Application of Firebird -V as Restaurant Assistant: Order Taking Robot

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Abstract: **Today's world, there are large number of restaurants and hotels serving variety of food items to a large number of customer. Everyone wants to visit the restaurants for good quality food and better servicing. In this regards people go to a particular restaurants and proper servicing of customer on a daily basis involves tasks such as taking orders, preparing food, serving, billing, etc. There is lots of chance of error during working. In this paper, Firebird V robot is used for automating the process of taking orders and inform the cooks in the restaurant. It is useful for reducing the numbers of human errors.**

Key Words: **restaurant, errors, firebird V robot.**

1. INTRODUCTION

Automation is the need of today competitive market. The increasing population and its increasing demand of resources have made it necessary to utilize the resources efficiently and effectively. Companies use robots to carry out every work more quickly than a human worker. One of one application of Firebird V robot is Restaurant Assistant. The robot will take orders from customer tables and giving them to the cooks.

Firebird V is a research platform for robotics developed by Nex Robotics, which consist Atmega 2560 as a master microcontroller and Atmega 8 as slave microcontroller. Two DC geared motors are driven by this microcontroller and caster wheel at front as support are responsible for locomotion of the robot. There are two types of indicators used in the robot, a buzzer with indicator LEDs and a 2X16 LCD display which is used to display message. There are sharp IR range sensors which are used to detect the obstacle when the robot is tracing the path. The picture of Fire Bird V robot is shown in Fig.1 All the components interact with each other for the appropriate functioning of the robot.[1-2]

Fig 1: Fire Bird V ATMEGA2560 Robot[1]

