

Boomerang BOT

Prasad G. Govardhanan

Department of E&TC, Goa College of Engineering (Govt of Goa) Farmagudi- Goa
Prasad.g.j@gmail.com

ABSTRACT

A boomerang is a flying tool with a curved shape used as a weapon or for sport. The basic property of any boomerang is the after launching, it come backs to its initial position automatically. In robotics this concept can be very well adapted. We can develop such a robot that can be sent anywhere for various reasons or applications and the robot will not require any more commands to come back after getting required job done.

I. INTRODUCTION

In the above proposed system Boomerang BOT means that the robot will be capable of memorizing the paths that it follows and when ordered can retrace or back track the whole path so as to come back to the initial position and direction.

II. BACKGROUND OVERVIEW

A. Existing System

In almost current robotic systems do not have feature to backtrack to the starting position. Once a Robot is send for exploration of certain areas then their path has to be manually memorized by the instructor or operators so as to take the Robot back to the initial position for data retrieval and power recharge. It's a time as well as manpower consuming task to bring back the Robot to the Initial position and Direction.



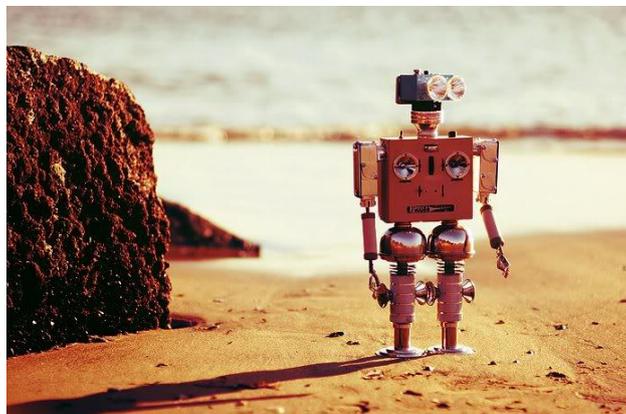
B. Proposed System

In our system the Robot will be smart enough to memorize the complete path along with executing the commands from the Instructor or operator.

When the Robot will reach to the Destination and is ordered to retrace the whole path then it will take complete 180 degrees, will invert the command set and after following the same path, it will come back to the initial position.

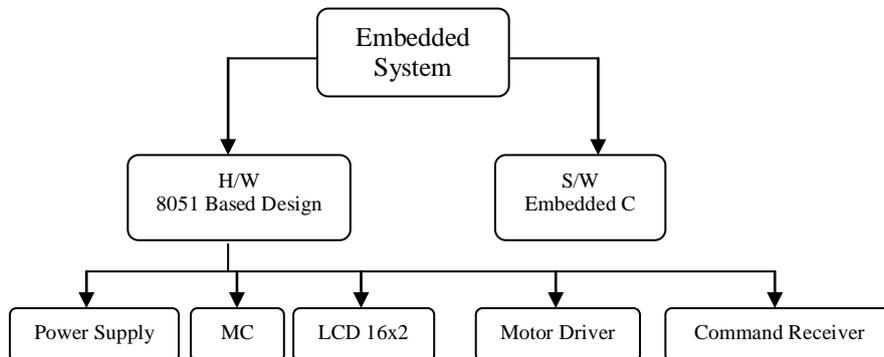
After coming to the initial position it will again take complete 180 degree turn to get initial direction too.

Hence The Robot will maintain the Initial position as well as initial direction both.



A. System Overview

The above proposed system will be divided into the following sub modules or sections...



B. Block Diagram

The Block Diagram of the system is attached behind.

C. Explanations of Blocks

The following are the brief explanations of the working principle of the various major blocks or sections used in the system...

- **Power Supply**

This unit will supply the various voltage requirements of each unit. This will consist of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier. It will convert 230VAC into desired 5V/12V DC.

- **Microcontroller**

This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In short we can say that the complete intelligence of the project resides in the software code embedded in the Microcontroller.

The controller here user will be of 8051 family. The code will be written in Embedded C and will be burned or programmed into the code memory using a programmer.

