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Obstacle Avoiding Robot Using Arm Controller-A Survey

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Abstract: Robotics is the growing and emerging field. Robot must have certain idea about the environment to move in the space without collision and human guidance. The proposed paper provide the design of a wheeled robot which gives the idea of its movement from source to destination avoiding obstacle in the desired path using IR sensor as the detector. The proposed design consists of a smart robot with four wheel based rover body, ARM 32 bit microcontroller for interfacing, DC motor for the movement of the robot and IR sensors with LCD display to display the direction of movement. The movement of robot is suitable for the static as well as dynamic environment. However the dynamic obstacle should move in constant moderate velocity.
Keywords: ARM Controller, LCD, IR Sensor.

I. Introduction

Robotics as a part of today's society carries an important role. The concept of Mobile Robot is fast evolving and the number of mobile robots and their complexities are increasing with different applications. So, there are many aspects of robotic field to make the life easier. Many robots for automation and navigation have been developed in recent years like wall-following, edge-following, human following and obstacle avoiding robots. The obstacle avoiding robot will evade obstacles it encounters in its path towards its operational goal. Due to the reliability, accessibility and cost effectiveness of using mobile robot in industry and technical applications, the obstacle avoiding robots are very important An Obstacle Avoidance Robot is an intelligent robot, which can automatically sense and overcome obstacles on its path. It contains of a Microcontroller to process the data, and IR sensors to detect the obstacles on its path. Out of various robots like legged robot, wheeled robot. This project deals with the wheeled robot. The robot makes the use of the IR sensor to detect the obstacle. There is the use of 3 IR sensors to detect the obstacle front, right and left. It will first check the obstacle in the front and then right and left to find the path for the movement. The IR transmission produces the signal, after detecting something the signal is reflected back from the object and is received by IR sensor causing it to detect the object. Then it uses the microcontroller to control its movement and continue its action. The main use of the robot is that it can be used as the roadcoptor .This autonomous robot can perform the task in the unknown environment The main motto of designing such type of Robot or the technology is that this technology can be used in today's very fast transportation to avoid the accident generally happen in congested or the Metro Politian Areas by applying emergency break. If we use this technology in the car or any vehicle, it will automatically sense the obstacles then it will take a side to the available free space. An obstacle may be a living things or any object. Autonomous Intelligent Robots are robots that can perform desired tasks in unstructured environments without continuous human guidance. Thus by using this technology in vehicles we make the drive safe.

II. Literature Survey

Vignesh Jathavara et al.[1] proposed that the making of autonomous robot must have many capacity one of them is cognitive capabilities like reception process. The paper conveys the use of complex motor coordination to avoid obstacle. In this paper the dynamic steering algorithm ensures that the robot doesn't have to stop in front of an obstacle during its navigation. Hence the robots may overcome some of the problems during navigation, discussed above and it can navigate smoothly during its operation avoiding the collisions. We have presented a basic algorithm and design which can be further improved depending upon the required applications. . A disadvantage with obstacle avoidance based on edge detecting is the need of the robot to stop in front of an obstacle in order to allow for a more accurate measurement. All mobile robots feature some kind of collision avoidance, ranging from primitive algorithms that detect an obstacle and stop the robot short of it in order to avoid a collision, through sophisticated algorithms, that enable the robot to detour obstacles.

Dorra ayedi et al.[2] gave the information about the dynamic environment behavior of object is tackled using VHF method for the calculation of configuration of space. The purpose is to produce a reliable and a smooth trajectory in static and dynamic environments. For that, we have adopted the principle of safe sectors in the VFH method with a simplified configuration space representation. This paper uses Single Input Single

Output fuzzy logic controller. It consists on directing the robot heading towards a desired direction allowing to reach the target or to avoid obstacles. This approach uses a very reduced fuzzy rules number. Therefore, the developed approach is efficient and very easy to implement. In addition, it require a low computational time. The movement of the robot in dynamic and static environment uses VHF method that is difficult.

