Autonomous Robotic Car

Session

2008-2012

Project Advisor

(Mr.Rauf Ali)

Submitted by

(Muhammad Adeel Kamran - 081220223)

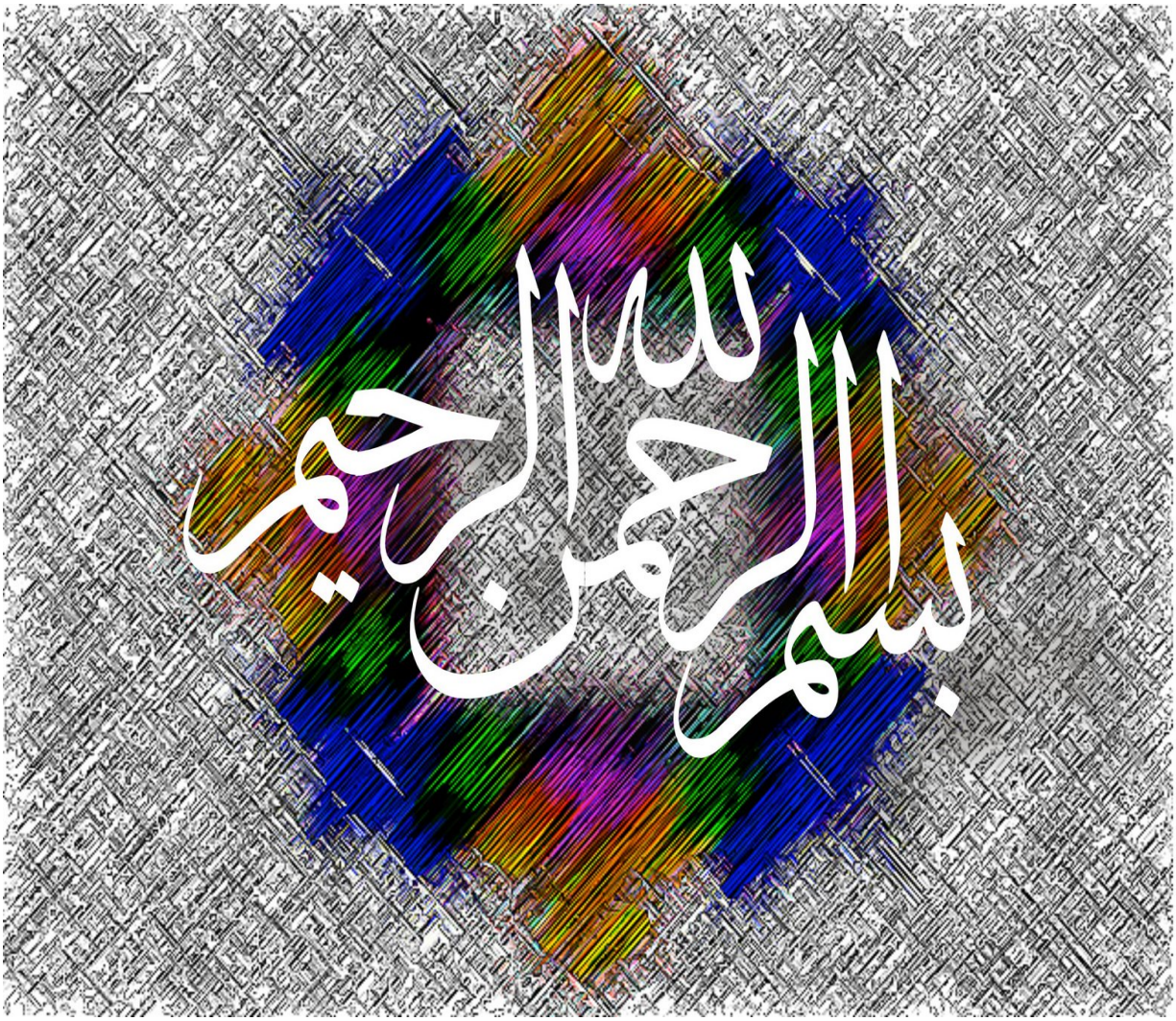
(Muhammad Saqib Mukhtar - 081220237)

(Asif Abbas - 081220181)

Department of Electrical Engineering

School of Science and Technology

University of Management and Technology


بسم الله الرحمن الرحيم

Autonomous Robotic Car

Project Report submitted to the
Department of Electrical Engineering, University of Management and Technology
in partial fulfillment of the requirements for the degree of
Bachelor of Science
in
Electrical Engineering

Advisor Name: - Mr.Rauf Ali

Advisor Signature: - _____

(Muhammad Adeel Kamran - 081220223)
(Muhammad Saqib Mukhtar - 081220237)
(Asif Abbas - 081220181)

