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Lobot: Low-Cost Robotic Vehicle

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Abstract— The objective of this paper is to implement and propose LOBOT, a low-cost, self-contained localization system for small-sized ground robotic vehicle. LOBOT does not require external reference facilities, expensive hardware, careful tuning or calibration and is capable of operating under various indoor and outdoor environments. It identifies the local relative movement through various inexpensive sensors and a correct location by GPS technology. The controlling becomes easy with wireless technology like Bluetooth and RFID. By graphical user interface is easy to find out various parameter and graph of some parameter. LOBOT keeps the positioning error well under an accepted threshold

Keywords— Localization, robot, sensor, GPS, RFID, Bluetooth

I. INTRODUCTION

Small sized ground robotic vehicles have great potential to be deployed in situations that are either uncomfortable for humans or simply too tedious. For example, a robot may become part of industrial operations, or become part of a senior citizen's life, or become a tour guide for an exhibition centre. The robot is kept as small as possible to allow access through narrow passageways such as a tunnel [1][2]. To fulfil these missions, the robotic vehicle often has to obtain its accurate localization in real time. Considering the difficulty or impossibility in frequent calibration or the management of external facilities, it is desirable to have a self-contained positioning system for the robot: ideally, the localization system should be completely integrated onto the robot instead of requiring external facilities to obtain the position; the system should work indoors and outdoors without any human involvement such as manual calibration or management. Meanwhile, the cost is expected to be as low as possible. To resolve the problems we propose the LOBOT [3].

II. LITERATURE REVIEW

The first industrial modern robot was the unimates developed by George Devol and Joe Engelberger in the late 50's and early 60's. Engelberger formed unimation and was first to market robot and has been called the father of robotics. Modern industrial arm has increased in capability and performance through controller and language development, improved mechanisms, sensing, and drive systems. In the early to mid 80's the robot industry grew very fast.

Mine Rover- It was developed in 2005 abandoned mines-remnants of old west mining booms –closely guard their secrets in the forgotten corners of Arizona's backcountry. "What's inside? What's concealed just around that bend in the tunnel?" are the inevitable questions those hikers and others ask when they stumble across these slumbering relics. Those can be dangerous questions. Crumbling walls and ceilings that threaten to collapse at the slightest touch; hidden vertical shafts; poisonous gases; wildlife lurking inside are just some of the dangers that prevent the non suicidal from exploring. Still the question remains: what's inside? They've built an 18 inch long, radio controlled rover to do the looking for them .it's equipped with a power full search light to explore the mines dark recesses and a pan and tilt video camera to send images back to their laptop computer. Jessica Dooley and Keith Brock made the ground rover to tour a mine [4].

Vision-based mobile Robot learning and Navigation- It was developed in 2005. This research develops a vision-based learning mechanism for semi-autonomous mobile robot navigation. Laser-based localization, vision-based object detection and recognition, and route-based navigation techniques for a mobile robot have been integrated. Initially, the robot can localize itself in an indoor environment with its laser range finder. Then, a user can teleoperate the robot and point the objects of interest via a graphical user interface. In addition, the robot can automatically detect potential objects of interest. The objects are automatically recognized by the object recognition system using Neural Networks. If the robot cannot recognize an object, it asks the user to identify it. The user can ask the robot to navigate back autonomously to an object recognized or identified before. The human and robot can interact vocally via an integrated speech recognition and synthesis software component. The completed system has been successfully tested on a Pioneer 3-AT mobile robot [5].

Search and Rescue Robot- This was developed in 2006 the centre for robot assisted search and rescue has developed a search and rescue robot which can be controlled for rescue operations. it edges forward ,climbs over a mound of debris ,then stops. Suddenly the rubber threads shifts from horizontal to vertical, raising the lens into a better vantage point to transmit images .it seems to have a mind of its own, even though every move is guided by a man 10 yards away with a remote control and laptop.

Hazardous Gas detecting method applied in coal mine detection robot- This was developed in 2011. As one of the largest coal production and consumption countries in the world, China is also one of the related accidents occurred frequently countries such as gas explosion, flood, breaking out of fire during the exploitation of coal mine. Coal Mine Detection Robot can be substituted or partial substituted for emergency workers to enter the mine shaft disaster site and detect hazardous gas and do some environmental exploration and surveying task. Coal Mine Detection Robot uses infra-red spectrum absorption way to detect methane, carbon monoxide and such gas simultaneously. The principle of gas survey meter of infra-red spectrum is according to the selectively absorption of infrared radiation by the mash gas, CO to achieve the detection of their concentration. The advantages of this kind of hazardous gas detecting are: simultaneously and rapidly detecting methane, CO and high sensitivity, good selectivity and fast response. Otherwise, it is easy to be taken by robot due to its simple and light structure, have a lager detection range and probe is not easy failure to be poisoning and aging [6].

The remote control of mobile robot based on embedded technology- This was developed in 2011 Along with the development of society, the remote control of mobile robot has broad prospect of application. With the continuous development of embedded system, the system provides excellent hardware platform for embedded mobile robot. With embedded WinCE5.0 operating system, This paper put forward a kind of remote control method of mobile robots. The experiments had proved then embedded mobile robot has low power consumption and strong real-time control. It also had proved the validity of this method [7].

