

A Navigation Robot Using GPS and GSM for Fire Extinguishing

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ABSTRACT

Robotic techniques have been used in various important fields such as manufacturing, military, medical, or security. The accuracy and working of the robot determines the result of the applications. Robots guided by GSM technology works well with its known limitations. This paper proposes an integrated system using GPS and GSM for implementing a mobile robot. Such Robots overcomes the limitations of previous method and it can be used system for important applications like navigation, fire extinguishing and message alerting with accuracy.

Keywords- Navigation robot, Fire extinguishing robot GSM robot, GPS robot, Integrated robot.

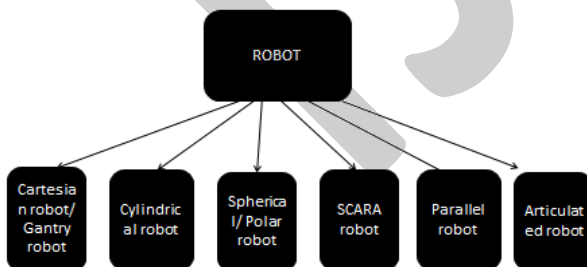
I. INTRODUCTION

Robotics is the branch of technology that is used for the design, construction, operation, and manufacturing process. Robot can found their applications in the manufacturing industry, the military, space exploration, transportation, and medical applications.

A. Why robots?

Typically robots are controlled by a computer systems for their controlling and information processing. Industrial robots do difficult, dangerous or dull jobs. They lift heavy objects, handle chemicals, paint, and perform assembly work. They perform the same job hour after the hour, day by day with precision and accuracy. They don't get tired and they don't make errors associated with fatigue and so are ideally suited for performing repetitive tasks.

The major categories of industrial robots by mechanical structure are:



Cartesian robot/ Gantry robot: Used for pick and place work, application of sealant, assembly operations, handling machine tools and arc welding. It's a robot whose arm has

three prismatic joints, whose axes are coincident with a Cartesian coordinator.

Cylindrical robot: Used for assembly operations, handling at machine tools, spot welding, and handling at die casting machines. It's a robot whose axes form a cylindrical coordinate system.

Spherical/ Polar robot: Used for handling at machine tools, spot welding, die casting, fettling machines, gas welding and arc welding. It's a robot whose axes form a polar coordinate system.

SCARA robot: Used for pick and place work, application of sealant, assembly operations and handling machine tools. It's a robot which has two parallel rotary joints to provide compliance in a plane.

Articulated robot: Used for assembly operations, die casting, fettling machine, gas welding, arc welding and spray painting. It's a robot whose arm has at least three rotary joints.

Parallel robot: One use is a mobile platform handling cockpit flight simulators. It's a robot whose arms have concurrent prismatic or rotary joints.

B. Law of Robotics

Asimov first proposed three "Laws of robotics" and later added "zeroes law"

Law 0: A robot may not injure a human being or through inaction, allow humanity to come to harm.

Law 1: A robot may not injure a human being or through inaction, allow humanity to come to harm, unless this would violate a higher order law.

Law 2: A robot must obey orders given to it by human beings, except where such orders would conflict with a higher order law.

Law 3: A robot must protect its own existence as long as such protection does not conflict with a higher order law.

This paper presents the designing and implementation of a robot for navigation and fire extinguishing. This robot system will help for home security and going inside tunnels in which humans cannot enter.

II. SENSORING TECHNOLOGY

The main censoring technology used in robot is GSM (Global System for Mobile Communications), Global Positioning System (GPS), and temperature sensor. GSM is a standard developed by the European Telecommunications Standards Institute (ETSI) used for mobile communication. GSM is used for emergency messaging in the robot system. The GSM standard was developed for replacement the first generation (1G) mobile networks. GPS is used in system for navigation and tracking current position of robot. GPS is a space-based satellite navigation system that provides location and time information. The GPS system provides critical capabilities to military, civil and commercial users. It is maintained by the United States government and is free for accessing by a GPS receiver.

III. NAVIGATION ROBOT IMPLEMENTATION

The navigation robot has mainly three modules they are GPS, GSM, driver module, this GPS module is used for tracking current location of robot. In the robot side there will be a GSM module and a driver module. GSM module is used for alert messaging and driver module is used for controlling DC motors and controlling the robot. Fig1 show these modules.

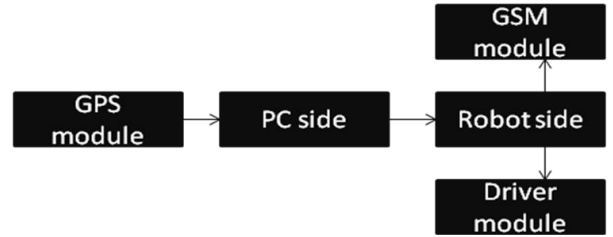


Fig1: Main modules of robot

The main parts of the robot side are Microcontroller, Motor Driver, GPS Receiver, Temp Sensor, Power Supply, Water Sprinkler, Video Camera, and Video Transmitter. In robot side there will be a microcontroller which will controlling GSM module, GPS module in the robot side. We are also giving a power supply for the robot side. We are also using a water sprinkler for primary extinguishing of fire. Video camera is used to transmit video signals to pc side. Adrino board is microcontroller used in robot side. Fig2 show robot side of robot. Fig3 show how we can see movement of robot.

