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Analysis on Line Follower Object Detecting Robot

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ABSTRACT--*Line following robot detects a visible line on a smooth area embedded on the ground and follows it. the trail line is predefined and visual with a black line on the white area or the other . A line follower robot is designed to develop and implement on a path of black on white or white on black using IR sensor and ultrasonic for object detector. The Arduino coding is developed by using C programming. The proposed system are often implemented on a schools, appartments, industries, hospitals for security purpose.*

Keywords*-- line follower,ir sensor, ultrasonic sensor, object detector,arduino.*

I. INTRODUCTION

The line following robot is that the self-operating intelligent machine that follows a drawn line on a floor area and therefore the path line are often visible as black on a white area ; or a reference point on the black surface area. it's an autonomous robot which identify and tracks either on a black line in white area or a reference point in black area . Line following robot must be ready to detect a specified line and maintain track thereon and do the assign jobs. For performing job, the given path line must be followed by the designed and developed robot for special situations. The developed system composed of input, process and output parts. First read the black/white or white/black path on considered floor and take input for transmission into microcontroller (Arduino UNO) during a process which will be asked and made the choices . Microcontroller decided supported the received inputs which will change (if needed) to be made directions or speeds of the robot. It converts the result to any directions which may be sent to the road follower speed. The system sends the primary or previous adjusted control signals to hurry and directions of line follower robot[1].

To design a line follower an ultrasonic sensor is required , which may be a device which will measure distance to an object by using sound waves. It computes the space between the thing and therefore the line follower by sending a acoustic wave at a selected frequency and listening for that acoustic wave to recover . it's important to know that some objects won't be detect by ultrasonic sensor. this will be applied for military purposes, delivery services, transportation systems, blind

assistive applications. Finally, there are many annual line follower robot’s competitions organized by universities or industries round the world[2].

LITERATURE REVIEW

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Fatima R. Ali ; Abdulmuttalib T. Rashid et. al.,describes static and dynamic methods for objects store gadget the usage of the road follower robotic. The static way the robot actions on static lines to reach to any store vicinity even as the dynamic manner that the organized of the following traces is changed in keeping with the location of the storage box. The static gadgets store gadget is represented through the Digital differential algorithm DDA and the dynamic objects store gadget is represented via the Bezier curve set of rules. In both environments the recommend store gadget consists of several bins that organized in several columns[3].

Mehran Pakdaman ; M. Mehdi Sanaatiyan et al.,describesthe line follower robotic is a mobile machine which could stumble on and follow the line drawn on the floor. Generally, the path is fixed and may be either seen like a black line on a white surface with a high contrasted coloration or it can be invisible like a magnetic filed. Definitely, this robot detects the line with its infrared ray (IR) sensors that installed underneath the robotic. After that, the records is transmitted to the processor by using precise transition buses. Hence, the processor is going to determine the proper commends after which it sends them to the driver and consequently the course can be accompanied via the line follower robotic[4].

Mustafa BurakDılaver ; ErkanUslu et al.,

RoboCup is the most prestigious robotics contest within the world, with increasing popularity among robotic groups and new contests. In this study, layout and implementation of a line follower robot for outside categories which have been recently introduced to RoboCup Search and Rescue League is emphasized. In this category, a 100m long coloured rope is located in a area whose floor is fabricated from sand, concrete and laminate and the competing robots are ranked in keeping with the maximum trajectory distance that they cowl in 20 minutes. The tune is product of right and acute angle components for the robot which is anticipated to observe the line[5] .

Mehran Pakdaman ; M. Mehdi Sanaatiyan ;describes the Line follower robotic is a mobile device which could detect and follow the line drawn on the floor. Generally, the course is predefined and may be either visible like a black line on a white floor with a excessive contrasted shade or it could be invisible like a magnetic field. Therefore, this form of Robot must sense the line with its Infrared Ray (IR) sensors that installed underneath the robot. After that, the data is transmitted to the processor with the aid of particular transition buses. Hence, the processor goes to decide the proper instructions after which it sends them to the motive force and for that reason the route can be followed via the road follower robot[6].

