Multi Sensor and Multifunctional Robot With Image Mosaic

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Abstract- **In this paper, A Multi sensor and multi functional robot will be developed with the features of obstacle avoider and line following, motion of robot will be based on clap sound and light sensor. The robot will have 2DOF arm (Degree Of Freedom) with camera through which successive image are joints by the help of different mosaicing algorithm and analysis is performed. Image mosaicing has become an active area of research in the fields of photogrammetry, image processing computer vision and computer graphics, previous image mosaicing algorithm suffers from the following problem: (i) Less Accuracy (ii) Suffers from problem of misregistration (iii) Percentage of mismatches occurs (iv) Difference in pixel intensities and (v) Mutual information sharing.**

Index Terms— **2DOF, edge avoider, image mosaicing, IR sensor and line follower.**

I. INTRODUCTION

A robot is a reprogrammable multifunctional manipulator designed to move material, parts, tools, or specialized devices through variable programmed motions for the performance of a spread of tasks.

Robotics is that the branch of technology that deals with the planning, design, construction, operation, and application of robots, as well as computer or laptop systems for their control, sensory feedback, data and information processing. The planning of a given robotic system will often incorporate principles of Mechanical engineering, Electronic engineering and Computer science significantly artificial intelligence.

In this paper, A Multi sensor and multi functional robot will be developed with the features of obstacle avoider and line following, motion of robot will be based on clap sound and light sensor. The robot will have 2DOF arm (Degree Of Freedom) with camera through which successive image are joints by the help of different mosaicing algorithm and analysis is performed.

Line follower robot means a machine that follows a line, either a dark line on lights surface or vice-versa. In this paper, we will make the line follower robot move on the line with a type of feedback mechanism. It is the most fundamental example of adding small intelligence to a robot, but it is actually the designer's intellect.

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Obstacle avoidance and detection robots are intelligent robots which can perform desired tasks in unstructured environments by finding and overcoming obstacles in their way without continuous human guidance.

Light follower robot that senses the light & follows it. A user can burnish a flashlight at its front and it will respond by following the light source. This robot uses a microcontroller for processing the sensor readings and responds by controlling the motors. So basically it is a robot that responses according to light.

Sound sensor are used here to move the robot with the clapping sound and when the user wants to stop the robot then again make clap to stop the robot.

Here also a 2 DOF arm with the camera, taking successive images in continuous manner than images are joints by the help of different mosaicing algorithm and analysis is performed.

II. PROBLEM STATEMENT

Most architecture currently used in such systems rely on having either a central processor where global data fusion takes place or a central communications medium through which all messages between sensors must pass. Such central architectures give rise to problems with communication and computational bottlenecks and are susceptible to total system failure should the central facility fail.

Previously, developed image mosaicing algorithms were not accurate. Fewer features are extracted from them. Moreover, they suffer from serious drawbacks based on four performance metrics like accuracy, peak signal to noise ratio, percentage of mismatches, difference in pixel intensities, and problem of misregistration. Problem of misregistration occurs due to mismatching of various portions of an image. Also, images were not verified from all aspects hence, inaccurate stitching can be done. Misregistration occurs when we take images from various points of views and images are wrongly stitched.

III. SOLUTION METHODOLOGY

Process of design a robot-

Define the Problem-

- Identify the purpose of a construction.
- Identify specific requirements.

Research and Design-

- Gathering information.
- Identify exact details of the design which must be satisfied.

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- Identify possible and alternate design solutions.
- Plan and design a suitable structure which includes drawings.

Create a Prototype-

- Test the design.
- Troubleshoot the design.

Build your Robot-

- Structure.
- Gear combinations.
- Arm mechanisms.
- Placing sensors.
- Hints and tricks.

Programming and Testing Robot-

- Now it's time to program your robot. This will be achieved in many various ways. Use can do achieve rudimentary intelligence in our robot by using only relays, potentiometers, bump switches and some separates parts. You can increase complexness in intelligence in your robot by adding additional sensors and continuing with in the same lode of using hardwired logic.

Evaluating your Robot-

- Evaluate the designing.
- Evaluate the look process.

Below Fig 1 shows the methodology for designing a robot-

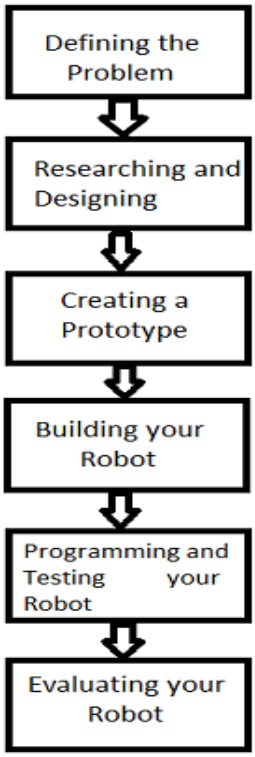


Fig 1:- Solution methodology for multi sensor robot

IR sensor -

- IR sensor works on the principle of emitting IR rays and receiving the reflected ray by a receiver (Photo Diode).
- IR source (LED) is used in forward bias.
- IR Receiver (Photodiode) is used in reverse bias.

