Autonomous Multicollision/Human Detection and Navigation bot using Distributed Processing

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***Abstract*— Many softwares are designed to avoid collision of bots with objects, which require human controlling. Previous devices used infrared sensors which detected objects and avoided collision with it.The sensors are unidirectional sensors which senses in single direction. With new researches in image processing, the project aims at building a bot/software which does not require human intervention for controlling, distinguishing and navigation. Proposed method presents a strategy for fuzzy logic which is based robot navigation in uncertain environments by multisensory integration. The main idea of the study is to coordinate conflicts and competitions among multiple reactive behaviors efficiently by fuzzy sets and a rule base.**

Keywords:- Fuzzy, Infrared.

I. INTRODUCTION

If robot moves in unknown environments to reach a desired target without colliding with obstacles, sensors must be used to acquire information about the real world. Using such information, it is difficult to build a precise model in real-time for exactly planning future collision-free path. On the basis of situational reactive behaviors, behavior based control has been proposed for robot navigation. Since this method does not need building an entire model and complex reasoning processes, it is most suitable for robot control in dynamic environments. In behavior based control is how to coordinate conflicts and competitions among reactive behaviors efficiently. In many previous works, the wide range of sensors and different methods for detecting and avoiding obstacles for robot purpose have been proposed. Good references related to the developed sensor systems and proposed detection and avoidance algorithms can be found in. Based on these developed sensor systems, various approaches are related to this work can be grouped into two categories. The first one uses ultrasonic sensors for their implementation and fast obstacle detection, but they show great accuracy and reliability when it comes to detect obstacles having a 3-D complicated shape. On the other hand, we have the vision-based sensor systems, which can be divided into two groups of sensor systems: stereo vision and laser range sensors. The former one applies with good reliability to the detection of 3-D objects but reveals to be deficient in term of speed and

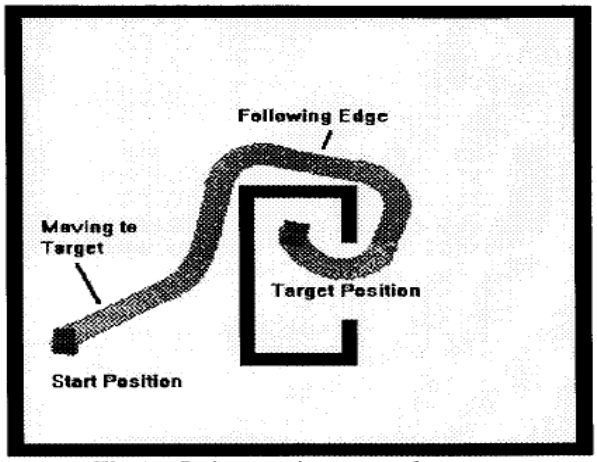


Fig.1: Robot motion to reach a target

towards weakly textured obstacles. The latter, when applied as horizontally emitted.

Laser range sensor is efficient only towards 2-Dimensional obstacles. We have also, 2-D laser range finder sensor which can detect 3-D obstacles but is poorly characterized in real- time detection. The following figure shows the motion of autonomous navigation of bot to reach final target.

In the figure we showed an approach for fuzzy logic based behavior control of a mobile robot. Unlike behavior control which is based on artificial potential fields, this method is to compute weights of multiple reactive behaviors in dynamic environments by a fuzzy algorithm rather than simply to inhibit some reactive behaviors with lower levels. We further present a strategy for fuzzy logic based behavior control of motion robot by multi-sensor integration. To achieve this objective, infrared sensors and a vision system are mounted on a robot. The infrared sensors provide distance information between the robot and obstacles for robotic navigation by reactive behaviors, such as avoiding obstacles and following near edges, while the vision of the system identifies some goals for determining a good motion direction to avoid robot trapping in local region. Since perception and decision units in this method are integrated in one of module by the use of the idea of reactive behaviors and are directly oriented to the dynamic environment, this strategy has the better real-time response and reliability as previous ones.

The reason behind designing such type of Robot or the technology is that the technology can be used in todays very Transportation to avoid the accident generally happen in congested or the Metro Politian Areas by applying

Emergency breaks. If somehow we use this kind of technology in the car or any vehicle, it will automatically sense the proximity of obstacles then it will take a side to the nearby available free space. An obstacle may be a living or any non living. Autonomous Intelligent Robots are the robots that can perform desired tasks in unknown environments without continuous human

Guidances. Thus by using this technology in vehicles we make our drive safe.