III. IMPLEMENTATION

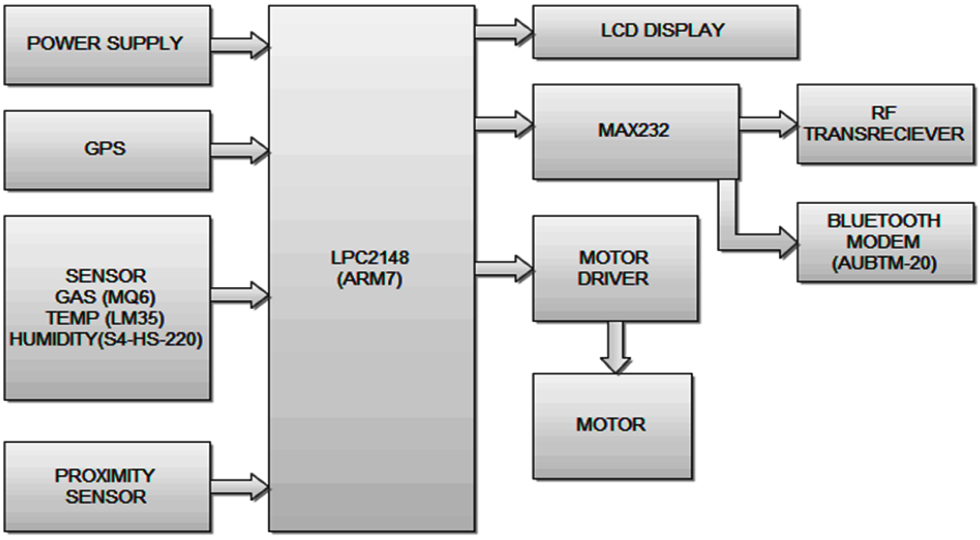

Fig.1. Block diagram

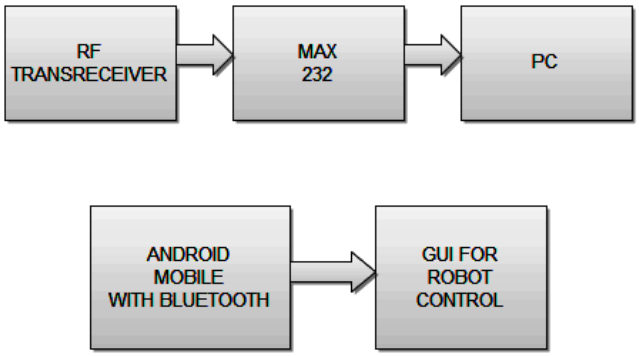

Fig.2. Control Section

The Design of LOBOT-- LOBOT localizes a robotic vehicle with a hybrid approach consisting of absolute positioning through a GPS receiver and sensors. All the different sensors such as Gas sensor MQ6, Temperature sensor LM35, Humidity sensor S4-HS-220, Proximity sensor are installed on the robotic vehicle. The proximity sensor is to detect the nearer object to the robot and Thus infer the travel distance of the robot. An embedded microcontroller LPC2148 ARM7 inside the robot vehicle takes central control of these sensors and also is responsible for computing the current absolute position. LOBOT uses GPS to obtain an absolute position and utilizes the sensors to measures local relative movement since the last known absolute position through GPS. As a matter of fact, even if GPS is available, LOBOT may still only uses the local relative component over a short time period instead of GPS because GPS is known to have error. The infrequent use of GPS saves electric power. RFID and Bluetooth module are used for wireless communication. Due to RFID we can sent the details of robot to personal computer and can be controlled accordingly and by Bluetooth we can

get details to are android mobile with SPP application and controlled through it. For exceeding level of set point there is the use of alarm. Graphic user interface GUI is used for displaying all parameters and graphs. And for GPS side by side Google maps can be shown for location. All data base can be seen which include parameters like date, time, and various readings. Range of RF is 30m and 2.4GHz. And Bluetooth range is 10-15m with 2.5GHz. GPS is ranging from 30-50m.

IV. RESULT

A software system in visual basic was developed to interact with the robot via a GUI. After localising itself, the robot continues to explore the environment. The user can watch the position of robot on the GUI or by Google map. Due to the parameters reading and graph we can get the information of the sensors rating. Due to the LOBOT's self-contained nature it can operate in indoor and outdoor environment. Due to its inexpensive set of sensors the LOBOT is cost effective and low cost.

V. CONCLUSIONS

We propose LOBOT a low-cost, self-contained, accurate localization system for small-sized ground robotic vehicle. it localizes a robotic vehicle with a hybrid approach consisting of infrequent absolute positioning through a GPS. by Bluetooth and RF transceiver it becomes easy for communication and controlling the robot. We can use Wi-Fi and implement LOBOT in future.

REFERENCES

[1] N. Petrellis, N. Konofaos, G. Alexiou, "Target Localization Utilizing the success Rate in Infrared Pattern Recognition," *IEEE Sensor*, Vol. 6, no. 5, pp. 1355-1364, Oct. 2006.

[2] J. Liu, Y. Zhang, and F. Zhao, "Robust Distributed Node Localization with Error Management." *Proc. ACM* pp. 250-261, 2006.

[3] B. Liu, M. Adams, and J. Ibanez-Guzman, "Minima Controlled Recursive Averaging Noise Reduction for Multi-Aided Inertial Navigation of Ground Vehicles," *Pro. IEEE/RSJ Int'l Conf. Intelligent Robots and Systems (IROS'05),* pp. 3408-3414, Aug. 2005.

[4] Arizona Engineer, Vol. 28, no. 1, Spring 2005 http://www.sptimes.com/Floridian.html .

[5] Arati Gopalakrishnan, Sheldon Greene, "Vision-based mobile Robot Learning and Navigation", *IEEE International Workshop on Robot & Human interactive Communication,* 2005.

[6] N. Zhigang, W. Lu , "Hazardous Gas Detecting method applied in coal mines detection Robot", *3rd IEEE International Conference on Measuring Technology & Mechatronics as Automation*, 2011.

[7] D. Chengiun, Y. Bingsen, D. Ping, "The Remote Control of Mobile Robot based on Embedded Technology", *IEEE 3rd Conference on Measuring Technology & Mechatronics as Automation,* 2011.

