Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 10, October - 2017

VKz Surveying Robot (GPTrack Edition)

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***Abstract* - A natural disaster can happen anytime and you can't stop it. Living in such a natural calamity loses their lives, but human beings are awake to defend themselves against such a catastrophe. So that you succeed in saving your precious life. The team is very difficult to work at such places and also suffers from severe problems and also has time to go. But using the Surveying Robotic Vehicle, we can overcome all these problems. In modern technology, autonomous robotic system is an outstanding innovation that can help robots in a natural disaster. In which places the Rescue team can't reach, robots will be helped so that the team can save time. Robots can help man by doing a job that is impossible for humans to do. The propose system design to identify the victim inside the collapse building and other underground areas like mines, heavy duty pipe lines as well as tunnels and some other places where rescue operation needs proper information about people inside the affected area.**

INTRODUCTION

In these days lots of natural disaster happening and in that disaster human beings or Animal lost their lives. So we need more security. By using surveying robot we can solve these problems. A robot is a machine designed to execute one or more tasks repeatedly, with speed and precision [2].

Robot consists of electronic, electrical and mechanical units. Robot can perform series of tasks as per their programming. Due to designing and programming robot can interact with human and environment. Surveying robot can recognize and detect motion automatically around a robot's environment [1].

This project is supposed to be prototype model which can be used in different applications such as land sliding, identify the victim inside the collapse building. We are developing surveying robot which uses Wireless communication, SAR mechanism, Android application and Ultrasonic mechanism. Effective communication system is to be eestablished between robot and sensor which communicates without any interference of the surrounding frequencies. When robot encounters with an obstacle robot capable to measure the distance of an obstacle and take its own decisions regarding its further proceedings.

The main feature of this is project is that, Exposure to robots rather than human beings, so that they can get information every moment because humans can't always monitor or be present in the Victim area.

LITERATURE SURVEY

Robot is a machine which carried the complex series of work which is programmed by the computer. Robot can handle one or multiple task at a time without any interference. They can do repeated and boring work in that work the people may be getting bore. Robot can do work faster than man. We can use robot where we can't go. Why we use the robot? By using the robot we can reduce the manpower and money. People need robots for dangerous, repetitive and high-precision work. Robots perform tasks in aggressive environments that are impossible for humans, while also carrying out repetitious tasks with speed and accuracy.

Around 1495, Leonardo Da Vinci publishes designs for a mechanical knight. From that year up to next 400 year that design was use to build toy, for the entertainment. The word robotics was first used by the famous science fiction writer, Isaac Asimov, in 1941. This word was use to describe the technology of robots and predicted the rise of a powerful robot industry. The term robotics refers to the study and use of robots; it came about in 1941 and was first adopted by Isaac Asimov, a scientist and writer.

On Ground Robotic Vehicle

The Mars rover is an example of a robotic vehicle under supervisory control from the earth, and capable of local autonomous operation for segments of motion and defined scientific tasks [3].

Fig. NASA Mars Rover

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Robotic vehicle have performed multi-kilometer traverses autonomously and have operated in the polar desert of Antarctica to autonomously seek and identify meteorite [4].

GPS Satellite

The GPS technique was initially developed for military purpose. In 1980, the government decided to make it accessible for the resident use. GPS has become accomplished tool in the field of technical use; the use of GPS in underwater, subterranean location, inside the building and caves is very difficult to detect the signal. The GPS system does not need the user to transmit any data, and it operates separately of any telephonic or internet reception, by these technologies we can get the useful GPS positioning information. The GPS satellites transmit signals to a GPS receiver.

Each GPS satellite transmits data in the form of signal. That data indicates its location and the current time. The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times because some satellites away from others. The distance to the GPS satellites can be determined by the time required to reach the receiver. GPS receivers receive data from the satellite and also calculate their position by calculating its distance from satellites and then by triangulation method calculates its position.