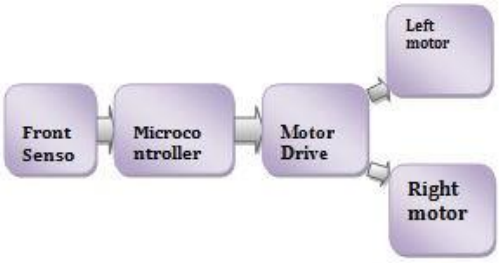


Fig2:- .Overall Block diagram of the robot

II. MECHANICAL DESIGN

This includes the hardware design of the robot that is motor and wheel placement, and body setup. Robot uses two Robotics gear motors & wheel for the Omni directional movement, Which will help it to move exactly forward, left or right. Robot uses two motor & wheel in the rear side and one freewheeling ball is placed at the front which helps it to move autonomously. The sensor is Placed in such a way that they can cover the maximum area in front of the robot and can be able to detect an obstacles either obstacle is small or large.

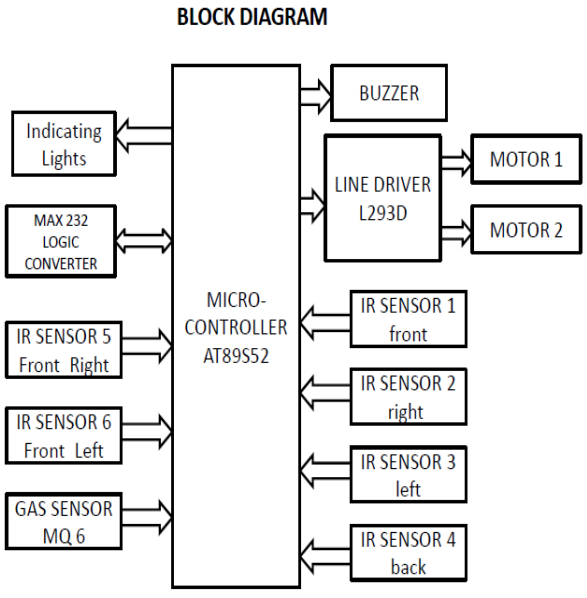
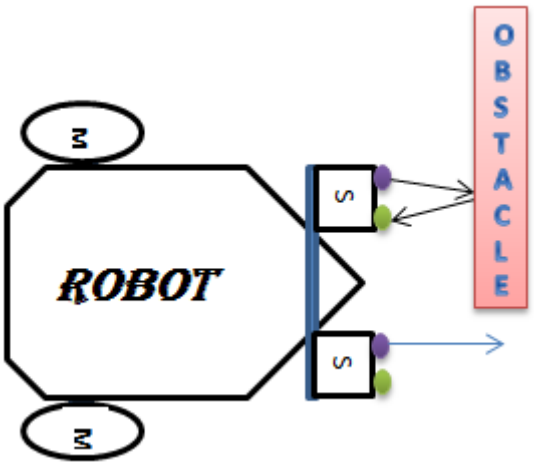


Fig3:- Block diagram



Circuit design mainly of two parts

a) A Sensor part

b) A Control board part

a) Sensor part:- sensors used in this robot are Infrared sensor, consisting two infrared signal generator and the

IR receiver is designed in single PCB. There are two sensors which are used as left side sensor and right side sensor and two sensors are used to sense the obstacle on left and right side.

IR Generator:-This is Monostable multivibrator using NE555 IC generating an Infrared Signal of 38 KHz frequency For determination of the object. By using a Different resistance we can also adjust the frequency of the IR signal, Detector TSOP1738 gives a high output signal

IR Detector:-IR detector circuit is a circuit which gives low output in absence of IR signal When some obstacle comes in path IR signal reflected back and fall onto the IR detector. In such a way that obstacle is detected.

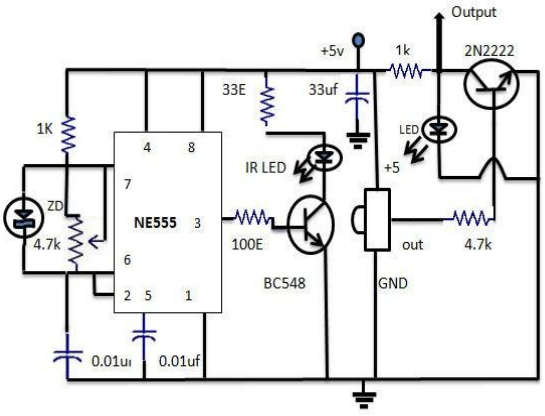


Fig4:- Sensor part circuit diagram

b) Control board:-
Control board is an important driver circuit of the robot. It mainly contains of the microcontroller of Atmel 89C205I and the motor driver.

Atmel 89C205I is a low-voltage, a high-performance CMOS 8-bit microcontroller with 2K bytes of Flash programmable
and erasable read-only memory (PEROM). The device is manufactured using the Atmel's high-density non-volatile memory technology and is compatible with t industry-standard MCS-51 instruction set. By combining the versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a very powerful and high speed processing microcontroller which provides a high flexible and cost-effective solution to many embedded control applications.

