DESIGN AND IMPLEMENTATION OF AUTOMATED SYSTEM AS A WAITER IN RESTAURANT

R. Ohmsakthi vel[1], C. Kamalakkannan[2]

[1]Asst. Professor, Agni College of Technology, Chennai, Tamilnadu
[2]Asst. Professor, PRIST University (Chennai Campus), Mamallapuram, Tamilnadu

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Abstract - *Over the necessity and emerging development in mechatronics field, numbers of automated products were raised to innovate and made more comfortable for the human life. Likewise this paper also targets the design and prototype implementation of perfect hospitality in restaurant by placing an automated product instead of human. In this competitive world, everyone leads their life as fast as others. The restaurant officers wish to satisfy the customer by providing the better hospitality. Our work brings an essence to them by introducing an automated process starts from receiving the customer to send off from the restaurant smoothly and luxuriously. We used various emerging technologies for the whole operation. This work mainly targeted to replace the waiter in restaurant to reduce the customer's ideal time. Our work facilitates that the customer can make communication directly with chef through wireless technology and in turn chef delivers their food using automation technology. The system can guide and help the customer in each level of occurrence. Though the system requires high installation cost, it reduces the labour cost with nominal maintenance.*

***Key Words*: Mechatronics, Automation, Restaurant, Embedded technologies**

1. INTRODUCTION

As we know that emerging technologies would pay a great way to the most comfortable life as people's wish. The technological development raises the development of whole nation. The new emerging high valued intelligent systems shapes the cultures in various aspects. Various automated devices were developed for automation in industry and home. This expectation motivates us to create an automated product to serve in restaurant for better hospitality. Initially everyone raises a question, is it technically and economically feasible or not. We got motivation and started a work to design and implement a prototype for achieving automation in restaurant.

Initially various research work has completed to automate completely in the restaurant using Graphical User Interface (GUI). In that work, they implement an automated product to deliver the things in time and those activities gets monitored by a technical person through graphical interface.

In our work we are going to implement an automated product for taking order from the customer and delivering the same to them in time. By this product, the hotelier can satisfy the customer by reducing the idle time. Our automation process gets start from the customer's entry at the entrance itself. Entrance module (E1) can communicate with customer and allocate the table number as per the number of customer. Then the customer occupied the allocated seat, meanwhile the entrance module sends the table number and number of customer to the cashier module (M1). In that table, the customer can order the required dishes through wireless technology gets implemented in customer module (C1).

C1 module transmit the digital data to the Chef module (D1) and display it with its table number, then only the chef can identified the order by whom. The trolley module (Wx) carries the prepared food and follows the prescribed line path and reaches the customer. Once the customer discharges all food items, the trolley gets backs to its original position. Since the hotelier can accommodate two or three trolley modules, they can able to deliver the food items in short time.
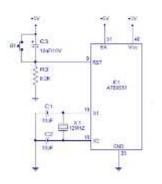
2. INSTRUMENTATION AND CONTROL STRATEGY

2.1 Microcontroller unit

This microcontroller unit plays as a heartbeat in every module. Here we are using AT89S52 micro controller for our prototype product in all levels. This 8 bit microcontroller belongs to 8051 family with 8K bytes of Flash memory, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two DPTRs, three 16-bit Timer/Counters, a full duplex serial port, on-chip oscillator, and clock circuitry. The micro controller gets deployed in all operations to receive, process and transmit data as per our programs. This micro controller unit implements the user interface as much user friendly. There is an availability of Universal Serial Bus (USB) for the In- System Programming (ISP). The program gets structured in embedded C and gets simulated in Keil IDE. All program gets modeled over proteus software package.
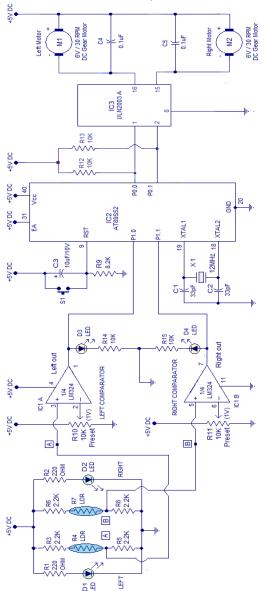
2.2 Line Follower

