project we will make remote which will have functions to control robot like forward, backward, right and left. There will be six functions. Material handling equipment is all equipment that relates to the movement, storage, control and protection of materials, goods and products throughout the process of manufacturing, distribution, consumption and

disposal. Material handling equipment is the mechanical equipment involved in the complete system. Material handling equipment is generally separated into four main categories: storage and handling equipment, engineered systems, industrial trucks, and bulk material handling. Scrap is one of the leading wastes generated in manufacturing industries. Collection of scrap is a tedious work and requires more labor work and is also a time consuming one. Thus this project emphasis the importance of scrap collection and an automated vehicle is designed to eliminate the manual scrap collection [1].

Robotics coincides most closely with programmable automation. An industrial robot is a general purpose, programmable machine which possesses certain anthropomorphic, or human like characteristics. The most typical human like

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characteristics of present day robots is their movable arms. The robot can be programmed to move its arm through a sequence of motions in order to perform some useful task. It will repeat that motion pattern over and over until reprogrammed to perform some other task. Hence, the programming feature allows robots to be used for a variety of different industrial operations, many of which involve the robot working together with other pieces of automated or semi automated equipment. These operations include machine loading and unloading, spot welding and spray painting [2].

## LITERATURE REVIEW

Deb .S.R, 2013, “ Robotics Technology And Flexible Autoamtion “, Tata Mcgraw Hill Publicing Publishing:Any industrialist is trying to have an automation on his shop floor to increase the production and to reduce the investment on manpower. Taking this fact in consideration we made a visit to a small study and found that we can make a working model which can reduce the idling time of worker very effectively up to the mark. Ram .K , 2010 ”Fudementals Of Microcontrollers “ Dhanpat Rai Publication :A robot is developed to conduct land survey, specifically to calculate the area of a given land and to divide it into subplots. The process involves two parts-Survey Robot and area measurement module. The Survey Robot is controlled through the ZigBee module to move about the entire plot. The distance travelled by the Survey Robot is calculated by timer concept and this value is then transmitted to the PC. The second part involves the area measurement module designed using Embedded C allowing the user to efficiently determine the area of the plot.

Dan Necsulescu , 2012 ( Indian Reprint ), “Automation “ , Pearson Education Asia: The Intention Of This Mechanical Engineering Project Is To Fabricate A Scrap Collecting Robot. Since Complete Automation Is Very Complex And Even Research Facilities Haven’t Come Up With One, You Better Design One That Is Operated Via A Remote Control Which Is Either Wireless Or Not.

Shipman,James:Jerry,Wilson,Todd,Aron(2009) Introduction Of Electromagnet In Vehicle . We used Arduino mega microcontroller with motor

shield to control this robot. We demonstrated the working of this robotic system 3 using a set of experiments that are monitor to the actual environment. Finally, this modular system can be extended to handle waste in the all industry.

Milikin,Robert:Bishop,Edwin(1997) Elements Of Electricity. Chicago : American Thechnology Society . uses error-sensing negative feedback to correct the performance of a mechanism. The term correctly applies only to systems where the feedback or error-correction signals help control mechanical position or other parameters. For example, an automotive power window control is not a servomechanism, as there is no automatic feedback that controls position—the operator does this by observation. National Highway Field Laboratry Usa is an automatic device that uses error-sensing negative feedback to correct the performance of a mechanism. The term correctly applies only to systems where the feedback or error-correction signals help control mechanical position or other parameters This is a working project and as usual requires the help of electronics students for the control systems. This robot is 4 wheeled with an arm to collect scrap materials. It also can move over small obstacles with the support of the arm.

Bolton . W ,2010 , “Automation” , Longman Publication < Second Edition : A scrap collecting vehicle, has a bucket drive mechanism. The vehicle has a scrap container that has a bin and a movable bucket for receiving scrap. The movable bucket is driven upwardly in friction contact with a side of the bin by the given mechanism. This mechanism further causes the bucket to rotate about a point for delivering scrap from the bucket into the bin. A rotatable paddle may be given for sweeping the scrap from the bucket and thus for dumping the scrap inside the bin. Such mechanism may include inclined actuators which are connected to chain 4 rollers that run over track to raise the bucket until the chain collars reach a disposed rocker shaft that acts as a joint for pivoting the bucket Bradley D.A.

