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Land Survobot for Measuring Land Values and Soil Quality

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ABSTRACT

This paper is an effort that has been put to cater the needs of land survey. Here, a robot is developed to conduct land survey, specifically to calculate the area of a given land and to divide it into subplots. The process involves two parts- Survey Robot and area measurement module. The Survey Robot is controlled through the Bluetooth module to move about the entire plot. An android application has been developed to control the robot and its process through Bluetooth technology. The distance travelled by the Survey Robot is calculated by timer concept and this value is then transmitted to the android mobile. The second part involves the area measurement module designed using Embedded C allowing the user to efficiently determine the area which is to be estimated by the accelerometer for estimating the soil required to make flat surface. And also the robot is taking the sample for the soil testing and test itself for the suitable for building or not.

1. INTRODUCTION

Land measurement is a general terminology which is used to describe, in best possible manner, the theory and application of measurement of land. This also includes land conversion that can be known as the procedure by which land or property is measured. It is the process which explains how the land or property is converted from one unit to another. To put it in more specific terms how much of land is one acre and so on. Land surveying forms an integral part of this conversion. Survey Robot, also referred as SURVOBOT is being designed keeping in mind the complexities that are involved in present techniques of area measurement and land survey. In conventional survey operations, a primary requirement of the survey party is to determine distance between two points. The surveyor has many devices that are used to determine distance. These range from the 30-meter steel tape to electronic instruments. Distance measurement is a basic operation that every surveyor must be able to perform with the tools available. Some of the surveying methods and equipment used to measure area of land are described below

2. LITERATURE SURVEY

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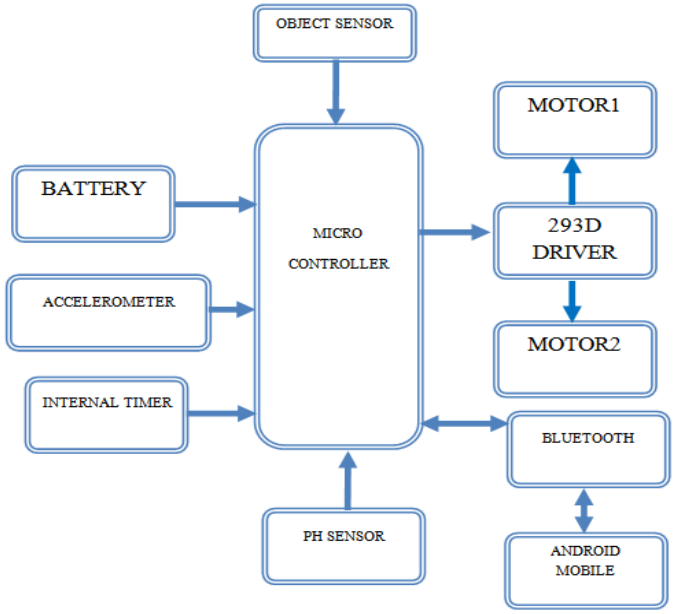
3. EXISTING SYSTEM

The present surveying technique used is EDM. The disadvantage of EDM is that it has heavy equipment that are to be carried and combined together every time for the set up. This set up takes a considerable amount of time. Also, if the plot is in terms of hectares, then carrying the entire equipment will become an issue. After the measurement of the sides, the obtained sides have to be transmitted to total station wherein the further calculations are done. So, for the measurement of sides, at least two people have to move on the plot continuously that increases the labour time. Here comes the need for Survey robot. To avoid the tiring procedure of area calculation that involves separate side measurement, carrying of the equipment and sending the obtained side to