Pratap Kumar Panigrahi el at.[3] have proposed an idea of dealing with path planning of robot to avoid obstacle using radial bias function neural network. This paper proposes a path planning and intelligent control of mobile robot in unknown environment with static/dynamic obstacles and fixed target. A radial basis function (RBF) network approach is proposed in this work for obtaining optimized path to reach the goal without collision. The competency of the proposed approach is verified by means of simulation results using MATLAB where robot moves in a variety of environments with obstacles of different shapes and sizes. A set of training patterns are considered for mobile robot to avoid collision with obstacles in the clustered environment and to change the directions of steering angle during navigation. The path planning with radial bias function does increases the movement capacity of the robot but its implementation is difficult.

Mohammad Danesh el at.[4] proposed that the use of genetic algorithm to create parallel robot with three freedom of rotation and to avoid the obstacle in its area of command. In this paper, a parallel planar robot with three rotational joints is considered. The 3-RRR mechanism has an end-effector linked to the base by three kinematics chains which has one active joint each. Each leg consists of three rotary joints, one active joint and two passive joints. A number of researchers have studied singularity and path planning analysis of this type of robots. Most of these researches concentrated on analysis of singularity. This paper deals with a way to design a path for this type of robots by considering singularities and probable existing obstacles in robot's trajectory. To do so, displacing form the initial point to the goal point is designed optimally. A polynomial function is used to define the path steps in time intervals. The simplest way to travel from one point to another is to pass on a straight line in constant speed. But this kind of motion damages the motors because of the instant variation and jumps in motor accelerations.

Thus it's recommended to use a polynomial to design a smooth path. The parallel robot uses the complex genetic algorithm and the making of the parallel robot is more complex than the serial robot due to their structure which has kinematics chain.

Lalit Goyal el at.[5] proposed the concept of obstacle avoidance can be taken from the line following robot. This line following robot can move in vertical, horizontal and diagonal way to complete its journey. This paper discusses the pseudo code of the proposed C- approach for reaching the target. According to given algorithm, the robot moves first diagonally then vertically and then horizontally to reach the target. Robot repeats this sequence until it reaches the target. For given obstacles and robot, there are eight possible placements of target: Bottom Right, Top Right, Top Left, Bottom Left, Horizontal Left, Horizontal Right, Vertical Top and Vertical Bottom. The path which robot takes also determines a huge role for its efficient way. The work presented here shows that C-approach based algorithm for solving problem of robot navigation has less path length and requires less time taken to reach the target than the Fuzzy logic based algorithm. C-approach based algorithms are better than Fuzzy logic based algorithms. The problem in this approach is that sometimes robot might get trapped in a cycle and does not reaches the target. The c-based algorithm has limited scope of only movement as the line robot.

Vignesh R el at.[6] proposed the use of best first search algorithm can be used to find the optimal path. This paper presents the design and implementation of an autonomous mobile robot for indoor purposes using an approach that minimizes the travel time. The robot uses a grid based map representation and the wave front algorithm to build representations of the indoor environment. The A* search algorithm has been used to carve out optimal paths. An obstacle detection strategy determines the presence of an obstacle and its location. The use of best first search algorithm to find the short path is exceptional method but the use of VFH and HIMM method is quite difficult.

Kyomin Jung el at.[7] has proposed that a single robot can be of limited help. Thus the use of decentralized control mobile robot for maximum coverage can also be beneficial. Map making involves generating a map of unknown environment for the purpose of navigating efficiently using sensor data.This paper utilizes movement information of the obstacle. The robot predicts a furore trace of a sensed moving obstacle using past few histories. The decentralization control increases the number of robots used and the area of coverage is increased. The use of complex algorithm and environment is used up to minimum level.

Emelia Cpumin el at.[8] proposed that the complex environment can be difficult to trace . This paper refers to the model of a parallel robot, with three-point guidance. This robot belongs to the family of mechanisms endowed with closed kinematic chains which have three points of guidance, called parallel mechanisms. It has six degrees of freedom which are given by the position and orientation of the end effector. Avoiding an obstacle by the method presented in this paper involves a deliberately erroneous training, as part of the training examples. The use of the fuzzy based methodology for WMR obstacle avoidance is used for

complex environment. In a fuzzy based methodology for complex unknown environment although all the fuzzification and control have been used but still the WMR cannot move to object in minimal path and cannot learn its track in mind.