U-center Software

The U-Center GNSS evaluation software for automotive, mobile terminal, infrastructure applications. It supports to all GNSS receivers. From this software we can collect the detail information from GPS system. U-center having all the information collected when GNSS device performing its operation. All data (position, velocity, time, satellite tracking etc.) of the GNSS. It evaluates performance like accuracy, tracking and create case studies by recording log files. This software specifically designs for evaluating u-blox GNSS receiver performance on Android platforms and Visualize the location data and GNSS status published by the Android framework.

The program receives the data stream from either from communication or log file and this stream splits into protocol messages. From the messages, applicable parameters are extracted and inserted into the current dataset of the database that is used by the displayand analysis features of the application. [7]

Medium Access Control (MAC) Protocols for Wireless Sensor Networks.

For low data rate, short distance and low power communication application IEEE 802.15.4. (MAC) is designed. In Remaining number of back off period in current superframe are not enough to complete data transmission procedure until next superframe the sensor hold data transmission like that whenever two or more sensors transmit holed dada in next superframe. It causes the collision of dada packet and waste of channel utilization. To avoid this problem MAC is designed. The main objective of the IEEE 802.15.4 open standard is to support the wireless connectivity of a vast number of industrial, home, and medical applications, including automotive monitoring and control, home automation, ubiquitous and pervasive health care, gaming, and sensor-rich environments [5].

Robot direction control

Moving forward and reverse is not big problem in the 4 wheel robot but difficult part is to take complete 360 degree turn at its position. In this project we have installed Rubber wheels to provide better traction and grip on the surface.

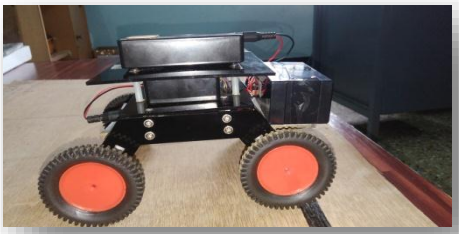

Fig. Four wheel robot control.

To rotate vehicle in left 90 degree, the back wheels B and D spins in opposite direction which are connected to the Motor Drive, (the wheel B rotates backwards and D forward) here by trying to make a left rounded motion.

SYSTEM DEVELOPMENT-

The Proposed System detects detail information regarding to the natural disaster which is helpful in rescue operations. The Surveying Robot consists of CPU. The input to the CPU is Ultrasonic Ranging Mechanism, Power Supply and Android Control and output of CPU is Vehicle Driver Module, SAR Mechanism and Windows Application Platform.

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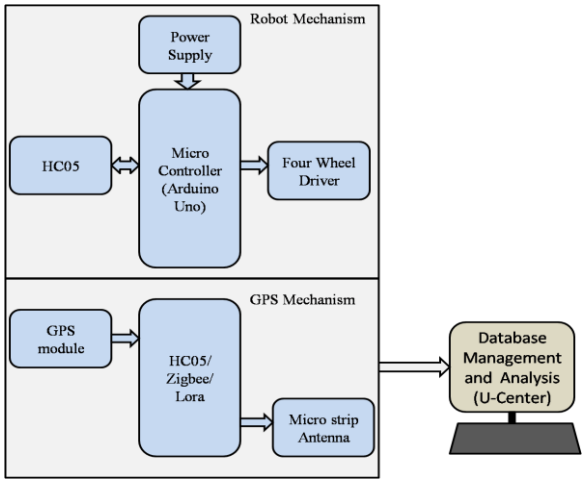
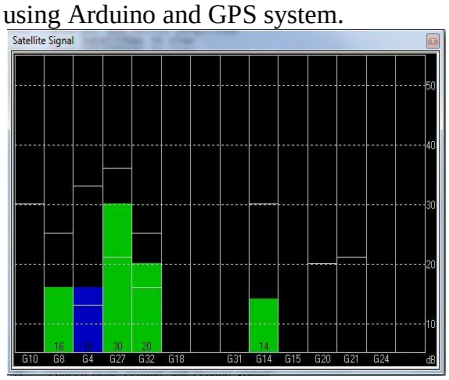