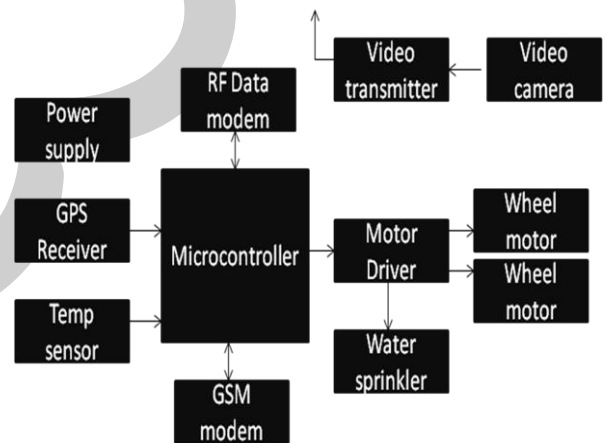


Fig2. Block diagram FROM Robot Side

IV. ADVANTAGES

Advantages of GPS-GPS is extremely easy to navigate as it tells you to the direction for each turns you take or you have to take to reach to your destination. GPS works in all-weather so you need not to worry of the climate as in other navigating devices. The GPS costs you very low in comparison other navigation systems. The most attractive feature of this system is its 100% coverage on the planet. It also helps you to search the nearby restaurants, hotels and gas stations and is very useful for a new place. Due to its low cost, it is very easy to integrate into other technologies like cell phone. The system is updated regularly by the US government and hence is very advance. This is the best navigating system in water as in larger water bodies we are often misled due to lack of proper directions. Disadvantages of Global Positioning System

C. Advantages of GSM

Free Roaming: - Worldwide Roaming since GSM service is obtainable in added than 200 countries, clienteles are capable to roam globally without altering their devices or their facility plans. Messaging facilities and other progressive services, such as data, too endure obtainable. Cellular businesses sort partnership contracts with suppliers overseas, so businesses are capable to roam globally at reduced roaming charges.

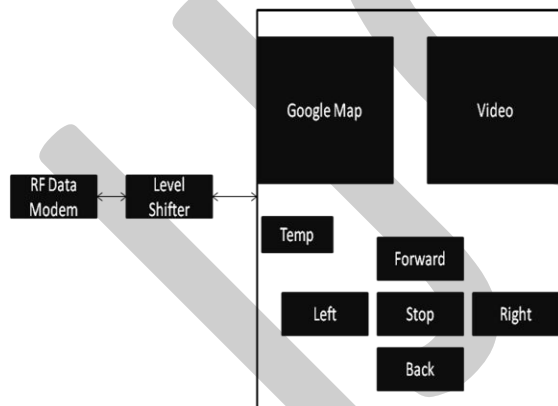


Fig3. PC Side

Highly Secure: - Security GSM facilities are extremely protected, with skills in place that can defend against both snooping and service riding. GSM devices and facilities cannot be duplicated as simply as other skills. The SIM card or Subscriber recognize Unit card which transmits

subscriber and exchange info, secures purchaser info. These cards also permit consumers to handover their subscription info and telephone book info from one receiver to add at any period.

Diversity:- Reasonable Devices and Facilities GSM suppliers switch a huge portion of the cellular marketplace and so are capable to deliver a huge diversity of reasonable devices and facilities. Constructors are capable to afford numerous diverse kinds of devices for reasonable values since the huge capacity of purchases aids to energy down the trade costs. The change of strategies and facilities request to consumers as well, since they need to try the latest and maximum exciting yields.

Extensive Spectrum range:- Extensive Spectrums Obtainable the GSM expertise usages five bands of MHz rate; 450, 850, 900, 1800 and 1900 MHz Builders are capable to yield devices that can choice up two or three diverse occurrence bands. Those receivers can then shift between those rates routinely as desirable, in order to preserve a network linking almost wherever. The signals obtainable with GSM facility are effectual, meaning that an excessive deal of data can transfer diagonally the frequency bands without dipping the efficiency of the signs.²

V. APPLICATION AREA OF NAVIGATION ROBOT

The main application area is that they can be used for navigation using GPS. With help of GPS receiver in robot side can be used for navigating some people who are unfamiliar with the way. One of the main applications is for detection of temperature using temperature sensors and if it detects fire the robot will do the primary stages of fire extinguishing. The robot can also be used for sending an emergency message alert to the nearest fire fighters. The emergency messaging is done with the help of the GSM module. The main component that is used in the GSM module is a SIM card that is used in the ordinary mobiles.

The camera in the robot side can be used for watching the robots movements. The robot thus can be used for watching inside tunnels and mines in which humans cannot be reached.

VI. TECHNIQUES SURVEY REPORT

TECHNOLOGY USED	PAPER	AUTHOR	YEAR	REMARK
GPS	<i>GPS-Based Path Following Control for a Car Like Wheeled Mobile Robot With Skidding and Slipping</i>	<i>Chang Boon Low</i>	2008	<i>Advantage : Helpful for tracking Disadvantage : GSM not used</i>
RFID & GPS	<i>RFID and GPS Integrated Navigation System for the Visually Impaired</i>	<i>Kumar Yelamarthi</i>	2010	<i>Advantage : Tracking is possible Disadvantage : no emergency alert</i>
COMBINED GPS & GSM	<i>GPS-based Indoor Positioning system with Multi-Channel Pseudo lite</i>	<i>Haruhiko Niwa</i>	2008	<i>Advantage : GSM helpful For emergency alert Disadvantage: Intermittent delay due to multichannel</i>

VII. CONCLUSION

This project is a great challenge because it allows the robot to move through the complex paths. And then present the design techniques of digital circuits, as well as the logic governing the robot motion when it moving through a path and detecting and extinguishing fire. Then the electronic circuits and boards are constructed, test and mount on the robot. The robot will give 75% aquarist movements.

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