Dawson .D, Buru .N.C And Loader .A.J, 2008, “Automation”, Chapman And Hall Publication: The collecting work station consists of the work room, two conveyors and a glass shattering machine. The big glass scraps from the work area

is collected by a conveyor and is brought to a glass shattering machine to reduce its size. This shattered glass scraps are brought away from the machine to the to the rail module through a conveyor for disposal. Automatic scrap collecting vehicle is designed to remove glass scraps from the work station to the disposal area with the help of electronic sensors and a rail [3-6].

## MICRO ELECTRONICS MICROCONTROLLER

Microelectronics engineering deals with the design and micro fabrication of very small electronic circuit components for use in an integrated circuit or sometimes for use on their own as a general electronic component. The most common microelectronic components are semiconductor transistors, although all main electronic components (resistors, capacitors, inductors) can be created at a microscopic level. Nanoelectronics is the further scaling of devices down to nanometer levels. Microelectronic components are created by chemically fabricating wafers of semiconductors such as silicon (at higher frequencies, compound semiconductors like gallium arsenide and indium phosphide) to obtain the desired transport of electronic charge and control of current. The field of microelectronics involves a significant amount of chemistry and material science and requires the electronic engineer working in the field to have a very good working knowledge of the effects of quantum mechanics.

## MAJOR COMPONENTS OF THE MOTORIZED SCISSORJACK

The electrical and mechanical components are listed below.

D.C Gear coupled motor (A.C Motor) -2

- ✓ Structure
- ✓ I.R Sensor
- ✓ Wheel
- ✓ Micro controller
- ✓ Battery
- ✓ R.F module
- ✓ Magnet

## DC MOTOR

The most widely used type of DC motor is the permanent magnet commutator type, which is simply designed to rotate at some approximate speed when powered from an appropriate DC voltage. This type of motors are often used as fixed speed drivers in tape cassette recorders and record/disc players and as wide range motive etc. in all of these applications, the motor performance can be greatly enhanced with the aid of electronic control circuitry. The basic action of this motor is such that an applied voltage causes a current flow through sets of armature windings and generates electromagnetic fields that react with the fields of fixed stator magnets in such a way that the armature is forced to rotate. The DC motor has a rotating armature in the form of an electromagnet. A rotary switch called a commutator reverses the direction of the electric current twice every cycle, to flow through the armature so that the poles of the electromagnet push and pull against the permanent magnets on the outside of the motor [7].