Ying Xoing el at.[9] proposed that the parallel robot uses the complex genetic algorithm. In this paper, hardware model for mobile robot with three wheels is constructed. A control algorithm based on MIMO fuzzy control theory is proposed. For this algorithm, there is implementation of the fuzzification of 3 inputs and 2 outputs, then present fuzzy control rules on the basis of practical experience, and finally implement the defuzzification of this system using center of gravity method. A simulation method by use of Matlab and an experiment in unknown environments will be given. The making of the parallel robot is more complex than the serial robot due to their structure which has kinematics chain.

The other drawback is WMR cannot move the object in optimal path.

Hoang Minh Do el at.[10] proposed that in the dynamic environment, the movement of the obstacle can be unrealistic and varying. This paper presents a new algorithm for obstacle avoidance mechanism based on Fuzzy Approach in case of considering the change in speed of mobile robots and moving obstacles. By defining 2 inputs which are the angle of obstacle relative to the direction of robot and the distance between obstacle and robot, then input information is fuzzfied into fuzzy set memberships. The output will be adjustment angle of the heading of robot to avoid possible collisions with obstacles. Input distances can be classified as members of the fuzzy sets along with the Fuzzy sets of outputs .The defuzzified values are then given to a separate module that will interpolate the speed and rotation component into actuator or rotor control instructions, specific to the type of vehicle being controlled. In order to improve the existing system based on fuzzy logic, a modified method of obstacle avoidance for mobile robots is proposed. By implementation the predictive collision-free fuzzy algorithm with change in the speed of robots and the speed of moving obstacles, it proves that number of crashes between obstacles and mobile robots are smaller than the existing method. The use of the hybrid fuzzy a* algorithm method to avoid obstacle that takes in account the angle, distance. The response of the robot has to improve the fuzzy logic improves the mobile robot. The use of a* method is difficult and it requires high software and hardware to measure the distance angle adjustments.

Donge Vang el at.[11] have proposed the visual devices can also be used as a part of sensing capacity to the robot. The analysis of the commonly used sensor in intelligent mobile robot obstacle avoidance, the ultrasound obstacle avoidance system of mobile robot is proposed based on multi-ultrasonic sensor. The fuzzy control rules and defuzzication of the ultrasonic obstacle avoidance system is introduced. In order To improve successful rate of the mobile robots obstacle avoidance in unknown environment, by inputting the obstacles information, it needs to find out the obstacle avoidance behaviour from the controlling output base, then generates the corresponding fuzzy logic control rules, and introduces the fuzzy control algorithm to the neural network .Which can make much improvement both in the line accuracy of fuzzy controller rule and in the learning rate of neural network. Then it can improves the mobile robot's response capacity and to achieve the robot continuing, fast avoiding obstacle and eventually reach the target. In the path planning of obstacle avoidance, makes full use of the global search ability of genetic algorithm to overcome the complexity of obstacle avoidance space method for calculation, at the same time it overcomes the disadvantage that artificial potential field method can only find the local route optimization. Some visual distance cannot detect the presence of glass and other transparent barriers.

Naja Manjun el at.[12] has proposed that sometimes light also can be used as the means to avoid path. In this paper, A compact system by combining three functions (light following, obstacle detection, android controlled) which are perfectly functional simultaneously or individually. For instance the robot acts in such a way that the "Light following" and "Obstacle detection" can function together or these two features can also function separately. Moreover it is an android based project where it is controlled from an android device to make it user-friendly. The robot can also controlled from an android device activating the feature „Obstacle avoiding assistance" in such a way that if there is any obstacle in front of the robot and the Forward button is pressed at that time from an android device, the robot will not move. However its maximum dependence on light limits its scope where the light is not used.

