

Intelligent Robotic Waiter with Menu ordering System

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Abstract: In today's world the advancement in scientific methods and technology innovation have empowered the augmentation to apply autonomy from conventional robotics to application specific robots. The value of an hour of labor is likely to skyrocket. As the information technology sector in the world is exploding, there is no need for child labors and youngsters to work as waiters in hotels and fast food chains. Interest in research and development projects for social services and healthcare has been growing in recent decades. This research work aims to build an environment of restaurant where a robot fulfills the role of dealing with customers. The menu card is provided using android application. The order will be send to the counter consisting of laptop through Wi-Fi link and the details will be saved in the database of the counter. Once the order is ready to be served the robot will be informed and it will deliver order from the counter to the required table. The robot uses a precise control mechanism using coordinate mapping method to reach the customer table. Robotic waiter eliminates ordering errors, reduces staffing costs dramatically for restaurant owners.

Keywords: Social Robots, Smart restaurant, Human Robot interaction, precise control mechanism.

I INTRODUCTION

Presently Digital multi-touch menu cards in restaurants are replacing conventional menu ordering system where waiters take request from client as per their menu prerequisite. In conventional restaurants requests are taken by waiters and they bring the food order when it is prepared later the client pay the bill to the server or at Reception area. This framework depends on substantial quantities of labor to handle client reservation, managing food orders, putting request on table, helping requests to remember client and charging. In this manner, how to successfully enhance the service quality for customers by utilizing technology advancement has received much attention in recent years.

Being a waiter at a restaurant is also one kind of job that humans don't prefer to do, at least the skilled labor doesn't want to do, and that is why we have set out our goal to build a robot and an entire system as a model and an archetype for such tasks. Our design will greatly reduce the reliance on manpower and unskilled labor as well as it will provide a complete built in system for local and small food chain businesses. Wireless Ordering System reduces the flow of work, simplifies the complex orders, receives accurate orders, provides pleasant environment & speedy service, prevents monetary loss, & increases customer reliability in ordering. In order to fill the gap and eliminate the need of manpower our robotic waiter would perform the tasks that humans normally don't prefer to do.

"Intelligent Restaurant"— it's about getting the greater part of your diverse touch-focuses

operating—associated, sharing data, customizing encounters and speeding forms. It anticipates Graphical User Interface (GUI) advanced touch screen module is utilizes as menu ordering system.. Customer can arrange through this touch screen gadget put on every table in restaurant. Clients see the menu, cost and make a request specifically utilizing this touch screen framework. HTML is utilized for designing web pages of restaurant.

II BLOCK DIAGRAM OF PROPOSED WORK

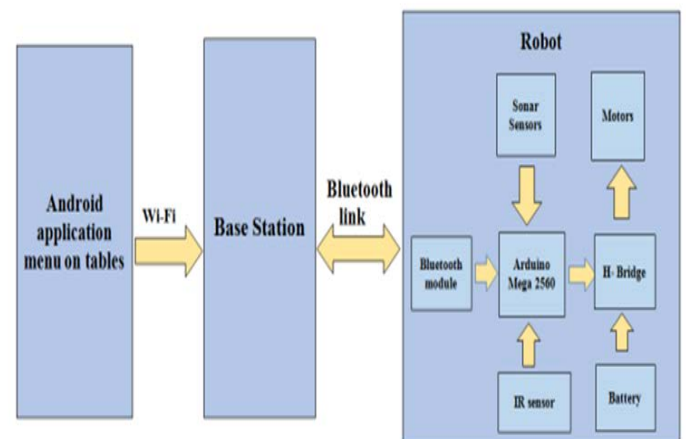


Figure.1 Block diagram of proposed work is as follows. Will setup an entire restaurant-like environment

with tables, counter and a waiter robot. The Waiter robot will be fully autonomous and will work without the interference of any human being, once the environment is set the waiter will await the instructions from the counter in response to the order sent from the table.

On the tables we will place smart phone devices featuring the meal offered by the restaurant, a customer selects any food item from the menu card through smart phone that will be send via Wi-Fi, containing exact Table number with item selected, to the counter. All the information of the table will be shown in the database at the counter just as the table no. time, date, items ordered, order no. and total price.