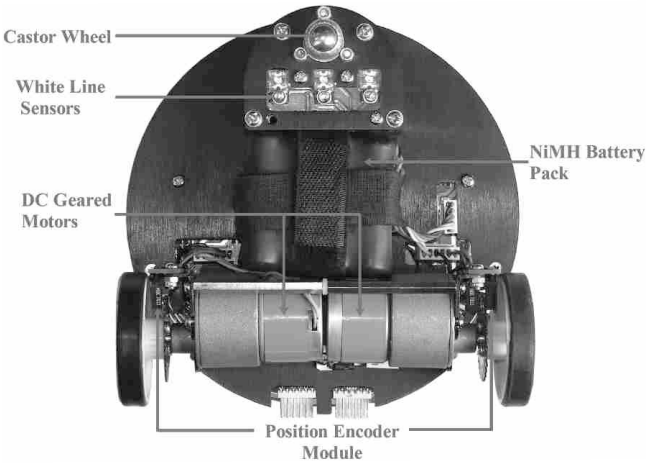

Fig 2: Fire Bird V ATMEGA2560 Robot bottom view

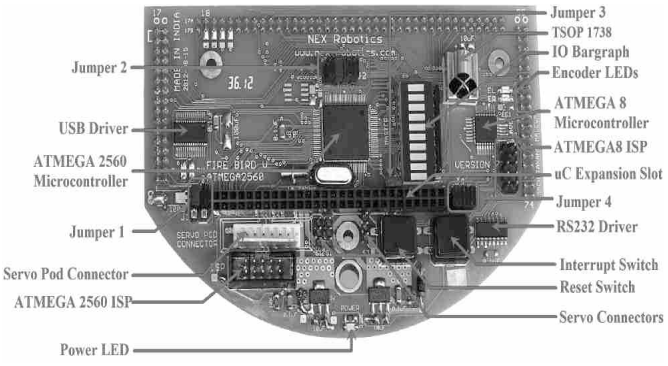

Fig 3: ATMEGA2560 microcontroller adapter board

There are many number of applications were developed in recent years by using firebird V. Patrick designed an autonomous soil monitoring rover to accelerate data collection. It is capable to navigate through a field and avoid obstacles [3]. Mahendran R. gave an idea of sorting and grading of fruits through image analysis and computer vision technique for evaluates the quality of fruits [4]. A system prototype by selecting an arena which considering the agricultural field of any kind of onion crop is proposed. [5]. A Pizza delivery system which reduces the human errors and efforts and reduces the time complexities achieving the maximum possible accuracy at the same time is proposed [6]. Fire Bird V robot to trace the path and any obstacle in the specified path is detected by the sharp range IR sensors [7]. Gayatri Sakya proposed a system which is based on wireless sensor nodes for the sensing the field parameters of irrigation system like temperature and soil moisture [8]. Prototype of Autonomous Robotic Waiter which will serve the refreshment to the customer is proposed by Ketan Deshmukh [9]. R. M. Nachammai used a robot for monitoring whether the plant/crop has grown to the correct height or not. For this purpose, an infrared sensor is used [10].

In this paper we present Firebird-V as Restaurant Assistant Robot for automating a basic task, taking orders from customer tables and giving them to the cooks. for taking orders from different tables and inform to cook in cooking area of given arena as shown in figure 4. There are nine customer tables serving three (03) different types of food (A, B, C). Each type of food has an associated cooking zone (C1,C2, C3). Food types are represented by flags of different colors and placement positions. Customer places his/her order choosing any of the three food types by placing the corresponding flag on the table. Robot traverses through the arena visiting each customer table and identifies the order placed by the customer, travels to the cooking zone to inform the cooks about the types of food ordered by customers.

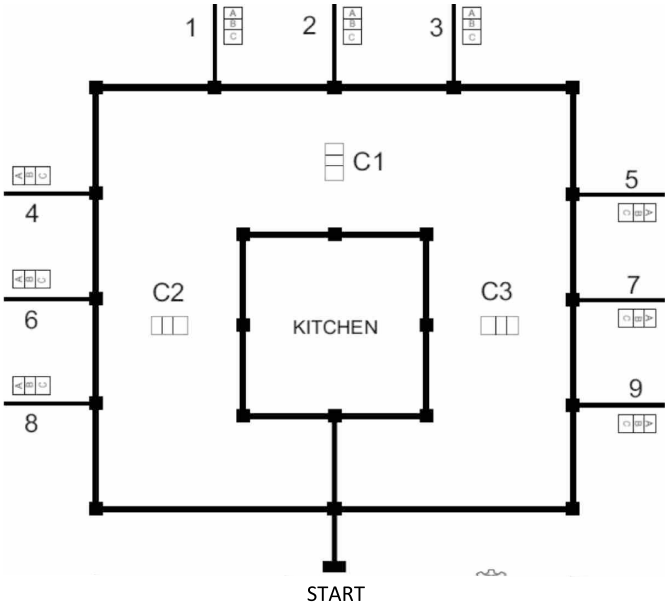

Figure 4: Proposed arena

Proposed Architecture:

Figure 5 shows a block diagram of proposed system

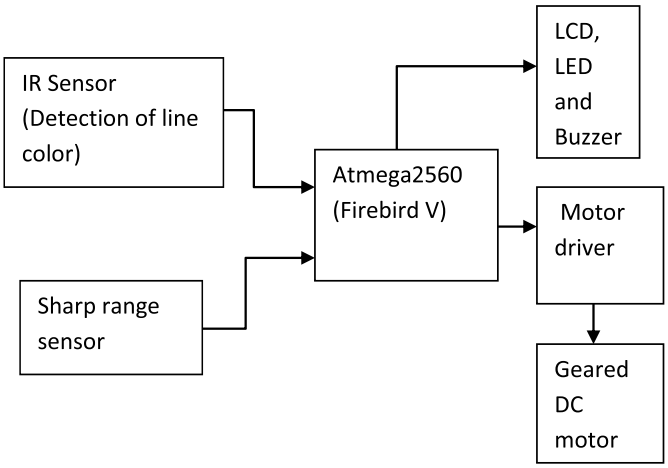

Figure 5: Block diagram of proposed system

The Atmega 2560 Microcontroller (Firebird V kit) is used for designing and testing of this robot. In this project, we have used two types of sensor, first is IR sensor for detection of black line to follow a predefined path and another is a sharp range sensor for detection of flag of different type of food and cooking zone of food. Two DC geared motor have used for locomotion of robot and a LCD, LED and buzzer are used as display and indicating device.