Abstract

It is an anti-accident car which automatically deviates its path when any hurdle comes in front. The Sharp IR distance sensor and camera is mounted at the front of the Robotic car for this purpose. The sharp IR sensor is used to detect the obstacles while camera is used to avoid that obstacle. While moving forward if IR sensor does not detect any hurdle the Robotic car is going to its normal speed. If IR sensor detects any hurdle, then the Robotic car slows down and takes the decision to overtake that hurdle by camera. The back motor speed is controlled by PWM that is depended on IR sensor's output while front motor is bidirectional motor and controlled by H-bridge that is depended on camera image processing data. Both sensor and camera output is controlled by PIC16f877A microcontroller. ADC is used for sensor output and level converter (MAX232) is used for PC to PIC interfacing. Whole PIC programming is done in PROTON Basic language while image processing is done in MATLAB.

Dedication

First of all we are very thankful to ALLAH ALMIGHTY who has given us enough courage to complete this project.

Then

Dedicated to

Our loving Parents

&

Mr. Rauf Ali

Who enlightened our minds with Knowledge, tried

To include the spirit of hard work and dedicational us

So that we could have a BRIGHT FUTURE in terms

Of being good human and turn out to be competent

Engineers with powers to take challenging

ENGINEERING PROBLEMS.

Acknowledgements

Alhamdulillah. Thanks to Allah SWT, who with His willing giving us the opportunity to complete this Final Year Project which is title Autonomous Robotic Car. This final year project report was prepared under School of Science and Technology, University of Management and Technology (UMT).

This project is a culmination of a long period of work and without the support of many individuals; it would never have been existed. First and foremost, we thank our families, for their care and endless support, both moral and financial, to complete this project.

We have set a light and ever burning flame of gratitude and deep sense of obligation to our honorable advisor Mr. Rauf Ali for his generous assistance and inspiring attitude during the course of our project. Not only he helped us in our project but also did his best efforts in familiarizing us with basic concepts of components used which proved to be very helpful while doing our project. We would feel great pleasure in thanking co-advisor Mr. Fawad Khan for their extreme co-operation and encouraging attitude during this project.

Our thanks also to Mr. Saleem Ata head of undergraduates affairs, Mr. farhan iqbal head of project lab for offering us insightful thoughts and guidance. We would like to thank Mr. Aqeel Arshad, Mr. Syed Mohsin Ali, Mr Jawad Chattah, Mr. Asim Butt who supported us both morally as well as giving us the advises to complete our project. Not forget, great appreciation go to the rest of the labs staff that help me from time to time during the project.

And finally thanks to everyone who were behind of all that work and for their co- operation.

Our heartiest thanks are to all of them.

Table of Contents

List of figures

List of Tables

Chapter I

Introduction

1.1: Introduction to Robot

A robot is a mechanical device that can perform tasks automatically. It may but need not be humanoid in appearance. Some robots require some degree of guidance, which may be done using a remote control, or with a computer interface. A robot is usually an electro-mechanical machine that is guided by a program or circuitry.

Robots can be autonomous, semi-autonomous or remotely controlled and range from humanoids such as ASIMO, and industrial robots .The branch of technology that deals with robots is called robotics.

Fig1.1 A Pick and Place robot in a industry

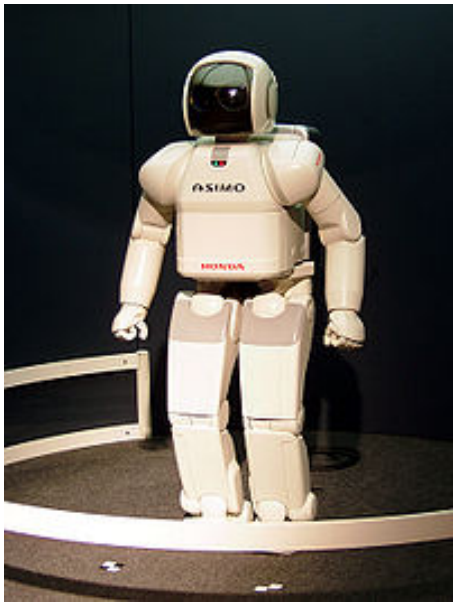


Fig 1.2 ASIMO humanoid robot

1.2: History of Robots

The notion of robots or robot-like automates can be traced back to medieval times. Although people of that era didn't have a term to describe what we would eventually call a robot they were nevertheless imagining mechanisms that could perform human-like tasks. In medieval times,

automatons, human-like figures run by hidden mechanisms, were used to impress peasant worshippers in church into believing in a higher power. The automatons, like the clock jack pictured here, created the illusion of self-motion.

The clock jack was a mechanical figure that could strike time on a bell with its axe. This technology was virtually unheard of in the 13th century.

Fig 1.3 Clock jack

In the 18th century, miniature automatons became popular as toys for the very rich. They were made to look and move like humans or small animals. In literature, humankind's vivid imagination has often reflected our fascination with the idea of creating artificial life.