Ter Fenz Wu el at.[13] has proposed that along with IR kind of sensors the ultrasonic sensor also can be used. In this work, ultrasonic sensors are adopted to implement a real-time obstacle avoidance system for wheeled robots, so that the robot can continually detect surroundings, avoid obstacles and move toward the target area. Secondly, six ultrasound sensors installed on the wheeled robot were utilized to detect large obstacles and to obtain distance information between the robot and the obstacle. The PD controller was used in the wall-following method to achieve the optimized path design. The only drawback is that when these sensor are used for the inspection purpose then these should be water resistive otherwise they could be damaged also sometimes sensors cannot measure the coordinates correctly.

Andea Clauds el at.[14] has proposed that The use of the 3D sensor can be good for the detection but it is difficult and expensive to implement. Obstacle detection is a basic task for every mobile robot. For robots moving along a floor, obstacle detection (or floor anomaly detection) and obstacle avoidance are critical to avoid failures and dangers to humans operating in close proximity with the robot. The problems of obstacle detection and avoidance are encompassed in the largest field of visual navigation for mobile robots, which was the subject of countless research contributions in the past decades. Various techniques exist to detect and avoid obstacles for visual indoor navigation, based on different kind of sensors. One of the simplest technologies is to use a laser stripe sensor to probe the floor in front of the robot; this technique is inexpensive, but suffers from several problems. A solution for indoor localization and 3D scene reconstruction is presented here.

Saokan Sin el at. [15] has proposed that the use of tensor method are not sample efficient means that they require more samples than EM(expectation maximization) to reach the same level of accuracy. Usually, an obstacle avoidance task can be considered as point-to-point motions, i.e. movements of end-effector in space stopping at several given points in a certain order while keeping all the links avoiding obstacle points stochastically interspersed in space. The general case of the robot to avoid obstacles and to approach targets with mathematical knowledge of tensor analysis and differential geometry. Based on this, a novel model is proposed to compute the joint angles so that the end-effector can approach the target with keeping all the links away from all the obstacles. Conventional work mainly forms a dynamical system (DS) through learning. The dynamical system learned from given demonstrations thus control the robot to perform tasks as expected. However, when the task becomes more complex, the form of dynamical system turns into higher nonlinear form. This results in huge time consumption and inaccuracy. Systematically the mathematical model of the motion of the robot arm (including both links and the end-effector) based on which we analyze the policy for the robot to avoid stochastically interspersed obstacles and to approach targets. Tensor analysis is utilized to compute the gradient tensor of the distance between obstacles and links for robot to effectively avoid the obstacles. The Front frame is applied to model the trajectory of the end-effector and some other knowledge of differential geometry is involved for planning the trajectory of the end effector to approach targets with avoiding all the obstacles. Several instances are provided to display the effectiveness of the novel model.

Seiji Sugiyuma el at.[16] has proposed that the tensor analysis is used to calculate the distance between the obstacle and itself by making use of gradient sensor to move more effectively. The velocity of the robot is also an One of the important key of any autonomous machine is the capability for it to navigate through its environment. This robotics task becomes become more complex when the mobile robot should identify and predict objects in a dynamic environment important factor. The use of hydrodynamic potential improves the robot velocity. The robot also moves with discontinuous velocity. A mobile robot can gradually avoid a moving obstacle from further away, and can be safely guided without rapid acceleration. The use of hydrodynamic potential increases the mobility of the robot, this concept is difficult to implement.

Maged Michale el at.[17] has proposed that the use of laser sensor cannot be implemented in 3D frame. The use of sensors like sonar, laser and camera with intelligent software will make the robot move effectively. The need for Autonomous machines are starting to become an increasingly sought after necessity in human society. As people become busier, they tend to be more dependent upon technology. Therefore, the need arises for Autonomous machines to help perform as many of society‟s tasks as possible. These Autonomous machines will also allow workers to perform these tasks in a very harsh and hazardous workplace and further than the ability of the employees. Utilizing advanced sensors such laser, sonar, and camera integrated with intelligent software system will make the mobile robot more intelligent and increase the degree of freedom to perform very sophisticated robotics tasks. In this paper, using the Mat lab platform to build a mobile robot in a virtual reality equipped with laser sensor as the only source of perception to navigate in a dynamic environment was developed. The Mobile robot software system integrated with a prediction algorithm based on potential field algorithms were used to improve the robot's navigation. The developed software system was tested, and the result was compared with and without the prediction software system. One of the important key of any autonomous machine is the capability for it to navigate through its environment. This robotics task becomes become more complex when the mobile robot should identify and predict objects in a dynamic environment.

