

AN AUTONOMOUS LAND SURVEYING VEHICLE USING MICROCONTROLLER 328.

Shikha.G.k, Vidyashree Patil, Keerti.R.K, Vaishnavi.S.K

Poojya Doddappa Appa college of Engineering, Kalburagi

ABSTRACT

The 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 mobile application to move about the entire plot. The distance travelled by the survey robot is calculated by the wheel rotation using the IR sensor and this value is then transmitted to the PC through IoT. The second part involves the area measurement module designed using Embedded C allowing the user to efficiently determine the area of the plot.

KEYWORDS: IR sensor, Microcontroller328, IoT.

INTRODUCTION

Land measurement is a general terminology which is used to describe, in best possible manner, the theory and application of measurement of land [1]. 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 [2]. 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 [3]. 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 [4]. Some of the surveying methods and equipments used to measure area of land are described below:

- Horizontal Taping - Horizontal taping is used in conventional surveys. In this method, all measurements are made with the tape held horizontally. Measure the horizontal distance between the rear station and the forward station.
- EDM - Survey sections equipped with the EDM (Electronic Distance Measurement) can measure distances in minimum time. The EDM is a compact, lightweight, economical, and simple-to-operate instrument that is especially suitable for short- and medium-range survey operations.

RELATED WORK:

[1] Ryan Miller, Omead Amidi, "3-D Site Mapping with the CMU Autonomous Helicopter", Proceedings of 5th International Conference on Intelligent Autonomous Systems. (IAS-5) June 1998.

. 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.

[2] Rong-Jyue Wang, Jun-Wei Zhang, Jia-Ming Xu and Hsin-Yu-Liu, "The Multiple-Function Intelligent Robotic Arms", in Proc.IEEE International conference on fuzzy system, FUZZ-IEEE, Jeju island, pp. 1995-2000, August 2009, ISSN:1098-7584.

The multiple-functional robotic arms were designed and produced meets the six appointed show functions, which in turn highlights their stability, accuracy, and high level of performance according to actual operation. It also demonstrates its application for amusement, educational, and industrial needs; finally, the production cost of this robotic arm is low and the flexibility of use is high.

[3] H.Uehara, H.Higa and T.Soken: "A Mobile Robotic Arm for People with Severe Disabilities", in proc.3rd IEEE international conference on Biomedical robotics and Biomechatronics (BIOROB), RAS and EMBS, Tokyo, pp.126-129, September 2010, ISSN: 2155-1774.

Design of a mobile robotic arm for people with severe disabilities is implemented. This system is composed of a robotic arm, microcontroller, and its controller. The main body of the robotic arm can be contained in a briefcase to carry a laptop computer. Its weight is 5 kg, including two 12-V lead acid rechargeable batteries. This robotic arm can be also mounted on a wheelchair. To verify the performance of the mobile robotic arm system, some tasks, such as drinking tea task and eating task were experimentally performed by an able-bodied subject.

[4] S.Karamchandani, S. Sinari, A.Aurora and D.Ruparel, "The Gesture Replicating Robotic Arm", International symposium computational and business intelligence (ISCBI), New Delhi, pp.15-19, August 2013.

The Gesture Replicating Robotic arm is a servo-controlled robotic arm which replicates gestures in a three dimensional environment. It makes use of cameras which detect the motion of one's hand in three dimensions. The cameras provide frames as input to the software which performs segmentation algorithms like background subtraction, colour detection and contour detection. Pixel to angle mapping gives the appropriate commands to the respective servo motors. Thus, replication of the human hand movements is done. Such lifelike robotic arms can be tele-operated to protect human workers in hazardous environments, such as on assembly lines, in space, undersea, and amid nuclear radiation.

[5] Feroz Morab, "Land survey by robot", International Journal of Advanced Research in Engineering and Technology (IJARET), ISSN 0976 – 6480(Print), ISSN 0976 – 6499(Online) Volume 5, Issue 9, September (2014), pp. 41-51 © IAEME.

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 Robot is controlled through the ZigBee module to move about the entire plot. The distance travelled by the Survey Robot is calculated by timer concept and this value is then transmitted to the PC. If the plot is in terms of hectares, then carrying the entire equipment will become an issue.