III. IMPLEMENTATION PHASE

The robot structure will be equipped with electronic circuits, power supply, Arduino mega 2560, ultrasonic sensors, IR sensor, Bluetooth shield and DC gear motors. Everything will need to be tenable in their right places, eliminating the possibilities of hardware damage. The ultrasonic sensors will be installed on the front and on one side of the robot in order to detect the obstacles in front of it and on the sides as well. A tray like section will also be premeditated inside the robot where the food items can be placed so that robot can carry them to required tables. For testing purpose we placed solid food items on the tray section and the robot was successfully reach

towards its target area.

The overall structure of the project is described as follows. When the database will receive the order coming from any of the table it will transmit the command which we had defined for the tables. For each table there is a separate command transmitted to the robot via Bluetooth shield HC-05, in this way the robot senses to which table it has to deliver the order. After the command is sent to the robot, it will move toward its required destination through a dedicated mapped path. If any obstacle comes in its way it will sense the obstacle through its ultrasonic sensor by generating echoes, the robot will then stops and wait for some seconds and changes its path to reach its destination. If the path of the robot would be blocked from two sides with the obstacles then it will wait for some seconds and then will ring its buzzer. Otherwise it will move towards its required destination, delivers the order and moves to the counter to complete its path.

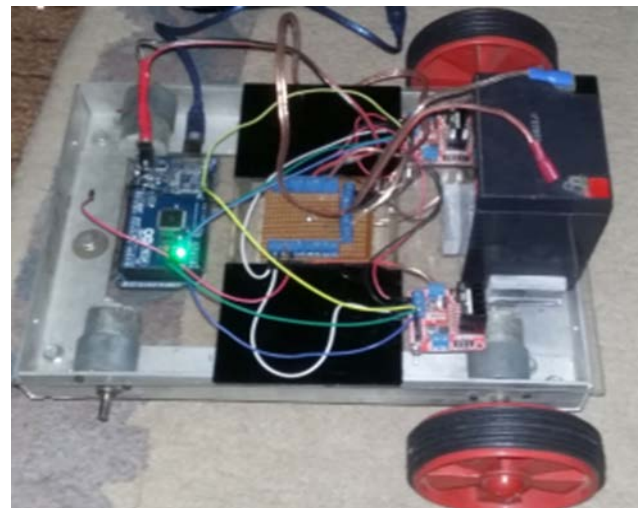


Fig. 3 Hardware Design of waiter Robot

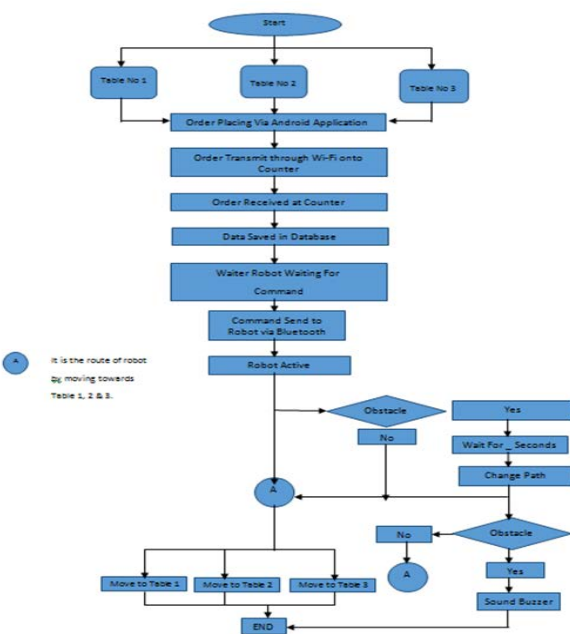


Fig. 2 Flow Chart



Fig. 4 Restaurant Menu Application

Restaurant menu application is basically an android based application.