Yanjie Chen, Yaonan Wang el at.[18] has proposed that a novel path planning strategy based on fuzzy logic for a robot arm with a fixed pedestal is proposed. In this paper, first consideration a simple working platform set in front of the robot arm system, it will become an obstacle when robot is working. Secondly, an obstacle avoidance path planning strategy is designed and the coordinates of robot arm end are used to achieve close-loop control. In addition, fuzzy control theory is applied to design a fuzzy path planning controller, and a dangerous sign is introduced to avoid obstacle.

Finally, the experiments simulated on a two joint robot arm with a fixed pedestal are given. The results show the feasibility and safety of the proposed path planning strategy. The simulation environment conditions in which the robot arm works are specific and unpredictable.

Anish Pandey, Rakesh Kumar el at.[19] has proposed that Autonomous mobile robots are used in several application areas including manufacturing, mining, military, and transportation, search and protect missions, etc. For the navigation system it is necessary to locate the position of the mobile robot in surrounding environment. For avoiding obstacles efficiently and to reach the target under many different shapes of obstacle in environment, a fuzzy logic controller has been designed to improve the movement of mobile robot according to obstacles positions by defining or establishing input variables, output variables, fuzzy logic membership functions, fuzzy logic rule base. The paper says that the navigation system of a mobile robot has to identify all potential obstacles in order to search for a collision free path. Obstacles avoidance and destination point can be achieved by changing the direction angle of the mobile robot. To make the mobile robot move in its environment, the basic path planning strategies have been used. While the mobile robot is navigating in its workspace environment, it avoids obstacles and look for the target.

Sng Hong Lian el at.[20] has proposed that a fuzzy controller is used to control an obstacle avoidance mobile robot. The aim is to guide a mobile robot along its path to avoid any static obstacles in front of it. The microcontroller presented here uses three sub-controllers. The outputs are summed here to produce a concerted effort to control the motors, steering the robot away from obstacles. This fuzzy controller was implemented on a miniature robot. This robot is able to overcome its limitation on range accuracy to follow left wall, maintaining a short distance from it, to avoid obstacles in pant of it, and to decide whether a gap is wide enough for a "side-step" maneuver.

MS Bhat el at.[21] has proposed that mobile robot used in the static environment is of limited scope. The use of stereo camera can be made for the exact positioning and orientation of the robot. The objective is to develop a real time obstacle detection and obstacle avoidance for autonomous navigation of mobile robot using a stereo camera in an unstructured environment. Autonomous navigation of mobile robots demands the Exact determination of position and orientation of Robot and Accurate determination of size, shape, depth and range of potential obstacles in the environment. Simple kinematic model is used for mobile robot and stereo camera with pan and tilt provision is considered for long range operation. Complete 3D reconstruction of object/obstacle is obtained from the stereo matching algorithm and with triangulation method. The pose (position and orientation) of mobile robot is formulated from the static object observation with stereo reference matching points using RANSAC (Random Sample Consensus) in successive frames. Potential field based obstacle avoidance formulation is carried out by using the obstacle range, size information, mobile robot position and orientation. Finally, proportional derivative navigation control loop along with obstacle avoidance algorithm is formulated and verified.

Alexander Tykin el at [22] proposed that the position of robot is also important. Beacon technique is used to find the positioning of the robot, a new approach to the mobile robot orientation in space and its obstacle determination. The method uses color beacons placed on the environmental objects for position determination. For obstacle detection the computer vision algorithm is used. All the system functions using one single camera. There is use of Autonomous systems that can also be of help when it's necessary to execute huge amount of work on a real-time basis.. The global navigation tasks are successfully solved. Thus, the necessity to research orientation methods able to function in a highly noised environment is evident. However this technique is difficult to implement and increases the complexity of functioning of the robot.

