SURFACE CLEANING ROBOT

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***Abstract*— Surface cleaning robots are environmental protection equipment mainly used for collecting garbage on the surface. We decided to design and build a robot capable of cleaning the floor of a room or area without any human effort other than just starting the unit. The cleaner is mainly built on a rectangular piece of board. It uses a rotating sponge underneath the unit to clean a floor as it passes over it. DC motor is used to change direction of wheels which connected at the middle of the rectangular piece Two DC motors are used for the movement of the robot and to detect obstacles proximity sensor i.e. IR(infrared) sensor is used.**

The robot uses 2 IR sensors (Rx) with distance between the two sensors is 25mm. The first Rx receives an analog signal that depends on the intensity of light reflected by the obstacle of emitted beam by the TX. These signals are sent to the MCP comparator which creates digital signals (0 or 1)that are sent to Microcontroller. Along with IRs the robot uses servo motor to move the sponge up and down if any obstacles detected

***Keywords*—ir sensor, industrial Sector, dc motor, Portable, sensors.**

1. INTRODUCTION

1. Robotics is the branch of engineering science & Technology related to robots, and their design, manufacture, application, and structural disposition. Robotics is related to electronics, mechanics, and software. Robotics research today is focused on developing systems that exhibit modularity, flexibility, redundancy, fault-tolerance, a general and extensible software environment and seamless connectivity to other machines, some researchers focus on completely automating a manufacturing process or a task, by providing sensor based intelligence to the robot arm, while others try to solidify the analytical foundations on which many of the basic concepts in robotics are built. In this highly developing society time and man power are critical constrains for completion of task in large scales. The automation is playing important role to save human efforts in most of the regular and frequently carried works.

2. One of the major and most commonly performed works is picking and placing of jobs from source to destination. Present day industry is increasingly turning towards computer-based automation mainly due to the need for increased productivity and delivery of end products with uniform quality. The inflexibility and generally high cost of hard-automation systems, which have been used for automated manufacturing tasks in the past, have led to a broad based interest in the use of robots capable of performing a variety of manufacturing functions in a flexible environment and at lower costs. The use of Industrial Robots characterizes some of contemporary trends in automation of the manufacturing process. However, present day industrial robots also exhibit a monolithic mechanical structure and closed-system software architecture. They are concentrated on simple repetitive tasks, which tend not to require high precision. The pick and place robot is a microcontroller based mechatronic system that detects the object, picks that object from source location and places at desired location. For detection of object, infrared sensors are used which detect presence of object as the transmitter to receiver path for infrared sensor is interrupted by placed object.

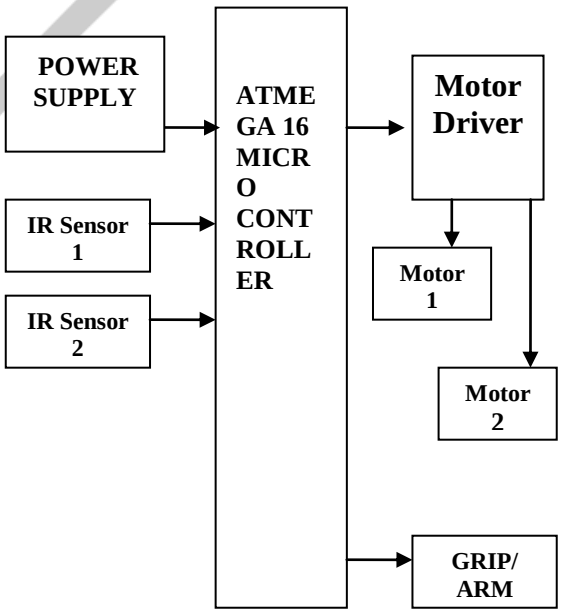
2. HARDWARE

The hardware requires fewer components which reduces the cost of production. The advantage of this technology is that here a single microcontroller controls the entire unit and provides monitoring facility. Instead of using individual modules with its own controller, we use a single controller.

2.1 HARDWARE BLOCK DIAGRAM:

The hardware block diagram other than regulated power supply is as shown below

The hardware essentially consists of the above components which are discussed in detail further.



2.1.1 IR SENSOR

This sensor is a short range obstacle detector with no dead zone. It has a reasonably narrow detection area which can be increased using the dual version. Range can also be increased by increasing the power to the IR LEDs or adding more IR LEDs

In this project we are using IR sensor for detecting obstacles.

2.1.2 DC MOTOR

A dc motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors.The input of a DC motor is current/voltage and its output is torque (speed).

The DC motor has two basic parts: the rotating part that is called the armature and the stationary part that includes coils of wire called the field coils. The stationary part is also called the stator.

Two DC motors are used in this project. Two DC motors are used for rotating the wheels and one for moving seed chamber and another for running water motor.

2.1.3 MICROCONTROLLER

The microcontroller used here is a 40 pin atmega 16 microcontroller.
Atmega16 is a CMOS flash-based 8-bit microcontroller. The features of this controller are very accurate and also advantageous when compared to other controllers. Due to this reason, this controller is preferred in this case.
The reset button is used to reset the controller periodically. Crystal oscillator provides the required frequency for the controller.
LED indicators are used to indicate whether there is a power supply or not for the controller unit.