1.3: Autonomous robots

1.3.1 What is Autonomy?

- A self-operating machine or mechanism, especially a robot.
- One that behaves or responds in a mechanical way.
- A fully autonomous robot has the ability to Gain information about the environment.
- Work for an extended period without human intervention.
- Move either all or part of itself throughout its operating environment without human assistance.
- Avoid situations that are harmful to people, property, or itself.

- An autonomous robot may also learn or gain new capabilities like adjusting strategies for accomplishing its task(s) or adapting to changing surroundings.

1.3.2 Brief History of Autonomous Robots

- Mechanical automata have been popular in many cultures throughout the ages
- Hero of Alexandria designed a number of water- and air-powered automata
- Leonardo da Vinci designed and built a number of lifelike automata, including a walking lion with Fleur deLis in his chest for a state visit by King Louis XII and an automated knight that could sit up, raise his arm, and move his head and jaw.

Fig 1.4 Leonardo's Knight (reproduction)

1.3.3: Current State of the Art for Autonomous Robots

- NASA's Deep Space 1 was the first space probe to demonstrate fully autonomous navigation
- The European Robot Arm, scheduled for delivery to the ISS in 2009, is capable of repositioning itself and of carrying out a number of tasks autonomously

- The Mars Science Laboratory, planned for launch in 2009, will be much larger than the current rovers and will traverse much more terrain – which will require a higher degree of autonomy

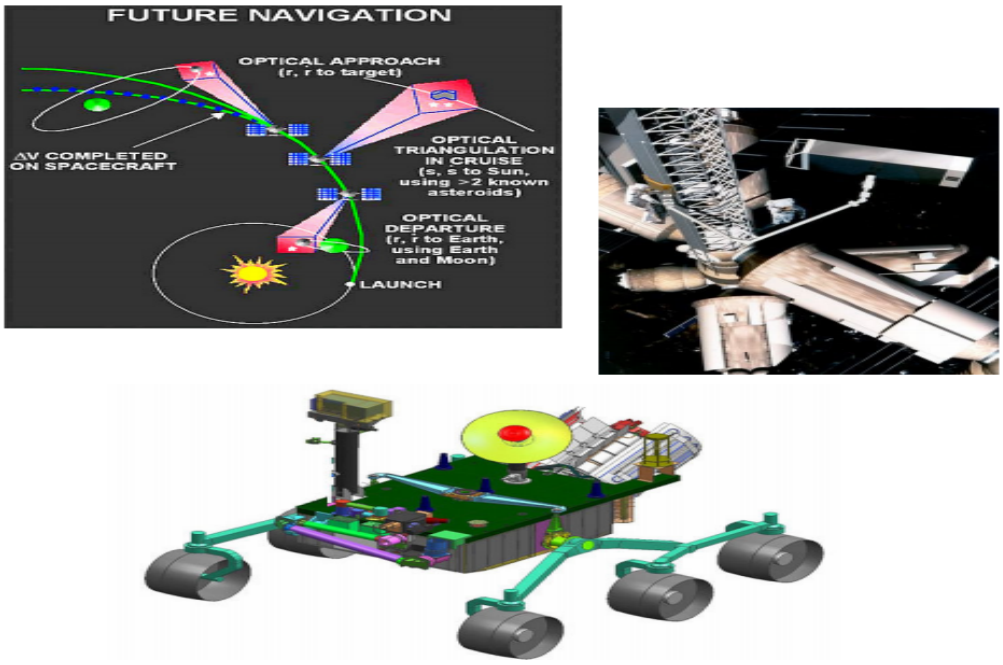


Fig 1.5 Autonomous Robots

1.4 Basic Idea

Nothing is more important than Human lives. Accidents are increasing day by day on the road in our daily life. Many accidents cause human damage or till death. So the basic idea is from this point that we should minimize accidents electronically. For that we take this project from Cornell University.

Fig 1.6 Basic Idea

1.5: About Project

The most important and worthy thing in this world is human lives. Thousands of humans are affected by accident. Many are lost lives in accidents. This project needs a sensor, camera and laptop .After completing this project, accidents will definitely minimize.

1.6: Our Aim

Our project's aim is to design an easy to use and low cost autonomous Robotic car that will save human lives. For this purpose we use sensor and camera. Sensor is used to reduce the car speed when object is detected and camera is used for two purposes .One is to detect the obstacle and other is to overtake the obstacle.

1.7 Basic Differences

As we have taken idea for this Project from Cornell University but we made the modifications in that project as they used

1. Atmel (MCU)

2. Servo motors
3. Toy car
4. C language

In our project we made use of following with some modifications and they are

1. PIC controller (16f877A)
2. Dc gear motors
3. Iron structure
4. Proton Basic
5. Image processing through MATLAB
6. The overall circuitry design is change, we used the L298 motor derivers for the DC motor