

Android Based Staircase Robot

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ABSTRACT

Today Smartphone are common thing and can afford by maximum people which leads to low price mobile phone robots. Mobile robots means which are operated using mobile .mobile phone has various feature like wifi, cameras, keypads etc. also it has powerful CPU inbuilt. Keypad through which command can be given to robot as per requirement .In this project android mobile is used. Robot has wheels and sensor connected .movement of robot is done using android mobile phone. Addition of sensor and camera is done to enhance feature of robot .by adding sensor and camera it will provide comfort to operator to operate it in dangerous area .this will provide safety to personnel .no of task which is performed by robot is already define during programming. the main purpose of robot is that it can be able to climb stairs. also to sense temperature in particular area and sense fire affected area. in this project programming is done by using PIC 16F887A.also Bluetooth model HC-05 is used. the wings of wheels are separated by 120 degree angle apart from eachother. there is difference between size of front wheel and back wheel.Front wheel re larger than back wheel.as back wheel are used to rubble and front wheels are used to climb stairs and it derived by dc motor.operator can view movement of robot if camera is placed on robot.

Keywords : PIC 16F887A, Bluetooth Model, Android Module, LCD, Buzzer.

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I. INTRODUCTION

The project aims in designing a Robot that can be operated using Android mobile phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in the project the Android smart phone is used as a remote control for operating the Robot. Robots are increasingly being integrated into working tasks to replace humans. They are currently used in many fields of applications including office, military tasks, hospital operations, industrial automation, security systems, dangerous environment and agriculture .Several types of mobile robots with different dimensions are designed for various robotic applications. The robot has been designed for the purpose of aiding rescue workers. Common situations that employ the robot are urban disasters, hostage situations, and explosions. The benefits of rescue robots to these operations include reduced personnel requirements, into slightly destroyed areas to find and help rescue people. The robot is even made to climb stairs and travel through fairly large amounts of rubbles. On the robot there will be a camera which is used to take video.

The robot is built to discover areas which people cannot reach. This robot is able to cope with stairs, very rough terrain, and is able to move fast on flat ground. The robot body was prepared mechanically and electrical components were chosen to be suitable for the task of the robot. The stair climbing robot is one of the most attractive performances of robot in legged and wheeled. Developments have been made on various kinds of stair climbers, considering how to make its climbing ability higher and its mechanical complexity reasonable and practical. The research includes realizing a large step negotiating. Reducing body weight and energy consumption is also the important matter of developing. We introduce some solutions to realize stair climbing machines that we developed. Each of them has good performance as in a category of their kind, e.g. various numbers of wheeled shapes. Then, we discuss a development of adjustable high grip mover, which we think one of the best solutions as the stair climber.

A mechanism is a combination of rigid or restraining bodies so shaped and connected that they move upon each other with definite relative motion. A machine is a collection of mechanisms which transmits force from the source of power to the load to be overcome, and thus perform useful mechanical work. Robotics is the area of automation which integrates the Technology in variegated fields like mechanisms, sensors & electronic control systems, artificial intelligence and embedded systems. The synthesis of mechanisms is the very first step in any robot design depending upon its application.

II. LITERATURE SURVEY

Stair Case Wheel Chair

Top Chair

Advantages:

- Modern.
- Requires no assistance.
- Long lasting performance.
- Already attached to wheelchair.
- Very simple and easy to use.
- Seat is kept horizontal.

Limitation:

- Restricted to a 33° height
- Expensive
- Heavy
- May be difficult to transport
- Too complicated to replicate
- May not be suitable indoors or on spiral stairs

Description:

This is a good wheelchair, but in terms of this project – it is too complicated and expensive to be replicated. Also, too much time is spent retracting and returning the rear and front wheels. (Not suitable for emergency evacuation)

The chair controls do not allow the chair to manoeuvre spiral stairs and this will be something the group hopes to improve. The design is simple however, and the tracks are definitely an element we will include to our own design.

iBot

Advantages:

- Easy to transport.
- In/outdoor use.
- Practical.
- Easily combats small curbs.
- Not visually intrusive.

Limitation:

- Requires stair rails and moderate strength or assistance.
- Might struggle with spiral stairs.
- Complicated.
- Expensive and heavy.
- Seat is tilted during stair operation.
- Restricted to slope angle: not stated, but probably higher than a combination of the two.

Description:

This is a complicated design as apposed to the TopChair. It appears to be stable, but the fact that the seat is not horizontal means that most owners tend to look uneasy on the seat. (According to you-tube demonstrations)

The chair is not fool proof. It requires both a stair railing and some strength to force the motion up the steps or an assistant (and some faith).

It is hard to see how this particular design would be useful to our objective.