PrajoonaValsalan ; Priyanka Surendran et a.l., describesOne of the most available robots in packages are the road followers. These robots usually observe either white or a black line.The robotic movements on a particular path determined by way of the consumer and detects the impediment that is available in its way. The automobile robotic stops and diverts its path and returns returned to original path, as soon as the impediment has been overcome. Whenever the robotreceives lost from thetrack, the robotic routinely calls to the saved number the usage of a GSM module, to signify emergency. The robotic is achieved through the implementation of many sensors interacting with the controllers. An experimental take a look at of time taken with the aid of the robotic for distinctive length impediment as well as for exceptional speed of the robot is also performedControl for balancing line follower robot using discrete**[7].**

EkoHenfriBinugroho ; Derry Pratama et al., explained thatrobotics has been extensively utilized in training as a learning tool to attract and encourage college students in performing laboratory experiments within the context of mechatronics, electronics, microcomputer, and manipulate. In this paper we propose an implementation of

cascaded PID manipulate algorithm for line follower balancing robotic. The set of rules is implemented on ADROIT V1 training robot kits. The robotic must be capable of comply with the trajectory given by way of the circular guideline while keeping its stability condition. The controller also designed to manipulate the velocity of robotic motion even as tracking the line. To reap this purpose, there are 3 controllers that is utilized in the equal time; balancing controller, speed controller and the road following controller. Those 3 controllers are cascaded to manipulate the movement of the robotic that makes use of two vehicles as its actuator. From the experiment, the proposed cascaded PID controller shows an acceptable overall performance for the robotic to maintain its balance position while following the circular line with the given pace setpoint[8].

PushkarGoel ; Geetika Arora ; V.K. Panchal et al., describes that path making plans is one among the maximum emerging problems for robot mobility in dynamic environment. In real time, the predefined direction for robotic might also change due to actual time problems like landslides, floods etc. therefore causing limitations in route. So an most advantageous technique is needed to reroute the route in case of above cited scenarios. In this paper an strive has been made to clear up this problem using the changed Ant Colony Optimization which has a unique addition of PERCEPTION RADIUS feature. ACO is a Swarm based totally optimization approach and an effort has been made to analyze its application in dynamic rerouting of a line-follower. This won't offer the shortest direction from supply to destination; rather it provides the high-quality optimum and to be had path in contemporary state of affairs of boundaries[9].

GadhviSonal ; PunitRaninga ; Hardik Patel et al.,describes layout and implementation of RGB color line following robotic. The robotic can differentiate amongst this 3 colorings and in step with given instruction it's going to follow the three different color lane. not like any other simple line follower robot having the potential to locate the presence of impediment on its path. The color sensor gadget is built in using colored LED and LDR as foremost component. The robot is able to following very congested curves as it receives the continuous information from the sensors. This robotic avoids collision and moreover it can stumble on collision with impediment sensor[10].

Yunha Lee ; Ui-Suk Suh ; Won-Sang Ra et al., explains this paper addresses the chief-follower formation control problem for multi-robotic without communique links. In order to correctly deal with the inherent nonlinearity of the hassle itself, the relative movement among the leader and the follower is modelled as a linear state-space equation in line-of-sight (LOS) frame. Provided that the relative kinematic statistics in LOS frame is measured through our gimballed seeker set up on the follower robot, the coordination problem is resolved with the aid of making use of the linear quadratic servo control theory for the derived relative motion model. The proposed approach might be an attractive preference because it does no longer require an high-priced sensors or communication links. Simulation results show that our method provides higher overall performance than the existing nonlinear formation controllers especially within the presence of un-modelled wheel actuator dynamics of the robot[11].

EbrahimAldousari et al., explains that

Robotics industry is unexpectedly growing, and it has grown spectacularly within the beyond century. a group of students designed and built a robotic that is capable of executing to three exclusive gestures. The crew in the end designed and constructed a robotic miniature car that has the potential to stumble on obstacles on its way, and is capable of following a black line path, along side different sound and mild sensitive gestures. The robot was

accrued and gathered using a robotic additives kit, and the designed robot vehicle become constructed the usage of low budget mechanical tools and equipment. Mainly, two servomotors were used along with other mechanical additives and an Arduino control board. The robot changed into programmed the use of Arduino open-source software program and it changed into intended to make the robotic do the different gestures. The testing technique for the robot car turned into successful as the crew hypothesized; the robotic became able to efficaciously operate as programmed and performed all of the supposed gestures[12].

