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CARGO ALIGNMENT ROBOT

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Abstract*—The objective of this project is to design a cargo alignment robot using Firebird-V,ATMEGA 2560 microcontroller. Cargo Alignment Robot, is the robot that will pick the objects from one position and place it to the specific location. To move the robot, the code will be written in AVR Studio and Hex file will be burned on the Robot. This project helps us to create a robot that will help us to handle critical situations where humans cannot interfere*.

***Keywords*—**Firebird-V; ATMEGA 2560; alignment; AVR studio.

I. INTRODUCTION

Robotics is the branch of technology that deals with the design, construction, operation and application of robots. Robots are now widely used in many industries due to high level of performance and reliability. Cargo Alignment Robot helps to increase productivity, accuracy and speed. Robot and automation is employed in order to replace human to perform those tasks that are routine, dangerous, complex and in hazardous area.

A robot is a Programmable, Self-controlled device which contains electronic, electrical, or mechanical units. Aim of project is to classify the colour objects which are coming on a way by picking and placing the objects in its respective programmed place. Project involves sensors which sense the colour and guide the direction which has been lined with the black tape and send signals to the microcontroller. It perform those tasks that are routine, dangerous, complex and in hazardous area.

II. OBJECTIVES

The main objectives of this project are:

1. To Improve Quality and Efficiency of the product.
2. Saving of Manpower.
3. To Increase Manufacturing capacity in Industries.
4. Manual based Task is Eliminated.
5. To Reduce cost factor and timing of handling the product.

III. FUNCTIONALITY

Main Functions of Project are:

In this project the field of movement of the robot is bounded by a black line strip. We had made line follower system that move on black line and it check the black line with the help of White-line sensor and go along a path.

If it detects an Object on any of its side sensors, it turns to align itself to face the object

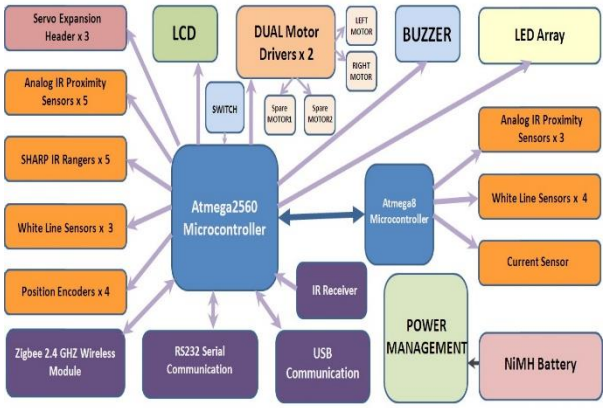
- **Color detection:** In this, operation of color detection is performed, Robot detects color of object by using IR Proximity sensors if robot detects the color, it places the object in their respective position.
- **Picking of object:** In this, we use robotic ARM. As firstly robot detects the color and according to distance it pick the object and place on certain distance, it moves and again pick the object on certain location.

IV. DESCRIPTION OF COMPONENTS

The Fire Bird V robot is the fifth generation in the Fire Bird series. First two edition of the robots were drafted for the Embedded Real-Time Systems Lab, Department of Computer Science and Engineering, IIT Bombay. These platforms were made commercially available from the edition onwards. All the Fire Bird V series robots share the same main board and all other extra accessories. Different family of microcontrollers can be added easily by simply changing top microcontroller adapter board. Fire Bird V supports ATMEGA2560 (AVR), P89V51RD2 (8051) and LPC 2148 (ARM7) microcontroller adapter boards. This quality of changing the microcontroller adapter boards makes Fire Bird V robots very versatile.

Fig. Firebird V Atmega 2560 Robot

V. BLOCK DIAGRAM



The above Diagram shows the block diagram of the Firebird V Robot. In Firebird V, there are two microcontroller- Atmega2560 as Master and Atmega8 as Slave. It has Three White line sensors which are extendable to 7, five Sharp IR range sensors, 8 analog IR proximity sensors. For displaying Output, there are 2 x 16 Characters LCD ,Buzzer and Indicator LEDs. The Various types of Communication are possible with Firebird V if particular module is installed in it. They are -USB Communication,Wired (serial) communication, Wireless Zig-Bee Communication (if X-Bee wireless module is installed) . Wi-Fi communication (if Wi-Fi module is installed), Bluetooth communication (if Bluetooth wireless module is installed

VI. METHODOLOGY

Fire Bird V provides us with an magnificent environment for experimentation, algorithm development and testing. Its modular architecture allows us to control it using multiple processors such as 8051, ATmega 2560, ATmega 8,etc. Modular sensor pods can be mounted on platform as dictated by intended applications. Firebird V will follow black line to locate the different Objects. It will pick the object to specified location, whose address as an input was given to it.

Fire bird V will detect the black line on which it is moving using the white line sensors. It will detect the obstacles using proximity sensors and infrared sensors depending upon the range of obstacle,

A robotic arm is used with Firebird V. The robotic arm will be used to pick the colored objects. The programming for the movements of the Firebird robot will be done in the embedded C. The programming for interfacing will help the robot to move efficiently along the Black line and perform other operations like turning right or left in the desired angle, picking up the objects, which is done by the robotic arm and placing the objects to the preferred location. The sensors play a vital role in determining the line on which it has to move or the obstacles in the path using proximity sensors.

VII. RESULTS AND DISCUSSION

The project involves sorting of objects on the basis of color. The research project successfully carry out the task of identifying the color of object and place those objects at the preprogrammed places i.e.; if robot detects the RED color, it place the object in right side of arena otherwise in other side and rejects if the conditions are not met. This method is verified to be highly beneficial for automated industries. The aim of the project was to have a fully functional robotic arm which sorts different colored objects and the target is achieved successfully. The sensor is key component of project which aides in distinguishing the objects. Failing of which may result in wrong material handling. Thus it becomes vital that the sensor had a very high sense of sensitivity and ability to distinguish between colors. The system responses are a little bit slower than expected. It can be improved by using a more advanced color sensor and microcontroller.

VIII.CONCLUSION AND FUTURE SCOPE

We have successfully studied about Cargo Alignment Robot System. We used Line follower system with IR sharp sensor to implement this work. This project will try to develop an automated robot system that will help human to perform those tasks that are routine, dangerous, complex and in hazardous area. The system will also helpful for elderly and disabled people so that they can monitor and control the Robot with their limited ability. Hence, the system is efficient and it consumes low power.

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