III. PROPOSED SYSTEM

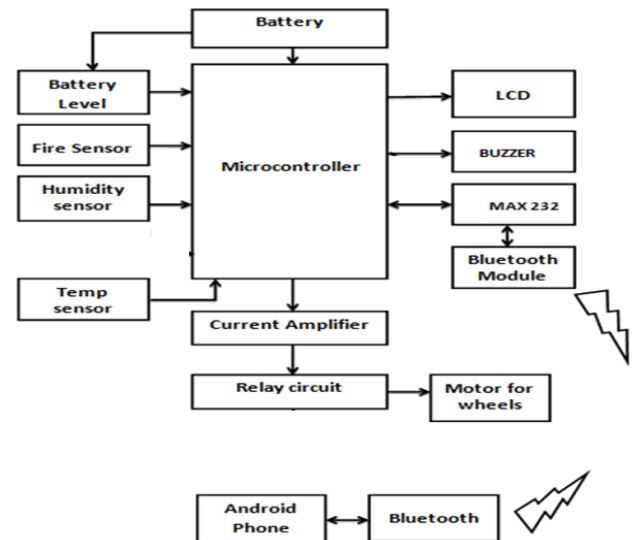


Fig 1. Block Diagram

Description

The block diagram presents the main structure of the stair-climbing robot which consists of: Power sources, charger circuit, motors (DC motor), and Bluetooth modules. The brain of the robot is PIC16F877A. The following sections describe in details each of these components. A smart phone Android operated robot. Now here is a simple to control your robot using Bluetooth module HC-05 and pic 16f877 microcontroller with your android Smartphone device. The controlling devices of the whole system are a microcontroller. Bluetooth module, DC motors are interfaced to the microcontroller. The data receive by the Bluetooth module from android smart phone is fed as input to the controller. The controller acts accordingly on the DC motor of the robot. The robot in the project can be made to move in all the four directions using the android phone. The direction of the robot is indicators using LED indicators of the Robot system. In achieving the task the controller is loaded with program.

Robot Movement Mechanism:

The robot mechanism drive works with the rear wheels being directly powered and the front wheel system being driven by the same motor via a series chain. The movement of the robot is established by using two motors in each side. servomotor with arm (Satellite Dish Motor) is used to thecae

of climbing stairs by controlling the position of the motor arm which is joined with the front of the robot.

Battery Charger:

Primary source of power for the robot are lithium batteries (Li-ion) because of its characteristics and advantages. The battery (12 Volt 7 Ampere) delivers, respectively, to provide 12volts and Can recharge this batteries using charger circuit. The circuitry to recharge the batteries in a portable product is an important part of any power supply design. The complexity (and cost) of the charging system is primarily dependent on the type of battery and the recharge.

IV. FLOW CHART

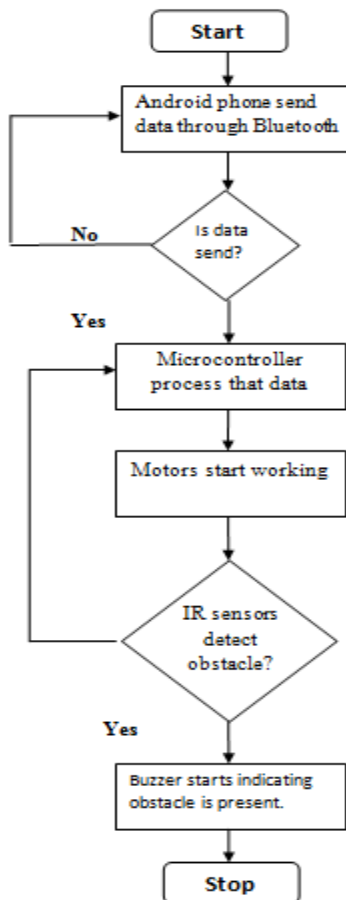


Fig 2. System flow chart

V. ALGORITHM

1. Start
2. Android phone send data to microcontroller through Bluetooth.
3. The forward, reverse, right and left turn controlled by phone through Bluetooth.
4. Forward, reverse, left and right turn and obstacle detection is displayed on LCD.
5. Data is processed by controller and robot starts working.
6. Motors are rotate by giving command from android phone.
7. IR sensors detect obstacles present or not.
8. If present buzzer start indicating otherwise not.

9. Stop.

VI. CONCLUSION

The objective of the project is to realize the smart living, more specifically the home lighting control system using Bluetooth Technology. Robot and smart phones is a perfect match, especially mobile robots. As phones and mobile devices is each time more powerful, using them as robot for building robot with advanced feature such as voice recognition. Android Bluetooth-enable phones and Bluetooth module via HC-05 and communication among Bluetooth devices. It is concluded that smart living will gradually turn into a reality that consumer can control their home remotely and wirelessly.

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