ROBOTIC SCRAP COLLECTING MACHINE

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Abstract : **The prominent objective of this project is to fabricate a scrap collecting robot. The robot is four wheeled with an robotic arm to collect scrap materials. In this project we will control robot with a remote which is wireless. As we know the value of robotics it can be used in biomedical industry, domestic food, auto parts etc. In this project electrical energy from rechargeable battery is given to dc gear motors which drive the whole vehicle. Dc motors are used to run the wheels, collecting the scraps in vertical direction and controls the robotic arm lifting and putting the scrap into collecting box .Controller is used to control the movements of the vehicle in appropriate direction. The robot can also pick objects and place them desired location.**

IndexTerms **- robotic arm, run, lifting, collecting, scrap, rechargeable, pick.**

I. INTRODUCTION

Garbage is the major problem not only in cities but also in rural areas of India. It is a major source of pollution. Municipal solid waste workers (MSWWs) or refuse collectors, universally expose too many work related health hazards and safety risks, notably allergic and other diseases of the respiratory system. Health impacts could also entail musculoskeletal, gastro intestinal and infectious diseases as well as injuries caused by work-related accidents. Hence to overcome this major problem of waste collection, Scrap Collection Robot is developed. It aims at providing wireless control to collect the garbage. It collects the garbage with the help of robotic arm and store in collecting box and then it disposes the scrap to specified place. It also can pick and place small objects from one place to another place with help of robotic arm. This robot is designed with advanced microcontroller and sensors which helps the robot in collection of waste material. This will prove to be a boon to the society as it will collect the waste and would also reduce the health risks in collection of chemical waste. For the scrap collection purpose various techniques and functionalized electronics and mechanical devices are used. The main objective of this project is to design and implement a scrap collection robot prototype by using Arduino mega, rf module, motor shield L293D to provide better experience.

This paper has been arranged into six sections. A detailed literature review of vacuum cleaner has been explained in section (2). Section (3) gives the detailing of the block diagram including description of its parts. Section (4) will cover the mechanical design of the robot. Section (5) describes the applications of the robot. The conclusion of the project is summarized in section (6).

II. LITERATURE REVIEW

From early human civilization human is increasingly dependent on the machines. Human is trying to reduce the workload upon him. By the help of machines also we can get huge efficiency because there is no chance of human error there. Now -a -days from 30 years intelligence and robotics growing with a vast pace. Every human is using 2-3 robots at least per day. If we look at past 30 years we will see robotics from large structure going to small and smaller in Nano range. Very complicated sensors have been designed to help the robot in various works .Complicated pneumatic and actuating systems have been designed. One of the best examples is the mobile phone. If we look at the floor cleaning robot we can see iRobot is dominating the market with its 90 sq. cm robot having indoor navigation as its principal controlling system. In the earlier days more chores and fewer cleaning tools were used. Normally scrap collection is done by human efforts in every industry and workplaces With modernization and advancement in technology various tools were designed to reduce manual work. A robotic scrap collecting machine an electronic device that is so programmed to collecting scrap and garbage at work area through robotic arm. Mobile robots are a major focus these days. Mobile robots are used in industrial, commercial, military and security settings. Domestic robots include entertainment robots and those that perform certain household tasks such as vacuuming or gardening.

III. BLOCK DIAGRAM AND ITS COMPONENTS

The main components of this proposed system are Arduino Uno(rev3) Microcontroller, RF module, Battery, Motor driver IC, robotic arm. The RF module signal will work as input for microcontroller and its output is given to the motor for its working. Rechargeable Lead acid battery is used for power supply. robotic arm will collect the waste and put it into collecting box.

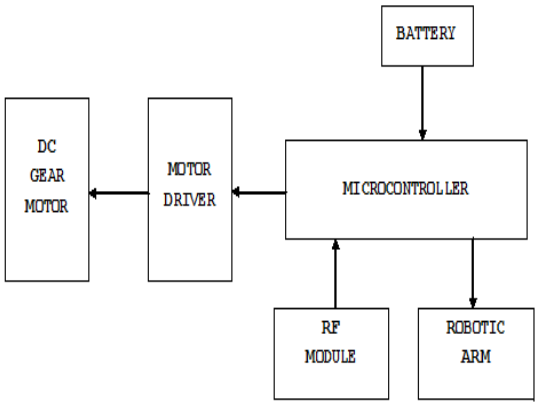

FIGURE 3.1: BLOCK DIAGRAM OF ROBOTIC SCRAP COLLECTING MACHINE

The robot is equipped with some standard parts: batteries, RF module, DC motor, Arduino and motor driver L298N dual channel. By trial and error we decided the specification of the battery, motor and choose Arduino UNO REV-3.