An infrared sensor is an electronic device that emits and/or detects infrared radiation in order to sense some aspect of its surroundings. Infrared sensors can sense the heat of an object, as well as detect motion. All objects emit some form of thermal heat, usually in the infrared spectrum. This radiation is invisible to our eyes, however are often detected by associate degree infrared device that accepts and interprets it.

Below Fig 2and 3 describes the working of Infrared sensors with Light Emitting Diode.

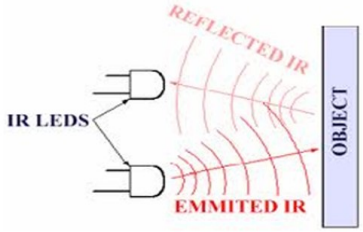


Fig 2:- Working of IR sensor.

Symbol of LED -

Fig 3:- Symbol of Light Emitting Diode.

Fig 4 below decribe the circuit diagram of IR Sensor.

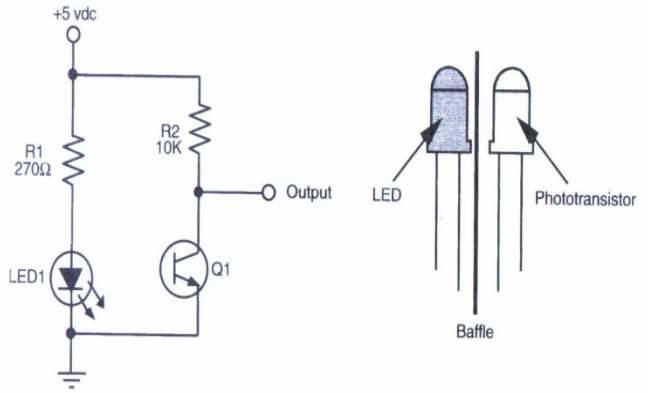


Fig 4:- Circuit diagram of IR Sensor.

Development Process of Proposed Methodology:

- Write C programs in AVR Studio.
- Compile them into a .hex file using the AVR-GCC compiler (which integrates into AVR Studio).
- Simulate the target AVR program and correct the code within AVR Studio.
- Program the actual chip using the AVRISP mk II USB device, which is attached to our target board with a special 6-pin cable.
- Once program created, the chip runs the program in your circuit.

Through IR sensor we can move left or right wheel of the robot. When IR sensor senses any object, it gives the instruction to micro controller to take the decision of moving the motor on left or right side. This transferring the decisions through IR sensor to motor takes within seconds.

Below Fig 5 shows that how decisions are taken through IR sensor to motor wheels-

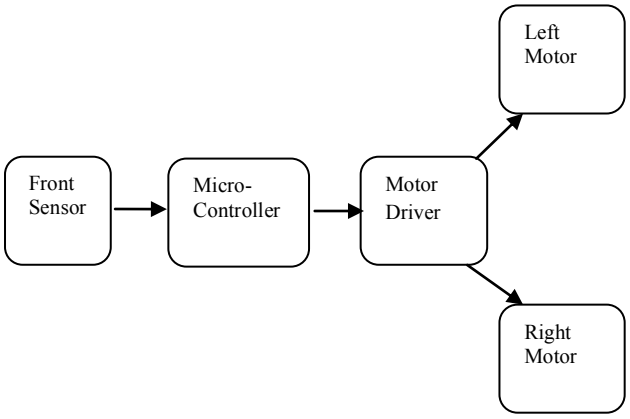
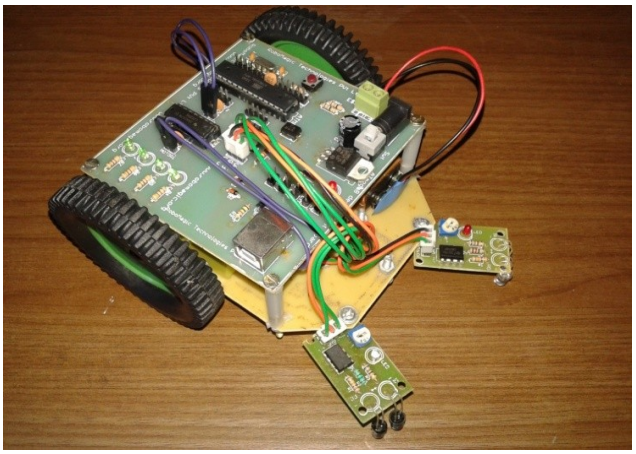


Fig 5:- Decision making process by microcontroller

IV. RESULT

In this paper, line follower robot with edge avoider functionality is designed and implemented. Line follower robot is the robot which follows the black line or can say that the implemented IR sensor avoids black surface, when robot's left sensor sense black surface than it will turn the right side and when right sensor sense black surface than it will turn left side. When we just cross the simple circuit motor wires than it will be edge avoider robot and it avoids any black surface edges.



V. CONLCUSION

In this paper, discussion about a multi sensor and multi functional robot with the features of obstacle avoider and line following, motion of robot will be based on clap sound and light sensor is done. The developed robot will have 2DOF arm (Degree Of Freedom) with the embedded camera through which successive images are joined with the help of different image mosaicing algorithms. Image mosaicing algorithms are based on grid which focuses on frame based image mosaicing that includes geometric, homographic and texture based features. The designed multi sensor and multi functional robot will captures images through embedded camera and after the performance analysis of different image mosaicing algorithms; better image stitching can be performed in minimum CPU execution time.

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