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Human Following Robot using Arduino

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ABSTRACT: Human following robot using Arduino, motors and different types of sensors to achieve its goal. An open-source hardware and software electronics platform is called Arduino. Arduino boards are able to read inputs like light on sensor, finger on a button, or Twitter message and turn it into an output like activating a motor, turning on LED, publishing something online. The car system that follows humans can move and adjust its location in relation to the subject in order to avoid obstacles and maintain a safe distance on its track. The principle of this work is based on the Human Following Robot, which detects the object moving in front of it, which will get sense from both sensors. That are IR sensor and Ultrasonic Sensor. It also uses gear motor where high torque is needed for robotics. This model uses live signals from Ultrasonic and IR sensors to detect motion of the object. The human following robots can follow a person autonomously and individually making them useful in various multiple scenarios like crowded places, navigation support, etc., This robot possesses ultrasonic sensors which is used for the determination of distance measurements within certain radius. It can also detect facial recognition. So, it is easy to follow an individual.

KEYWORDS: Arduino, sensors, object, motors.

I.INTRODUCTION

Robot is a programmable, automation device that replace human intervention from basic daily activities to activities that people think it cannot be alternated like consultant or any field related to art. There are several robots that can support various facets of human existence. Among those machine assistant, a robot that can detect and follow humans or obstacles within a certain range is known as a 'Human Following Robot. a human being Robots can coexist with people and improve their quality of life. This robot poses as a delivery person who makes regular deliveries to establishments including restaurants, hospitals, and shopping centre. The robot can easily transcend human limitations to achieve the goal more quickly and efficiently when it comes to tasks requiring higher strength and speed. For example, in military field, the weight of lug-gage and the harshness of topography types will definitely be a huge disadvantage for human. Thanks to this innovation, human intervention will reduce and be even more productive despite enormous difficulties appeared before.

Robotic technology has been increasing now a days. The development of this robot technology has increased significantly due to industrial, medical, and military applications. This technologies are also used in various fields such as underground mining, war zones, medical, construction and space exploration etc., The main requirements of this robots is to detect humans and also interacts with min non technological ways.

II. RELATED WORKS

A. MARVIN

Researchers at the University Kaiserslautern, Germany has developed a robot and gave it the name MARVIN. The robot main functionality is to detect and follow someone. It uses a technique called Sequential Reduced Support Vector Machine (SRSVM). The sensor used is SICK S3000 laser scanner- placed at its front side and a LMS200 scanner on its rear side which is used for obstacle avoidance allowing it with the same time to map its surroundings autonomously, the laser scanner is able to detect specifically the human leg. This made it possible for MARVIN to track the human using the leg detection. Fig.2 shows the robot MARVIN.

Fig.2. Marvin

B. Human Detection and Following Mobile Robot

A researcher from Pakistan's University of Sciences and Technology has created a mobile robot that can detect and follow people. It detects humans by using the 3D features allowing it to follow them. The Cam Shift theory is the tracking technique employed for this robot. The sensors used are stereo camera and laser range finder. Fig.3 show the human detection and following mobile robot. For this project, a decentralized top-down strategy is employed. The project is divided into five modules; each module is independent from one another. Step by step, various phases were completed, commencing with from basic sensor testing and proceeding towards obstacle avoidance, object detection, object tracking and data transmission.

Fig.3. HDFM Robot

III.EXISTING METHOD

Detecting people is one of the most important challenges for many applications where human-interaction is involved. People detection is the process of finding people in the robot's environment. The person can-found using data from multiple sensors. The existing system of a human-following robot utilizing Arduino is a technology that employs a combination of sensors and microcontrollers to enable a robot to autonomously track and follow a human target. The system typically comprises components such as ultrasonic or infrared sensors to detect obstacles and the presence of a human, servo motors for directional control, and an Arduino microcontroller for processing sensor data and controlling the robot's movements. This technology finds applications in fields like surveillance, entertainment, and healthcare , where the robot can assist or follow a person while maintaining a safe distance. Various iterations and enhancements of this system continue to advance its capabilities and reliability.

IV.PROPOSED SYSTEM

In this project, hardware was defined in advance and camera must be used. People detection as redefined as process of finding people in an image obtained from a camera. The proposed system for a human-following robot using Arduino is designed to create an autonomous and user-friendly robot that can navigate and track a human operator. The system utilizes various sensors, such as ultrasonic, infrared, or camera modules, to detect and track the human's movements. Arduino microcontrollers serve as the brains of the robot, processing sensor data and controlling the robot's motors or wheels to maintain a safe distance from the user. The robot's mobility and direction are adjusted in real-time, ensuring that it follows the human operator as they move. This technology can find applications in scenarios like personal assistance, security, or even as a mobile camera platform.