Fig. System block diagram

- The Android application controlled robot communicates via Bluetooth to the Bluetooth module present on the robot. While pressing each button on the application, corresponding commands are sent via Bluetooth to the robot.
- The commands that are sent are in the form of ASCII. The Arduino on the robot then checks the command received with its previously defined commands and controls the servo motors depending on the command received to cause it to move forward, backward, left, right or to stop. Thus allowing us to create an Android controlled robot.
- Vehicle driver module consists of robot chassis, L293D and DC motors. DC motor is used to move robot in forward, reverse, left and rsight directions. L293D motor drive module controls the DC motor.

RESULT

We have successfully implemented Surveying robot by using Arduino and GPS system.



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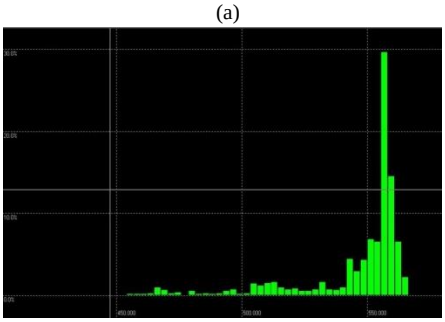

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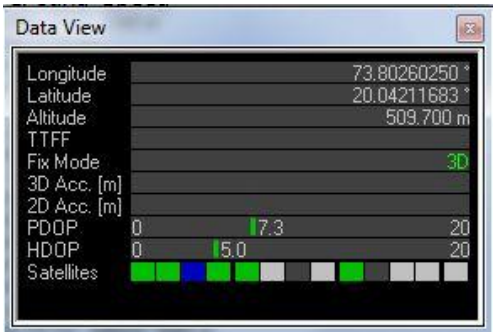

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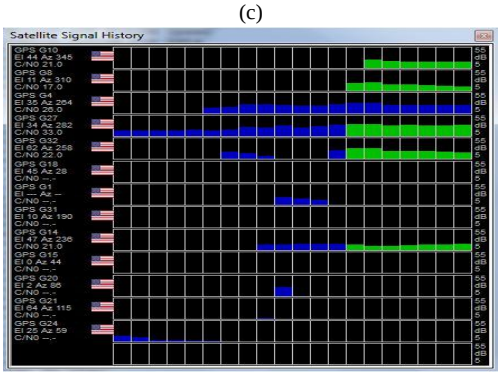
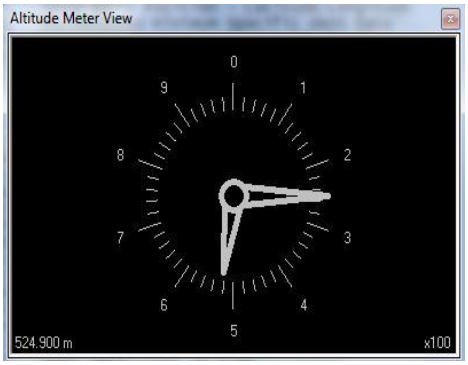


(d)

Fig. a) Signal Strength b) Histogram c) Data view d) Satellite Signal History

From above result we can see that signal strength in dBHz.G10-G24 is the satellite. Receiver uses satellite for position calculation which is in green. The satellites in blue represent signals are available but not in calculating position. By using Histogram the user can view GNSS data and probability distributions. Data view indicates detail information of Satellite like longitude, Latitude.