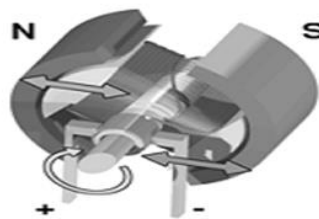


Figure 8: DC motor

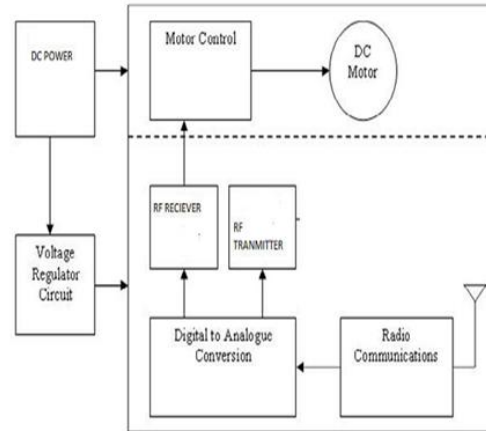


Figure 16: circuit diagram

## ELECTROMAGNET

An electromagnet is a type of magnet in which the magnetic field is produced by an electric current. The magnetic field disappears when the current is turned off. Electromagnet. Usually consist of wire wound into a coil. A current through the wire creates a magnetic field which is concentrated in the hole in the center of the coil. The wire turns are often wound around a magnetic core made from a ferromagnetic or ferrimagnetic material such as iron; the magnetic core concentrates the magnetic flux and makes a more powerful magnet. The main advantage of an electromagnet over a permanent magnet is that the magnetic field can be quickly changed by controlling the amount of electric current in the winding. However, unlike a permanent magnet that needs no power, an electromagnet requires a continuous supply of current to maintain the magnetic field. Electromagnets are widely used as components of other electrical devices, such as motors, generators, electromechanical solenoids, relays, loudspeakers, hard disks, MRI machines, scientific instruments, and magnetic separation equipment. Electromagnets are also employed in industry for picking up and moving heavy iron objects such as scrap iron and steel [8].

## PROPOSED CIRCUIT DIAGRAM

The main aim of “automatic electromagnetic scrap collector is to collect scrap automatic and conveyor based, easy to operate, easy construction, less space required. In this project we are collecting scrap in the machine by using bucket provided at front of it. The conveyor using dc motors (12 volt). One motor is used for connect to conveyor for guiding scrap into machine. And another motor required to connect to the wheel to giving driving motion to scrap collector chassis. After the belt conveyor a sheet metal plate is provided with magnets which separates magnetic scrap and non magnetic scrap and then to a storage container so we can recycle the scraps. This machines are some kind of heavy there for its difficult to handle manually and also we realized that automation is need of today’s industrial world then we choosed remote control operating for our machine. Most of the time it is difficult collect scrap from machines parts and machine bed for that purpose a vacuum cleaner. Used to suck the scrap and fall down on belt conveyor and separating it as magnetic and nonmagnetic scrap in different collectors.

## CONCLUSION

Our goal was to build a robot that can discover and collect metallic object in an industry. We used Arduino mega microcontroller with motor shield to control this robot. We demonstrated the working of this robotic system using a set of experiments that are monitor to the actual environment. Finally, this modular system can be extended to handle waste in the all industry. We studied that the scrap collecting one of the universal job fo r any industry and specially in Indian industries are using the traditional techniques. These traditional techniques for scrap collecting takes the physical involvement of an worker and this involvement increases the idling time. We are having a concept to use the modern circuits in the market in the traditional scrap collecting systems and manufacture a fully

modern and automated scrap collecting system which do not required any physical contact of worker. We are introducing an automation in the traditional scrap collecting systems. The automation in this system can tolerate the negligence of worker during the system is in operation as this system have fool proof system on its own. This system works on wireless circuits. A remote controlled circuit that can operate two motors which are installed at the rear wheels of scrap collecting system. These circuits have range of 100 meters to 500 meters. The force involving the interaction of electricity and magnetism. It is the science of electrical charge, and its rules govern the way charged particles of atoms interact. He concluded that magnetism is the result of electricity in motion.

## REFERENCE

- [1]. Bradley D.A, Dawson .D, Buru .N.C and Loader .A.J, “Mechatronics”, Chapman and Hall Publications, 1998, 132-198
- [2]. Bolton .W, “Mechatronics”, Longman Publications, Second Edition, 1999, 7-11.
- [3]. Dan Necsulescu, (Indian reprint), “Mechatronics”, Pearson Education Asia, 2002, 59-67.
- [4]. Deb .S.R, “Robotics Technology and Flexible Automation”,Tata McGrawHill Publishing Co. Ltd., 13-19, 1999.
- [5]. Dwivedi S.C, Sunil Kumar, “Electronics for you”, EFY India Publications, 59-66, 2006.
- [6]. HMT Ltd., “Mechatronics”, Tata McGraw Hill Publishing Co. Ltd, 1998, 231-239.
- [7]. Ram .K, “Fundamentals of Microprocessor and Microcontroller”, Dhanpat Rai Publications, 1999, 121-127.
- [8]. Ramesh S. Gaonkar, “Microprocessor Architecture, Programming and applications” Wiley Eastern Publications, 1997, 327-341.