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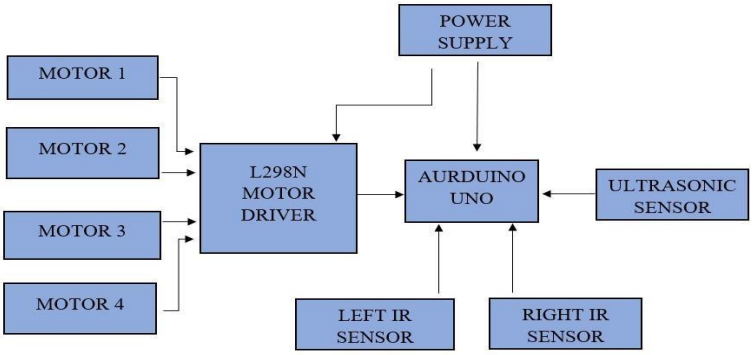
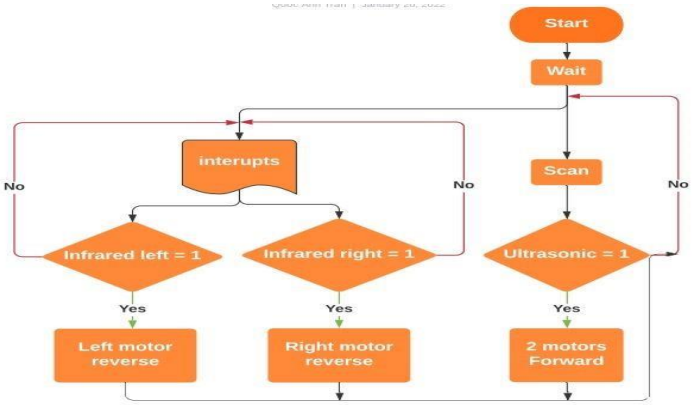
V.BLOCK DIAGRAM

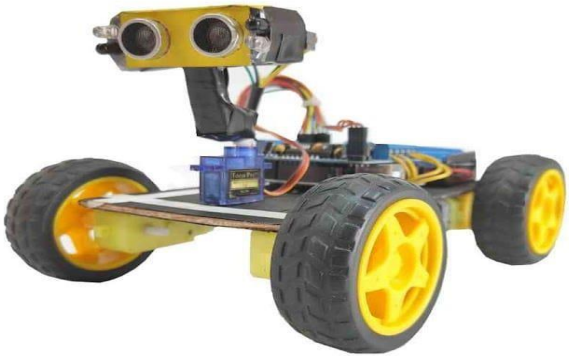


FLOW CHART



VI. EXPERIMENTAL RESULTS

The performance of the human following robot was tested in a variety of studies.Test was performed on the ultrasonic and infrared sensor. Then, the test was performed to check whether the robot maintains a specific distance with the target object.Then, check the serial communication between Arduino, motor shield and the various motors used in robots. On the basis of results obtained from these tests andexperiments, we made the necessary changes in the processing and control algorithm.



VII. FUTURE SCOPE

Robots have already become commonplace in many aspects of daily life. As Engineers and Scientists continue to develop and advance robotics, and the capabilities of the robotics technology will increase. In future, the growth of robotics will increase and used in various sectors including personal assistance, teachers, surgeons, entertainment and so on…

The ultrasonic situating framework utilized in the execution of an individual following portable robot is a stable framework kept on the robot. The robot may neglect to follow the target if the objective individual deliberately moves out of this reach. What is more, while the robot is carrying out impediment aversion, the expansion in the bearing because of the rotating of the robot could be an issue. It is worth noting that the robot will wander around in the weather until it finds the objective sign again. A functioning ultrasonic situating framework might be an answer for this issue. The ultrasonic situating framework can keep up the view to the objective individual and keep following the sign in any event, when the robot is finishing a turn. Another technique to determine this issue is to incorporate an assessment model of the objective individual's movement in the calculation. One of the applications is the Kalman channel. Particularly when the objective individual goes out of the ultrasonic sensor cone, this system gives more precise data to the robot, so the robot can distinguish the objective sign again in a generally more limited time stretch. Thus, the general capacity of an individual following portable robot can be made to work in a more adaptable way. The ultrasonic situating framework and the sonar sensor framework both utilize acoustic standards. Subsequently, the strength of the global positioning framework in a climate with soundlevel clamours can be inspected later on work. This research has a variety of interesting applications in several fields, especially military and medical. A wireless communication capability can be added to the robot to increase its versatility and allow it to be controlled from afar. A robot with this functionality might also be exploited for military purposes. We can also add some modifications to the algorithm and structure to make it suitable for a different application. It can correspondingly benefit the general people in shopping centres. Consequently, it may be used as a luggage carrier, eliminating the need to lift or draw the weights Correspondingly, this prototype might be modified in a variety of ways to suit a variety of purposes.

VIII. CONCLUSION

This study provides an example of a human following robot prototype that has been successfully implemented. This robot not only has the ability to identify things, but it also has the next capability. This robot not only has the ability to identify things, but it also has the next capability. While making this prototype it was also kept in mind that the functioning of the robot should be as efficient as possible. To identify the algorithm's errors and fix them, tests were run under various scenarios. The different sensors that were integrated with the robot provided an additional advantage. The human following robot is a vehicle system with the ability to detect obstacles, move, and adjust the robot's location with respect to the subject in order to stay on course. To accomplish its objective, this project makes use of motors, Arduino, and many kinds of sensors. This project challenged all the separate parts to cooperate with each other, communicate, and expand understanding of electronics, mechanical systems, and their integration with programming. The significant point of this framework was to plan and develop a devotee automated truck utilizing ultrasonic sensor which can follow the objective individual in unstructured conditions. The devotee automated truck is accomplished utilizing ultrasonic sensor, engine drivers and microcontroller. The framework gives another approach in the field of advanced mechanics. This truck would be useful in lessening work while playing out certain assignment. The follower automated truck has a better degree sooner rather than later.

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