M. Dakulovic el at.[23] has proposed that perspective sensors are used which avoids the populated environment in the narrow passage. A strategy for deadlock avoidance of mobile robots in narrow passages of environments populated with other moving objects. The proposed strategy detects deadlocks in narrow passages only by robot's perceptive sensors, i.e., no other communication means with moving objects is assumed. The strategy is based on the random multi-access algorithm for the network congestion avoidance. The strategy is implemented within our existing motion planning and control system for mobile robots and thoroughly tested by simulation and experimentally on the Pioneer 3DX mobile robot equipped with SICK LMS-200 laser range finder. The test results illustrate the appropriateness of the proposed strategy for resolving deadlocks in narrow passages. An autonomous mobile robot is expected to perform goal directed tasks in dynamic environments populated with other moving objects such as mobile robots, animals and human beings. The mobile robot motion planning system has to avoid deadlocks or path conflicts with other moving objects. A deadlock is a possible situation in path planning in which a solution cannot be found, even though one exists. The deadlock avoidance problem is usually solved as the part of the multi-robot path planning and motion coordination problem under assumption that the environment is populated only with multiple autonomous mobile robots.

Jeong yoo el at.[24] has proposed that a navigation framework for humanoid robots, which integrates gaze control and modified univector field-based path planning to cope with moving obstacles. To make

navigation robust, obstacles are modeled according to their relative velocities and positions. Moreover, partial evaluation values for gaze control architecture are also considered for modifying their virtual size and moving trajectory. In addition, gaze control architecture is proposed, which estimates the size of local map confidence area, self-localization error, surrounding obstacles and obstacle-free distance against those obstacles in the local map. In the navigation aspect, various navigational concepts for wheeled robots, such as heuristic search algorithm, dynamics-based random state search approach and force based algorithm, have been applied to humanoid robots. A* algorithm was applied to footstep planning, and vision-guided footstep planning in dynamic environment was performed.

Budianto el at.[25] has proposed that the simulation is also one of the important feature for path determination of robot. Wall following robot, line following robot can also be considered as the WMR to move towards the goal but these have limited scope and also due to the lack of the sufficient information about the neural network. Also the fuzzy logic controller in this technique cannot be used for the further modification. The combination of the use of the neural network and fuzzy logic controller is combined with intelligence provides one of the smartest form of mobile with maximum accuracy and efficiency. The robot has three input variables and two output variables. The inputs are distance between the robot and the wall which is sensed by HC-SR04 ultrasonic sensors. The output variables are the speed of the two wheels which is driving by 12 Volt DC motor. In this case mobile robot is designed to avoid the collision with any obstacles like wall or other mobile robots. In this implementation mobile robot is designed with a numbers of ultrasonic sensors and placed on certain position like center front, left front and left back. The sensor will send the data in real time. After being processed, the input produces output in form of speed value governing motor rotation mounted on both wheels of the robot to find the optimum point. Wall following Autonomous Mobile Robot is using Atmega2560 microcontroller. The logic is uploaded to the microcontroller. The technique used in the simulation is quite complex and uses 3D technique that is not easy to implement.