The ultimate design objective is to place orders from the tables which would be received on database managed at the counter. Basically we are setting a restaurant prototype for which we have designed android menu application to be set on the tables for customer use. The application was designed in such a way that it consist of six layout files. At first the customer could see the title of restaurant menu on the device placed at the table. After clicking on the screen the next page will appear containing five options from which three are for selecting the desired items and the remaining two are for viewing and clearing of the selected orders respectively. We have designed three menu pages for the customer namely lunch, dinner and drinks respectively which have items their prices and the time it would take to be delivered on the table. We can also view our selected orders on every page. Finally all the selected orders from different menus can be viewed on the separate page namely "your order". This page also has an icon of submit your order. After clicking this icon the order would be submitted and a text will appear on the screen showing a statement that your order has been submitted and will be served in 20 minutes.

In general this application has been structured on three files. android manifest file, activity files and layout files.



Fig. 5 Welcome Screen



Fig. 6 Menu Screen



Fig. 7 Menu Ordering Screen

IV. FUNCTIONAL DESCRIPTION

The functional description of proposed system can be divided into three major categories

1. Placing an order by Customer

The Customer will take a seat at one of three tables. On the tables smart phones having android application named “Restaurant” are installed. Food item from menu card will be selected by the customer from the android application. Once the food items are selected by the customer they can be reviewed back from the button “view your order”. By pressing the button “submit your order” on android application the order will be transmitted via wirelessly to the counter. “Clear Order” button on android application will enable the customer to reset the order and place a new one.

2. Receiving and displaying at counter

Food order with complete information like table no. , date, time, price, items and order no will be transmitted from the Wi-Fi option available on the smart phones at the tables. This data is received at the counter, on the counter database is opened where appropriate orders are received and checked.

3. Transmitting to the waiter Robot

All the details of the orders are displayed on the website and are saved into the database for later viewing. The items that are ordered are placed onto the tray of the robot and then Robot is directed with the command to serve at the required table, using the Bluetooth module. Data is sent wirelessly to robot. The robot will serve the orders to required table by avoiding all obstacles in its path and then returning back to its initial point. This flow chart shows how the order is selected and submitted to the database.

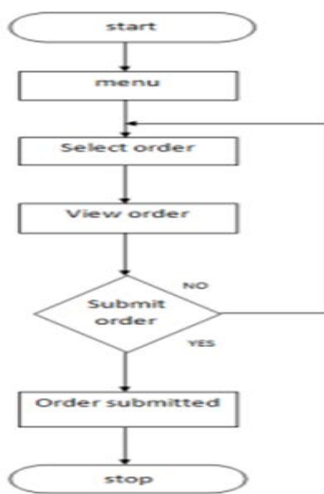


Fig. 8 Flow Chart for the algorithm

V. FUTURE ENHANCEMENT & RECOMMENDATIONS

Throughout our research we have stumble upon many models accessible performing the similar occupation as waiters, cleaners, chefs, etc, each with exclusively different criteria. Our robot is based on driving it on the defined paths with the intelligence of detecting obstacles in its way and would change its path to reach the destination after encountering an obstacle. Many features can be added to assist the robot and the operators for better management of task and functionality of the robot

1. Adding cameras (sense of sight).

Many models we came across used cameras mounted typically on what is supposed to be the head of the robot. The camera would take real time images or real time video and store it or transmit it wirelessly to the control terminals and screens installed in control room or the counter.

2. Multi-purpose single robot.

A robot of this style can be upgraded in the sense that it can be made to perform multiple jobs, such as a waiter, a cleaner a guider and even an entertainer. All through our research we had observed many distinct models from which one interesting model was designed in such a way that it would dance to the music to entertain the customers while it was idle (had no new order).

VI. CONCLUSION

This project integrated HTML for restaurant menu page designing, embedded C for code of touch screen module supported by autonomous waiter robot. The objective was to construct an archetype of an effusive functional environment with wireless transmission of orders and an autonomous robot that will serve the meals to the customer. This implementation were created to improve quality of services and additionally to upgrade customers eating experience. The proposed smart system strongly improves the pace and dependability of request satisfaction. Taking the requests through advanced touch screen stay away from wastage of paper furthermore lessens the need of printing printed copy of menu card. A client going into restaurant does not need to wait for the waiters to take the request. When he possesses a seat, he can arrange whatever he needs, additionally the client has freedom to take as much time as necessary to place order.

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