3.SOFTWARE

1. CodeVision AVR

2. ISIS proteus

3.1 CODEVISION AVR:

Code Vision AVR is a C cross-compiler, Integrated Development Environment and Automatic Program Generator designed for the Atmel AVR family of microcontrollers:
The program is designed to run under the Windows 98, Me, NT 4, 2000, XP and Vista 32bit operating systems. The C cross-compiler implements nearly all the elements of the ANSI C language, as allowed by the AVR architecture, with some features added to take advantage of specificity of the AVR architecture and the embedded system needs. The compiled COFF object files can be C source level debugged, with variable watching, using the Atmel AVR Studio debugger. The Integrated Development Environment (IDE) has built-in AVR Chip In-System Programmer software that enables the automatically transfer of the program to the microcontroller chip after successful compilation/assembly. The In-System Programmer software is designed to work in conjunction with the Atmel STK500, AVRISP, AVRISP MkII, AVR Dragon, JTAGICE MkII, AVRProg (AVR910 application note), Kanda Systems STK200+, STK300, Dontronics DT006, Vogel Elektronik VTEC-ISP, Futurlec JRAVR and MicroTronics' ATCPU, Mega2000 development boards.

2.2 proteus

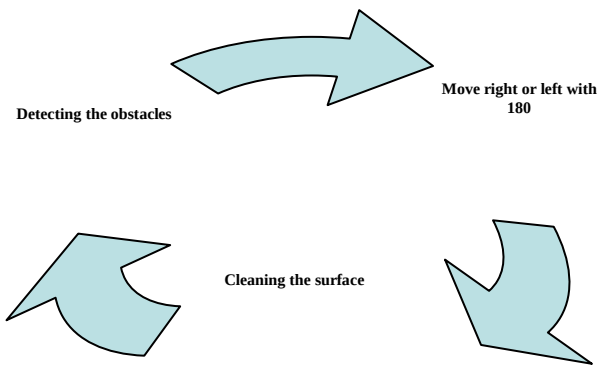
Proteus is a Virtual System Modeling and circuit simulation application. The suite combines mixed mode SPICE circuit simulation, animated components and microprocessor models to facilitate co-simulation of complete microcontroller based designs. Proteus also has the ability to simulate the interaction between software running on a microcontroller and any analog or digital electronics connected to it. It simulates Input / Output ports, interrupts, timers, USARTs and all other peripherals present on each supported processor.

Many CAD users dismiss schematic capture as a necessary evil in the process of creating
PCB layout but we have always disputed this point of view. With PCB layout now offering automation of both component placement and track routing, getting the design into the computer can often be the most time consuming element of the exercise. And if you use circuit simulation to develop your ideas, you are going to spend even more time working on the schematic.

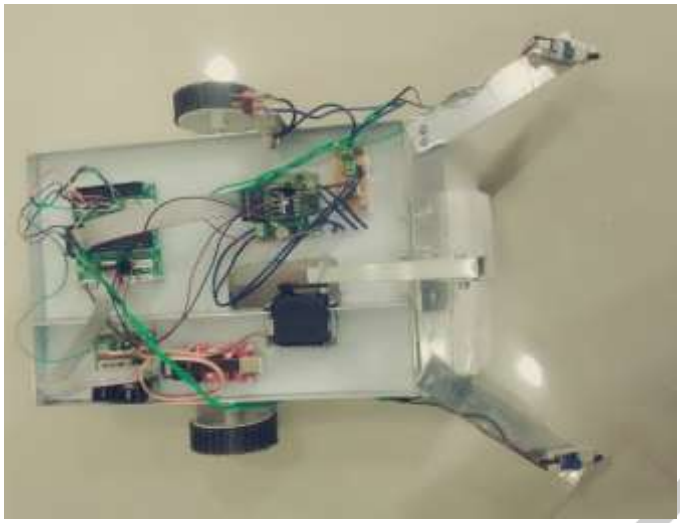
ISIS has been created with this in mind. It has evolved over twelve years research and
development and has been proven by thousands of users worldwide. The strength of its architecture has allowed us to integrate first conventional graph based simulation and now with PROTEUS VSM – interactive circuit simulation into the design environment. For the first time ever it is possible to draw a complete circuit for a micro-controller based system and then test it interactively, all from within the same piece of software. Meanwhile, ISIS retains a host of features aimed at the PCB designer, so that the same design can be exported for production with ARES or other PCB layout software.

For the educational user and engineering author, ISIS also excels at producing attractive

4. SEQUENCE OF CODING PROCESS



5. PROTOTYPE OF SOLAR BASED AGROBOT



6. RESULT

It is a low running cost and pollution free robot.The Purpose of this project is to build an obstacle avoidance autonomous robot and is used for cleaning the surface.A robot has high efficient design and consumes low power.

7. CONCLUSION

The project "**SURFACE CLEANING ROBOT (CLEAR)**" has been successfully designed and tested.
Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.
Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

8. FUTURE SCOPE

This project shows a better and simple approach to provide an overview of design of a simple robotic cleaners control design using gadgets and instruments easily available in market. This robot is specially made on the basis of modern technology.Features of this robot can be enhanced with addition of mapping and high suction. As it has scheduling feature which can be operated with computer only, android and windows app can be made to make it little more user friendly. It can also be used for the industries where cleaning with the help of human is toxic, vacuum cleaner can easily be used and we can fix the camera on the robot for knowing the things that are undergoing as a waste.

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