Motor driver L293D, always decide which motor should be in motion or should stop in according to the incoming signal from the
microcontrollerAT89C2051.

There are two sensor S1and S2 placed left and right side of the Robot to sense the obstacle. These sensors can be infrared sensors or ultrasonic sensor depending upon the various applications. Sensors sense the object then generate a signal high or low then corresponding signal is processed by the microcontroller AT80C2051; the Microcontroller is programmed to avoid the obstacle, when it gets a signal from sensor then after processing this signal drive, the motor driver accordingly ,according to the incoming signal of sensors the microcontroller will decide either left or right motor should rotate. In such a way the Robot works.

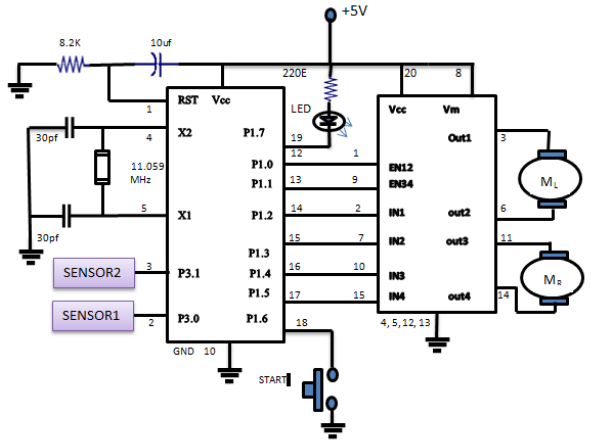


Fig5:- control board circuit diagram

Algorithm:-
1. Start
2. Check whether switch (p1.6) is on or off
3. If 'on' then go to the next step4, or rotate at the same step.
4. Initialize the input port (P3) & output port(P1).
5. Set the bit of port pin 1.0 and pin1.1
6. Read data from the port 3.
7. Check the bit on p3.0
8. If bit is present move left motors in Forward direction and Stop the right motor, or else go to next step9
9. Check bit in p3.2
10. If bit is present on pin p3.2, then move right motor in forward direction till we get high signal on the pin p3.2 and stop left motor.
11. Again go to the step 6.

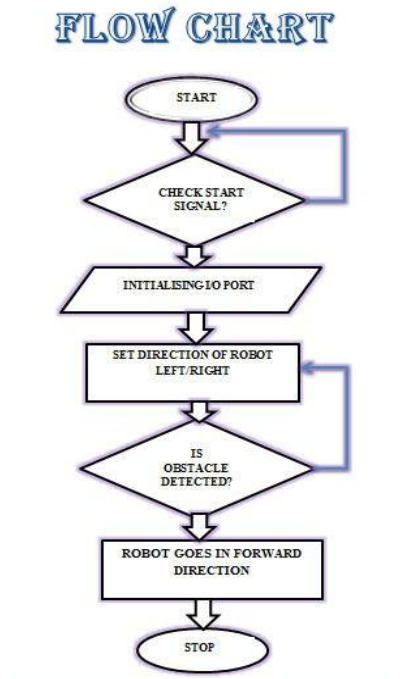


Figure6. Flowchart for the software

III. APPLICATION

Obstruction avoiding technique is useful in real life, this technique can also use as a vision belt of blind people by Changing the number of IR sensor by a kinetic sensor, which is on type of microwave sensor whose sensing range is so high and the output of this sensor changes in accordance to the object position changes. This technique makes a blind people capable to navigate the obstacle with ease by placing three vibratos in left, right and the centre of a belt named as VISION BELT and makes a blind people able to walk anywhere. On top of obstacle avoiding robot temperature sensors can be added to monitor the atmospheric conditions around (for future scope). This is useful in places where the environment is not suitable for Humans. Same technology can be used in various applications by analyzing and changing the microcontroller program for example

1. Line / Path finder Robot.
2. as automatic vacuum cleaner.
3. With proper programming we can use it as a weight lifter.
4. in Mines

IV. CONCLUSION

From this study, a walking robot that achieved the stated objectives had been developed. This robot is able to produce the basic walking movements using two gear motors. we developed the robot with a very good intelligence which is easily capable to sense the obstacle and by processing the signal coming from the sensor it is perfectly avoiding collision with the obstacle coming in between the path .Robot take the left or right or the forward movement in accordance with the sensing signal with the help of the two gear motor which makes the movement of the robot smooth and efficient .In future, the sensing range can be increased by increasing the sensor quality with the help of ultrasonic sensor or the IR signal spread all over the provide area.

VII. FUTURE SCOPE

With further analysis, the concept of detection and identification of object by using image processing can be employed in this bot. The query image will be feed to bot's database. With feature extraction algorithm the bot will be able to rectify similar image pattern in unknown surrounding. This helps in identification and security purposes.

VIII. ACKNOWLEDGMENT

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