PROPOSED BLOCK DIAGRAM

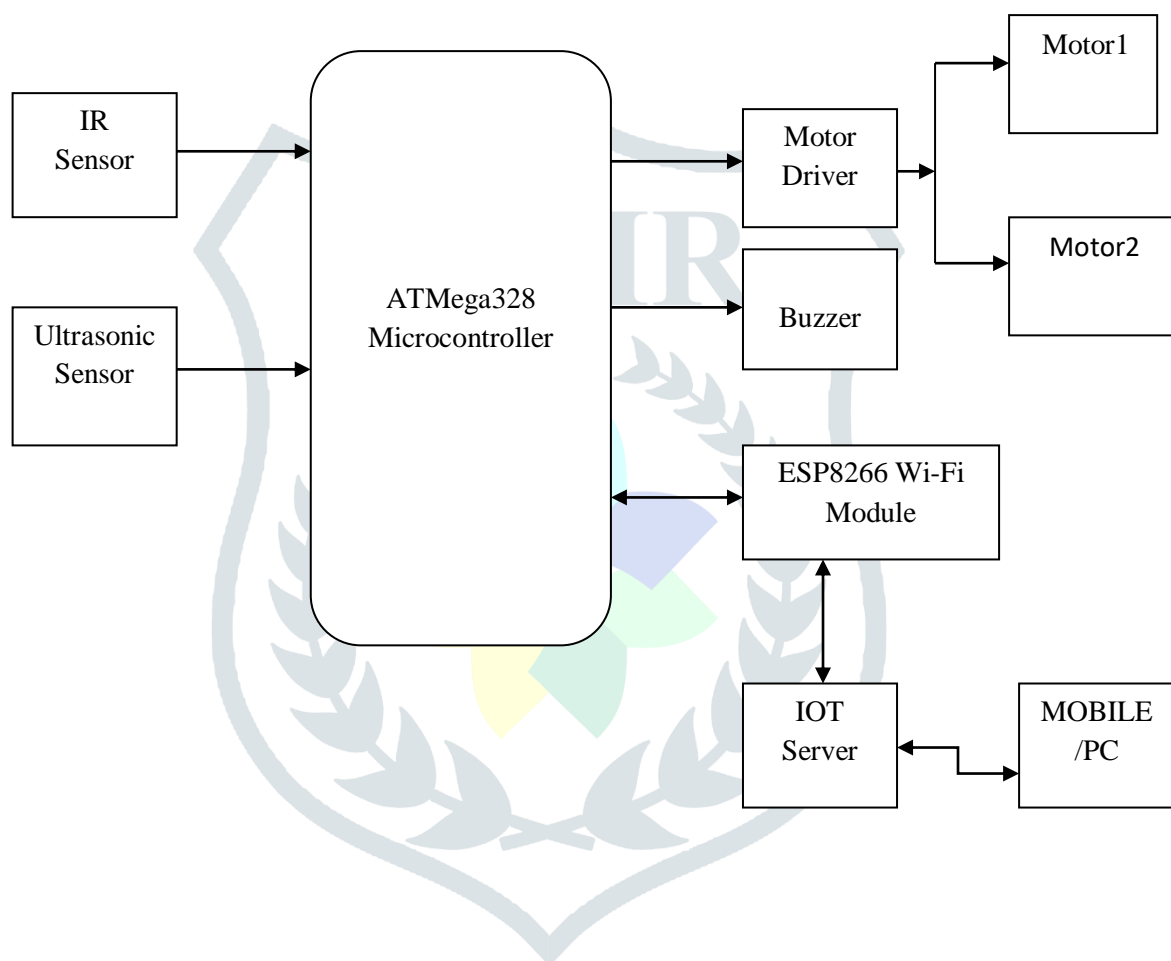


FIG 1: BLOCK DIAGRAM OF THE SYSTEM

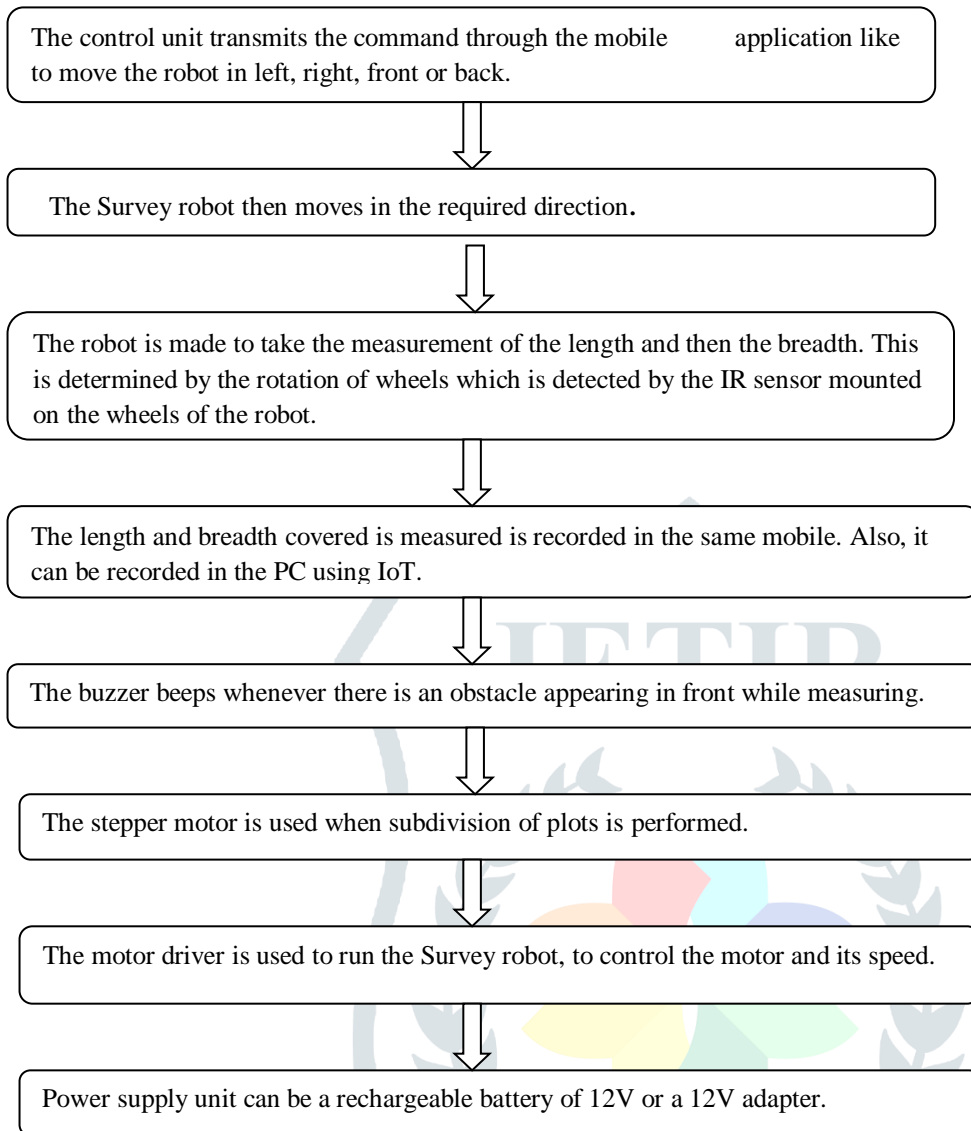
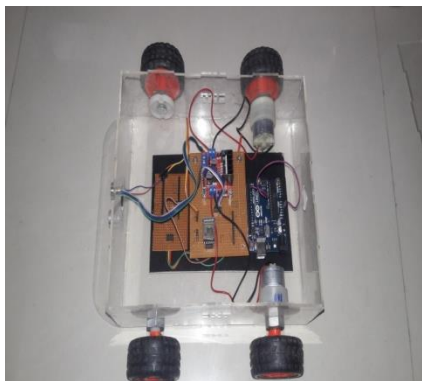
FLOWCHART :**SNAPSHOTS OF THE ROBOT**

FIG 2: TOP VIEW OF THE SYSTEM



FIG 3: SIDE VIEW OF THE SYSTEM

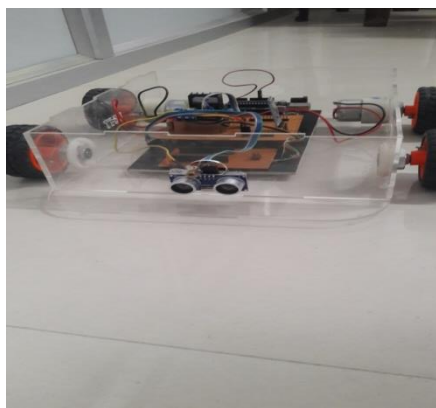


FIG 4: FRONT VIEW OF THE SYSTEM

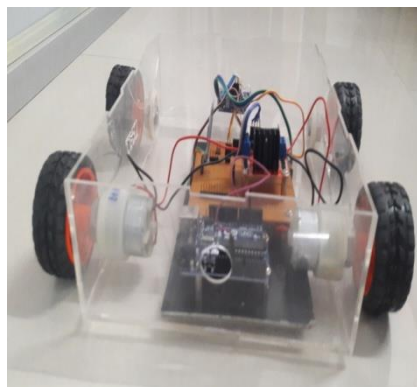


FIG 5: BACK VIEW OF THE SYSTEM

ADVANTAGES

- Manpower required and equipments used are less.
- The time consumed for area measurement is considerably less compared to the conventional technique.
- It has better accuracy making reprogramming easier and cost effective.

DISADVANTAGES

- For remote operation internet should be available.
- Electrical malfunctions could happen, especially in weather conditions.

APPLICATIONS

- Commercial, Agriculture land survey.
- Found in auto, medical, manufacturing and space industries, health care, disaster management, manufacturing.
- Military applications: Targeting energy, saving human life from risk.

CONCLUSION

Since time immemorial, for measuring the area of regular size plot or any other plot, more manpower is required, because, there are various tools that are involved in this process such as measuring tape, rulers etc. So at least a minimum of two people have to stand end-to-end to measure each side of the plot. This measured value is then recorded by a third person who does the required conversion. And then the area of that particular plot is obtained. Hence the present surveying or area measurement techniques are tedious and tiring. On the other hand, the major advantages of Survey robot is that manpower required and equipments 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 the designed and implemented a robot that can solve this problem of present surveying technique and reduce manual labor.

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