total station. We incorporate Survey robot which combines all these features. In other words, it performs three most important tasks. Firstly, it can be freely moved about the plot when given a desired direction. Secondly, it obtains the length of any desired plot as it moves and transmits the length. This transmitted length is stored in the PC and then an area measurement module is used to find the area. Thirdly, if the user wishes to subdivide his entire plot then we just need to program the Survey robot appropriately and the subdivision of plot is done in a very less duration. Survey robot replaces the conventional techniques of area measurement and the complexities involved with it, by automating the entire process. The combination of a remote control helicopter with a 3-D mapping system has the potential for use in a variety of applications, and provides a platform for further research and development. Much previous works have been done with active sensing of 3-D structure from both aerial and ground vehicles. Banic, Sizorics and O'neal has flown scanning laser sensors aboard manned helicopters to map the ocean floor. Lockheed Martin is developing an airplane based mapping system which uses synthetic aperture radar to build digital elevation maps of very large regions. Ryan Miller and Omead Amidi developed a highly-accurate 3-D perception system which integrated the Carnegie Mellon University (CMU) autonomous helicopter and a scanning laser sensor . Sebastian Thrun, Mark Die land Dirk Hahnel applied a real-time laser scan matching algorithm to 2-D range data acquired by a remotely controlled helicopter to obtain urban and natural 3-D map. In this paper, a remote control helicopter associated with navigation sensors and other sensors is applied to topographic survey. The significance of the system lies in that it can substitute human efforts where human participation is dangerous, inefficient and/or impossible. The topographic survey described in this paper refers to capturing the three-dimensional information including longitude, latitude and altitude of the ground point and then depicting the accurate 3D structures of terrains. It is effective and useful for many applications. For example, archiving a historical structure or guiding cruise missiles and robotic ground vehicles, all of which need precise 3D information of their surroundings.

4. PROPOSED METHOD

4.1. BLOCK DIAGRAM



4.2. COMPONENTS USED

1. PIC16F877A Microcontroller Device.
2. Power supply module.
3. Accelerometer.
4. Sensors.
5. DC motor.
6. Bluetooth.

4.3. EXPLANATION

In brief, the control unit transmits the command through AOT at the transmitter side which is received by the AOT on the Survey robot. The Survey robot then performs appropriate tasks. The LCD displays the length covered. The buzzer and motor are used when subdivision of plots is performed. The geared DC motor is used to run the Survey robot. To control the motor and its speed, a L293D motor driver is used. Power supply unit can be a rechargeable battery of 12V or a 12Vadapter.

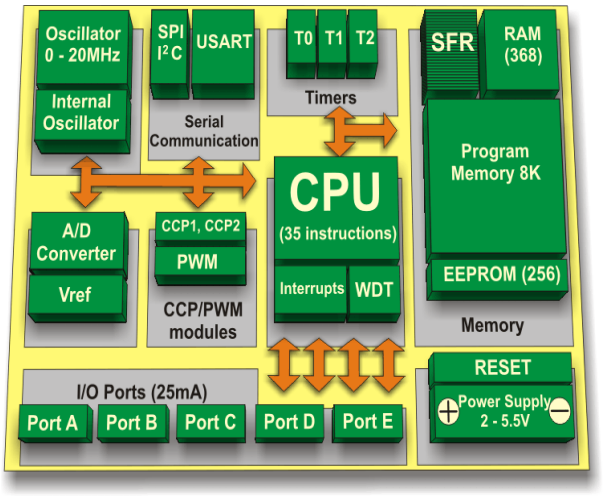
As seen in the figure, a Survey robot is a 2 wheeled robot which has an Omni-directional wheel attached to the front portion. The body material of the robot is made of ply wood which is of 12mm thickness, having dimensions of 15 x 5 inches. Here, the ply wood of such a dimension is used to neatly place the microcontroller which provides the control mechanism via AOT module for transmission and the various drivers used to drive their respective motors. Also it provides a suitable space to insert the marker used in subdivision of plot. We have a rectangular slot of dimension 3 x 1 inches which has been cut as shown in figure. This slot serves as an opening wherein we place a marker that will be later used when we have to divide the plot into subplot. In the front portion on the Survey robot, three holes are drilled, 1 inch from the side of the plywood, which are used to hold the Omni directional wheel using three screws. Here this Omni directional wheel is used to provide direction to the Survey robot, that is, it enables the robot to take turns at an easier pace. At the rear end, pair of clampers is connected at opposite sides. It is used to hold the chassis wheels and he DC motors onto the plywood. The geared DC motors is used to provide controlled motion for the Survey robot