Proposed Configuration:

The sharp range sensor placed at ADC channel number 11 and 5th position on FIRDBIRD V. White line sensors are connected on ADC channel no. 1,2 & 3. There are three different LEDs also connected according to given table 1. Two DC motors are connected to L293D IC and the pins of L293D are connected to Port A and Port L of Atmega 2560.

1. Four Pins for Direction control are connected at PORT A.
   - PA0 - Left Motor Control
   - PA1 - Left Motor Control
   - PA2 - Right Motor Control
   - PA3 - Right Motor Control
2. Two Pins for Enabling Motor Driver IC are connected at PORT L.
   - PL3 - Left Channel Enable
   - PL4 - Right Channel Enable

A buzzer is connected to pin 3 of port C and LCD is connected to port C except pin 3.

Table 1: LED connection

LED Color	PORT No.	PIN No. at expansion header
Yellow LED	PJ2	43
Green LED	PJ3	44
Red LED	PJ5	42

Working Algorithm:

- Wait for start button.
- When start butten is pressed, start ADC conversion of sensors values.
- 1. If: value of wite line sensor at center is greater than thresold value, robot will move forward.
- 2. If: value of left sensor is greater than thresold value and condition 1 is false, robot will turn left.
- 3. If: value of right sensor is greater than thresold value and condition 1 & 2 are false, robot will turn right.
- All values are less than thresold, robot will stop.
- If: all sensor values are greater than thresold, Node will detect. Counter will increased by one, which counts the node value.
- If: Counter value is equal to node value which represent a table than start ADC conversion of value of sharp range sensor and find the type of food.
- Store food type and table number and move forward.
- If: counter value is not equal to node value which represent a table than move according to path turns on arena.
- After taking orders from all tables, robot will enter in cooking zone and sound buzzer at respectiv cooking zone of food A,B & C.
- Finally robot reach at start position and displays table number and type of food on LCD.

2. CONCLUSION

Thus, Firdbird V robot can be used as restaurant assistant for order taking. It will reduce the drawbacks of human efforts in a restaurant. The reduced human efforts, time saving, more accuracy are evidently the salient features of this system. The final result shown in figure 6.

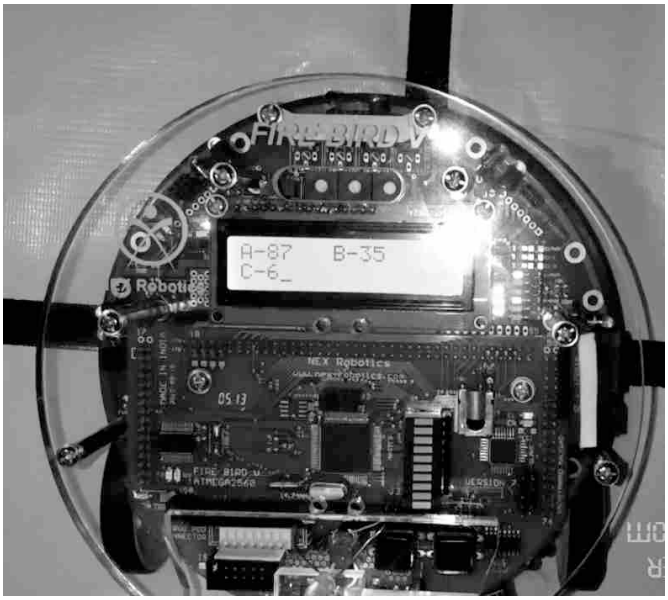

Figure: 6 LCD display showing results

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