This unit requires +5VDC for its proper operation.

- **LCD 16x2**

It is called Liquid Crystal Display. We are going to use 16x2 character LCD. This will be connected to microcontroller. The job of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface.

This unit requires +5VDC for its proper operation.

- **DC Motor Driver**

This unit is nothing but H-Bridge driver encapsulated in a single IC. Here we will use L293D IC for DC motor driving. It can drive up to 4 DC motors in unidirectional mode and 2 DC

motors in bidirectional mode. It can sink up to 600mA per Channel.

The job of this unit is to drive the connected motors in desired direction when microcontroller sends signal to their respective channels.

This unit requires +12VDC for its proper operation.

- **DC Motor**

Here we are going to use DC Geared Motors of 10/30/45 RPM. The voltage required to drive the motors are 12VDC and current is nearly 200mA. Gears are used for more torque.

This unit requires +12VDC for its proper operation.

D. Features

The following are the prominent features of the above discussed system...

- Can be navigated in all directions viz. Forward, Backward, Right & Left,
- Can be operated using remote control,
- The system can memorize the travelling path,
- Automatically Backtracks to its initial positions,
- The returning is in forward direction and not in backward.

E. Technology & Programming Languages

As microcontrollers are the core of these days digital circuit design in industry, this system uses it for the centralized operation and digital processing. The technology used here is embedded technology which is the future of today's modern electronics.

The following are the various Programming Languages & Technologies that are going to be used in the proposed system...

For Embedded System...

- Embedded Technology,
- 8051 Family Based Controller,
- Embedded C - Keil Compiler,
- Eagle Software for PCB Designing,

F. Project Development Methodology or Steps

The following will be development steps so as to achieve the working Prototype Model of the above proposed system...

- Defining the Problem,
- Understanding the Need & Usability in industry and society (Market Analysis),
- Developing Block Diagram,
- Designing Circuits of individual blocks,
- Testing circuits in LAB & Finalizing,
- Developing PCB on PC,
- Getting the PCB printed from market,
- Soldering the components,
- Performing various Basic Experiments to test the PCBs,
- Developing Flowchart for the entire process,
- Writing actual Software Program,
- Compilation & Burning,
- Testing and Debugging,
- Finally Running the system and,
- Documentation.

IV. SCOPE & APPLICATIONS

Only the imagination can limit the applications of the above proposed system.

Though the following are some examples...

- Exploration of celestial objects in space.
- Exploration of those areas in which survival of human being is not possible.
- Under water exploration and at all those places where the device or machine is supposed to regain its own position and direction.
- Retracing its (robot's) path for the purpose of refuelling or recharging.
- etc,

V. CONCLUSION

By the realization of the above proposed system one can learn many aspects of a digital electronics circuit. This will give the complete knowledge of designing microcontroller based system and developing embedded software.

VI. ENHANCEMENTS

A. Limitations

As generally all systems have some limitation, here are some listed for the proposed system...

- Limited range of 10 meters only.
- Low efficiency batteries are used hence the robot has less operating time.
- Can memorize limited number of steps only.
- No backtracking is done if power failure takes place after memorizing the paths,

B. Drawbacks

This system has certain drawbacks also as listed...

- Can not detect and avoid obstacles,
- Can not regain the backtracking after obstacle,

C. Future Modifications

There is always chance to improve the any system as research & development is an endless process. Our system is no exception to this phenomenon. The following improvements can be done...

- Weather Monitoring Systems can implemented on this Robot to record various weather changes,
- The range can be improved by using advanced and costly Bluetooth devices to 100 meters or to Kilometres too.
- By interfacing external memories Robot's memorizing capabilities can be enhanced.
- It can be used to carry luggage from/to a particular destination by installing hydraulic actuators and lifters,
- A low battery level signal sensor can be implemented which will track the current level and when the current level goes below the threshold level the battery sensor will automatically issue a Backtracking command to the robot instructing it to return to its base to recharge the battery,

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THE SYSTEM BLOCK DIAGRAM