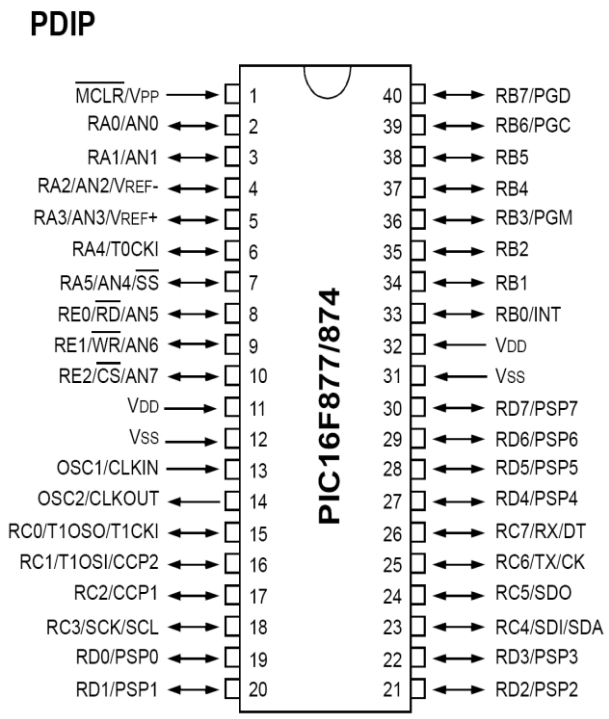
4.4. PIN DIAGRAM

As seen in Fig. 1-1 above, the most pins are multi-functional. For example, designator RA3/AN3/Vref+/C1IN+ for the fifth pin specifies the following functions:

1. RA3 Port A third digital input/output
2. AN3 Third analog input
3. Vref+ Positive voltage reference
4. C1IN+ Comparator C1positive input

This small trick is often used because it makes the microcontroller package more compact without affecting its functionality. These various pin functions cannot be used simultaneously, but can be changed at any point during operation.



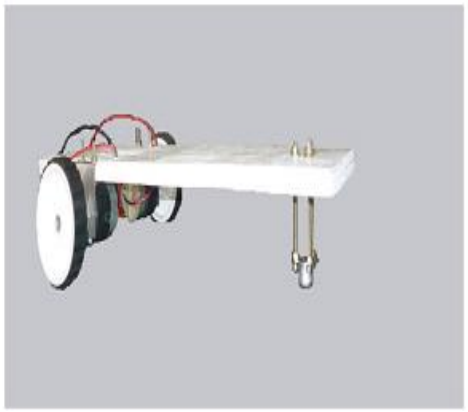


5. WAY OF COMMUNICATION

5.1. ANDROID

Android is now nearly eight years old and despite the green robot android peeking out of phone shops up and down the high street, there are still plenty of people who don't know what Android is. If you fit into this category then have no fear; this article is your complete guide to understanding what Android is, what it can do and where to find it, including the best Android mobile phones, Android apps, which games you can play on Android devices, the very best features you can enjoy and how to update to the latest version.

ROBOT MODEL



6. CONCLUSION

In this paper, we have demonstrated a capable robotic system for topographic survey by integrating the AOT equipment. There are two primary accomplishments in this work. One is that an robotic system with the purpose of terrain modelling is constructed . AOT based GUI interface. On the other hand, the major advantages of Survey robot is that manpower required and equipment used are less. The time consumed for area measurement is considerably less compared to the conventional technique and it has better accuracy making reprogramming easier. It is cost effective as well. Also, robots have now become a major part of today's technological advancements. Hence we have designed and implemented a robot that can solve this disadvantage of present surveying technique and reduce manual labour. Being a new concept, it has a great scope for improvement.

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