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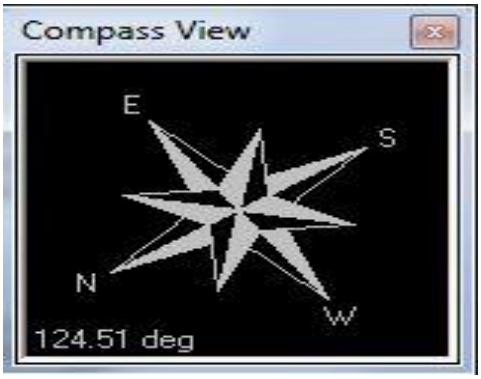

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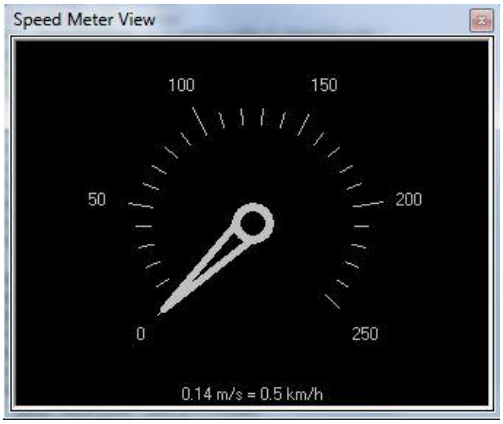
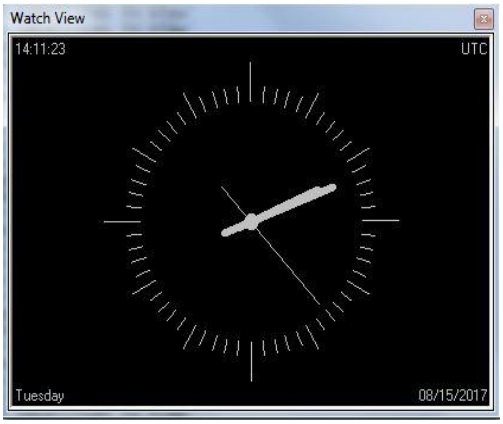


(c)

From above result you can see the summery of main satellite and sensor data information. Altitude meter represents altitude in meter or feet. Compass view represents heading which is capture by GNSS. Speed meter provides current speed in km/h, m/s, or mph. UTC Time signify by watch view.



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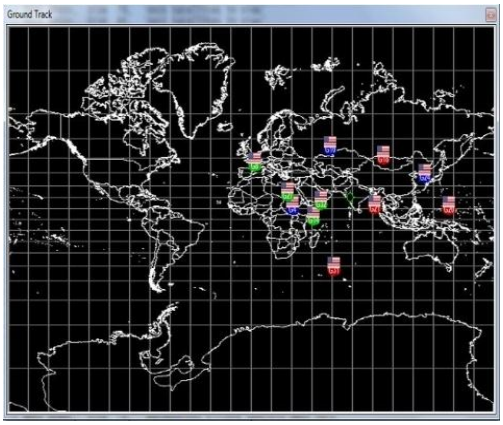

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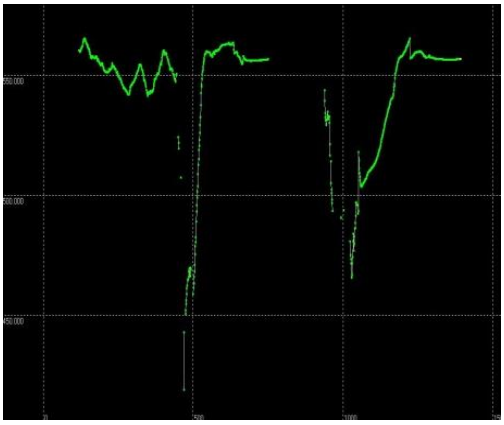
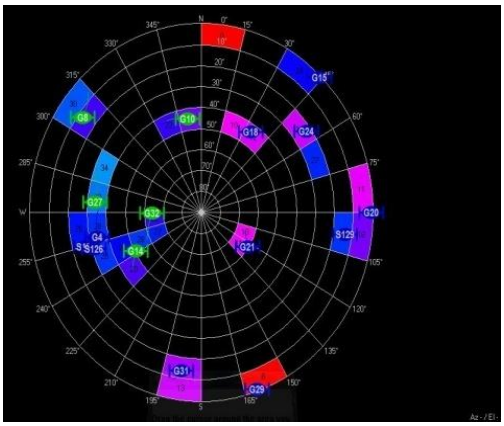


Sky View represents the performance of antennas and the conditions of the satellite Observation environment. Chart view allows the user to view GNSS data records in graphical form. World position view indicates our current location with longitude and latitude.