S. Watanabe ; M. Yoneyama et al., describes

An ultrasonic visual sensor the usage of a neural network is proposed and stepped forward by way of decreasing both the dimensions of the neural community and the number of coaching samples. A 3-D image calculated through acoustic imaging is converted into function and rotation invariant values, after which reorganized by using a multilayered neural network. Many classes of metal or glass objects can without problems be categorised with this system, even when they are placed at unknown positions or rotation angles[13].

Akshaya U Kulkarni ; Amit M Potdar ; Suresh Hegde et al.,explainsObject detection, recognition, position, motion speed, etc. is straightforward while the item is close to or without difficulty visible. But, the same doesn't stand true in particular while the object is some distance or not visible due to so many elements like climate conditions, day/night time cycle, etc. Therefore, Radio Detection And Ranging (RADAR) become invented, which makes use of radio waves to determine the range, angle, or velocity of objects. But, it makes use of long time to detect, has quick detection range, now not goal specific due to extensive range, oversensitive, costly, etc. A cheaper, clean and powerful exchange solution is to apply ultrasonic sensor which use sound waves for detection and ranging[14].

K. Higashijima ; H. Onda ; T. Ogasawara et al.,describes that it is difficult to recognise the place and direction of an impediment with an ultrasonic sensor, on account that distance is the only statistics furnished by way of the sensor. The authors endorse here a way for estimating the area and direction of a wire impediment via the usage of multiple gadgets of statistics on distance[15].

Yuan-Tsung Chang ; Timothy K. Shih et al.,Proposed an algorithm for fall detection depends on event pattern matching with ultrasonic array sensors signal. In several references cited later the use of ultrasonic sensors to detect human fall. But indicates pass over detection of event pattern matching set of rules. Our contributions are the algorithm and development of the human fall detection results. We are expecting that the predominant bottleneck will be the implementation of ultrasonic array sensors. The form of falling occasions was determined through the implemented SVM model[16].

Baharuddin Mustapha ; AladinZayegh ; explains that Ultrasonic (US) and infrared (IR) sensors are broadly used in cell applications for distance measurements. In this project, an obstacle detection gadget is built primarily based on these two styles of sensors. The machine is intended for use through the elderly and people with imaginative and prescient impairment. The prototype advanced has been tested to locate obstacles and shows exact distance measurements. The gadget additionally demonstrates correct detection for different obstacle materials such as wood, plastic, mirror, plywood and concretes[17].

K. Higashijima ; H. Onda ; T. Ogasawara et al., describes It is hard to recognize the placement and direction of an obstacle with an ultrasonic sensor, on account that distance is the only statistics provided by the sensor. We

suggest here a method for estimating the location and route by means of the usage of multiple objects of statistics on distance. We also advise a way for retrieving the path with decreased manipulator freedom by using the use of projection on a aircraft and restrictions that employ the specific components of twine obstacles.

J. De Geeter ; H. Van Brussel ; J. De Schutter ; M. Decreton et al. describes a popularity and location technique for objects, composed of primitives with a easy analytical description, using local sensors including an ultrasonic and an infra-crimson sensor. As those sensors most effective return nearby data, several

measurements are wished to obtain international information. To permit effective exploration, on-line estimation is wanted. Estimation is based on a limited Kalman filter, the limitations defining relations between the primitives within the item model[18].

Yichao Li ; Xiaoling Wu ; Dongik Shin ; et al., describes the traditional line following navigation still plays an essential role due to

its simple layout and occasional cost. We have designed and examined a line follower robotic and attended line follower robots competition. In order to deal with the common place troubles inside the normal robotic line following navigation technology, including weak environmental adaptability and adjusting to the outside ambient light, an improved line following navigation non-linear and depends at the reflectance characteristics of the object surface[19].

Kazi Mahmud Hasan ; Abdullah-Al-Nahid ;et al., describes the path may be seen like a black line on a white surface or may be opposite of that or it can be invisible like a magnetic field. A close loop control gadget is used inside the robot. The robot should sense a line and move as a result to stay on path while correcting the wrong actions using feedback mechanism. This robot is simple however powerful having honest layout to perform line following task[20].

I. CONCLUSION

This research proves that a line following robot is meant , developed and implemented that doesn't need any remote controller, Bluetooth, Wi-Fi, GSM, etc. this may run automatically with following a given line using Arduino microcontroller. This line follower robot is low cost but very effective for various purposes. This approach are often applied in several sectors like an office block , industrial floor,hospitals for security purposes.

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