III. Discussion

The making of autonomous robot explains the use of complex motor coordination for obstacle avoidance.VHF method is used to tackle the dynamic environment behaviour of the object. The main purpose is to produce a reliable and smooth trajectory in static and dynamic environment. The method of radial bias function of neural networks is used for path planning to avoid obstacle. The RBF method is proposed to optimized path to reach the goal without collision. The genetic algorithm is used to create parallel robot for 3 freedom of rotation and to avoid object collision. The line following robot can be used for obstacle avoidance in vertical, horizontal and diagonal ways. This can be obtained by using C- approach. The best first search algorithm can be used to find the optimal path in case of autonomous robot. The decentralised control mobile robot can be used to overcome the limitations of single robots. The model of parallel robot with three point guidance can be used for tracing in complex environment. The fuzzy based methodology for WMR obstacle avoidance can be used for this purpose. The control algorithm based on MIMO fuzzy control method along with genetic algorithm can be used for the designing of parallel algorithm. The mechanism based on Fuzzy approach can be used for obstacle avoidance in dynamic environment. The analysis of the commonly used sensor in intelligent mobile robot is used for obstacle avoidance. The compact with three functions (light following, obstacle detection and android controlled) can be used for obstacle avoidance. Along with IR sensors ultrasonic sensors can also be used for the obstacle avoidance. The use of 3D sensor is a better option for obstacle avoidance despite of being expensive and difficult to implement. The tensor analysis is used to calculate the distance between the obstacle and itself by making use of gradient sensor to move more effectively. The use of sensors like sonar, laser and camera with intelligent software will make the robot move effectively. a novel path planning strategy based on fuzzy logic for a robot arm with a fixed pedestal is proposed for obstacle avoidance and path planning. Autonomous mobile robots are used in several application areas including manufacturing, mining, military, and transportation, search and protect missions, etc. A fuzzy controller can be used to control an obstacle avoidance mobile robot. The use of stereo camera in mobile robot enhances its functioning by exact positioning and orientation of the object. Beacon technique is used to find the positioning of the robot, a new approach to the mobile robot orientation in space and its obstacle determination. The perspective sensors can be used which avoids the populated environment in the narrow passage. A navigation framework for humanoid robots, which integrates gaze control and modified univector field-based path planning to cope with moving obstacles. The simulation is also one of the important feature for path determination of robot.

IV. Conclusion

There are many microcontrollers in use today but ARM controller has more advantages than rest of controller. Hence, we have made the use of ARM controller. For more accuracy and reliability, the use of GPS is made. The source and destination's geographical feature appears in LCD. The use of IR sensor is made for the obstacle avoidance as mentioned in many paper. There are many features in the paper that are difficult to implement. Hence the robot used in our project is to implement the features which are easy to learn and adapt. The proposed design consists of a smart robot with four wheel based rover body, ARM 32 bit microcontroller for interfacing, DC motor for the movement of the robot and IR sensors with LCD display to display the direction of movement. The movement of robot is suitable for the static as well as dynamic environment. The use of the complex algorithm and environment is used up to the minimum level. The use of simple and basic algorithm is used to make the robot more useful and versatile in every approach.

V. Future Scope

The proposed method provide the design of a wheeled robot which gives the idea of its movement from source to destination avoiding obstacle in the desired path using IR sensor as the detector The robot is very much useful in real life. Apart from the roadcoptor and simple household materials carriers. As a part of its future scope, this concept can be used as the vision belt carriers by using kinematic sensor instead of the IR sensor. This feature helps in the movement of blind people. Along with IR sensor the temperature sensor can be used to know about the environment. It can be used in the vehicle to make the driver aware of the obstacle in front. However, the dynamic obstacle should move in constant moderate velocity.

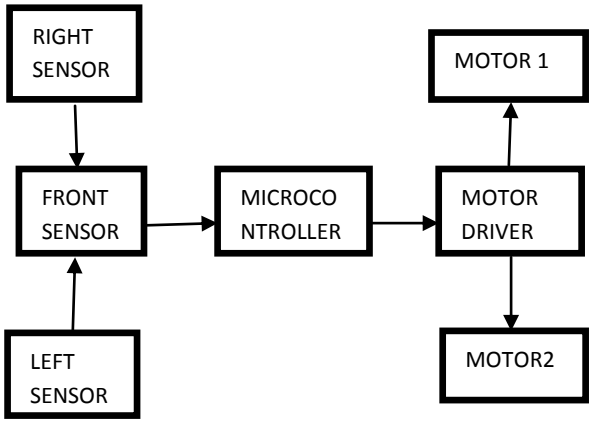

Fig: Block diagram of ARM Controlled Robot

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