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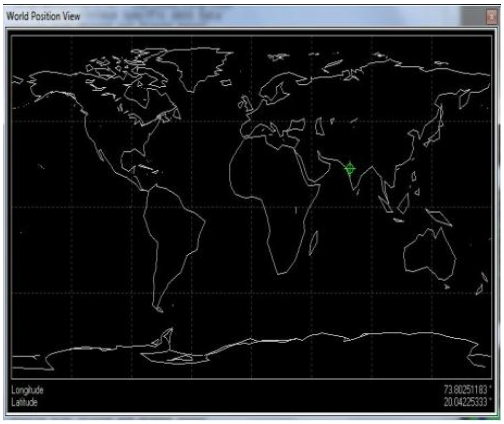

(d)

Fig.

a) Ground Track
b) Sky View
c) Chart View
d) World Position View

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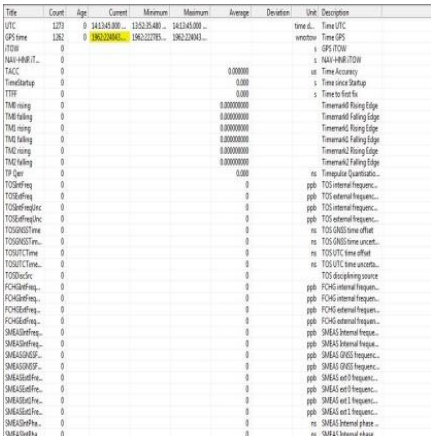
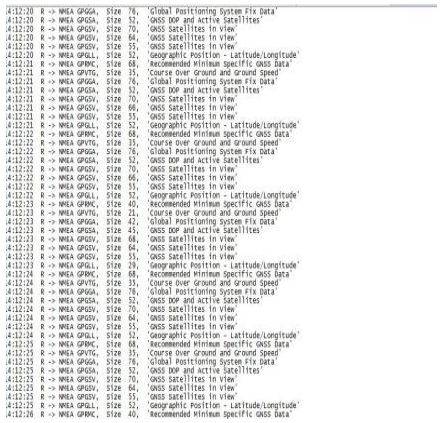


(a)

In statistical views calculated data by U-Center are display. The text console view displays the messages in textual form such as UBX-INF or NMEA messages. NMEA messages are shown with heading $Gxyyy, where x stands for the satellite system. The Text View lists out all incoming and outgoing messages, and provides message length and its type.



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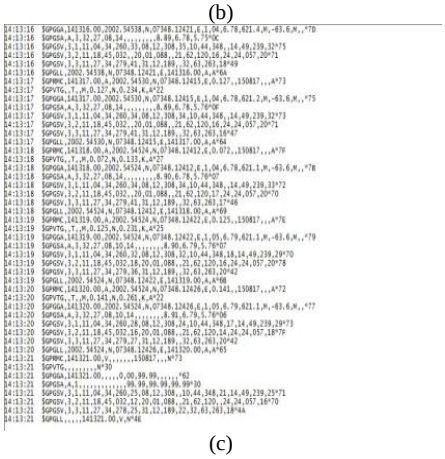

(c)

Fig.

a) Statistical Analysis
b) Text View
c) GPS Signal

CONCLUSION

By using this system all rescue services will get detail information about obstacle inside the collapse building, mines, earth quake, prone area constructions as well as this robot will be used to identify the choke up points inside heavy duty pipeline of water, gasoline and chemical plants. Due to the secure communication between robot and control units like computer, smart phone and special purpose remote controls, we can analyze proper data coming from robot mechanism.

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