1.1.1 MOTOR

We selected motor of 100rpm. For the better control over the movement of robot 2-wheel drive mechanism is selected. It has two DC gear motors which are used to accurately drive the robotic vacuum along the room. Result of hit and trail method is tabulated below:

Table -3.1: MOTOR SELECTION

TYPE[RPM]	45	60	100
SPEED[m/sec]	0.141	0.188	0.314
REMARK	Slow	Moderate	Fast

1.1.2 RF MODULE

This RF Module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **434 MHz**. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4.

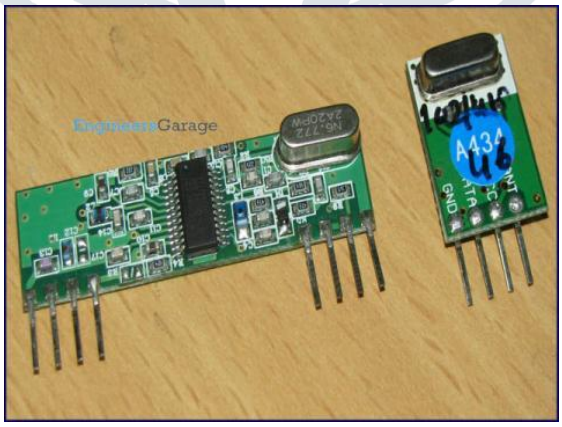

FIGURE 3.2:RF MODULE

1.1.3 BATTERY:

After selecting motor, sensors, we calculated total power required for driving whole mechanism.
Total Power required=∑VI

Where, V=Voltage
I=Current

So, 12V, 1.5A rechargeable battery is selected for Vacuum and 9V, 0.5A is selected for Arduino. The rechargeable battery is connected to the solar panel using a controller through which it will get charged.

a) b)

FIGURE 3.3: BATTERIES. a)12V b) 9V

1.1.4 ARDUINO UNO REV3

The Arduino UNO is a microcontroller board based on the ATMEGA328p. It has 14 digital and 6 analog pins along with one transmitter and one receiver pin. The programming is done on the Arduino IDE software. L293d will work as the motor driver IC that will drive the motor.

FIGURE 3.4 ARDUINO UNO REV3

The L298N dual H-bridge motor driver is a low cost driver broad i.e. used to drive two motors. Its uses the L298N dual H-bridge motor driver chip and is powerful enough to drive motors from 5-35V and up to 2Amp per Channel.

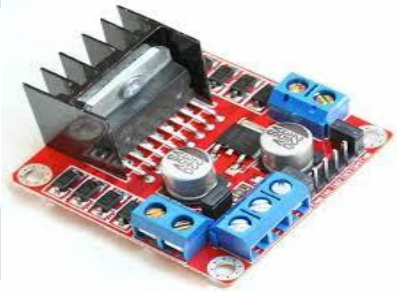

FIGURE 3.5 MOTOR DRIVER L298N DUAL CHANNEL

IV. MECHANICAL DESIGN

In this project an scrap collecting machine has been designed that could collect the scrap and pick and place the objects with the help of robotic arm.Mechanical components consist of chassis and robotic arm.

FIGURE 4.1: OVERVIEW OF PROJECT

V. APPLICATION

The basic functionalities allowing the robot to deal with this kind of environment are ready but have not been used yet. Following are some important applications of this device:

1. Scrap Collector Robot can be employed for cleaning process at home and work places.
2. Scrap Collector Robot can be used in biomedical industry, domestic food, leather and auto parts.
3. It also can be used as pick and place robot.

The additional features that may be added in smart vacuum cleaner are:

1. GPS control system using smart phones.
2. It can be done by controlling the device by Bluetooth or ZigBee.
4. Implementing the fuzzy logic in the device we can enable artificial intelligence in cleaning.

VI. CONCLUSION

The Scrap Collector Robotic Machine is not yet ready for work. Nevertheless, many of the achieved results are very promising, especially considering that they were achieved in four months of work by four persons. The shape of the device would be well suited for the application, especially for a task like of driving vehicle wireless.The combination of the device shape, its tactile sensor system and its algorithm will play well together and make the task of cleaning an unknown and unstructured environment feasible. The Garbage and recycling pickup work is physically demanding and it exposes workers to many occupational hazards. This project is designed to fulfil the task of collecting garbage from certain places.The project would gives out a scrap collector robotic device with wireless remote control. Further future extensions will completely make it an artificial intelligent device.

VII. REFERENCES

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