Line follower robots were one of the well-known and traditional type of an automatic guided robots (AGV). They can able to proceed over a contrast line in the background, usually a black line on a white surface or vice versa.
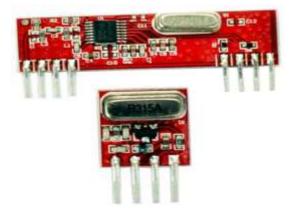

Usually the line follower robot works based on the principle of closed loop control system, where the feedback

signals are raised from the line sensor gets drained to the controller for regulating the robot's path. The sensors are usually LED/LDR, LED/Photodiode or LED/Phototransistor pairs. Gear motors or stepper motors are used for driving the robotic wheels. The line follower robot presented here is designed to follow a black line on a white background. It has a pair of sensors (LED / LDR) and works on a simple "align robot on center of the line algorithm". The motor driver circuit functions to drive the motors according to the output signals from the microcontroller. The motor driver circuit is based on ULN2003A IC. ULN2003A is a high current (500mA), high voltage (50V) darlington array consisting of seven darlington pairs with common emitter and open collector.

2.3 Transceivers

Transceivers can able to do both transmitting and receiving operations. Generally this module gets implemented in half duplex communication rather than full duplex. This hybrid transceiver module provides a complete RF subsystem which can be used to transmit and receive data at up to 500Kbps from any standard CMOS/TTL source. Extensive hardware support is provided for packet handling, data buffering, burst transmissions and link quality indication. Automatic collision avoidance is also provided with the clear channel assessment features. The modules are ideal for battery powered applications, current consumption is reduced with the burst transmissions and wake on radio features. The data stream can be automatically Manchester encoded and decoded ensuring high reliability and low error rates. The modules frequency, output power and sensitivity are all programmable through an efficient SPI interface.

3. SYSTEM DEPLOYMENT

3.1 Entrance Modeule

This module only starts the automation process at the entrance itself, hence it is called by so. Once the customer reaches the sensor reachable area, this module gets actuated and enquires the question "How many members are going to accommodate?" Once the customer replied by using
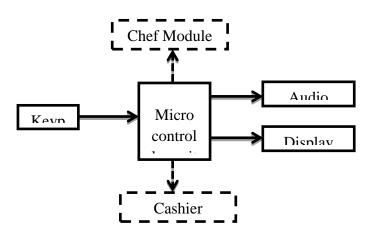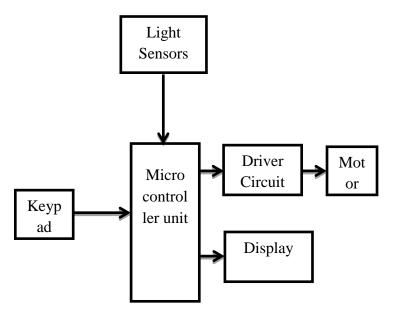
Senso

available keypad, the controller checks for availability in and allocates the table. If all the tables get accommodated, then the controller informed the customer to wait in common room.

3.2 Customer Module

Once the customer reaches the allocated table, they can order their prescribed food items through the touch pad available in that table. Those digital data gets transmitted to both chef module as well as the cashier module. This module pays a way to create a communication with chef directly. By this process the idle delay time gets reduced as much for the customers.

3.3 Chef Module

This module is nothing but the basic micro controller equipped with a RF receiver and the display unit. The receiver receives the signal from RF transmitter availed in Customer module. Then the microcontroller display the received data in the display with the identification number as table number. Once the display starts functions the chef gets alerts to prepare the ordered food.

3.4 Trolley Module

This trolley module is nothing but the implications of line following robot. Once the chef prepared the food items, he can keep the dishes in the trolley. The trolley receives the input from the chef through keypad, then starts functioning to

reach the respective table in the below mentioned predefined path. The trolley delivers all the food items and starts to its home position by completing full circle.
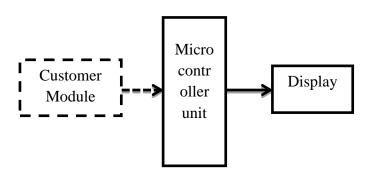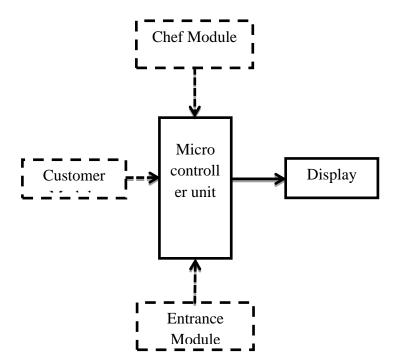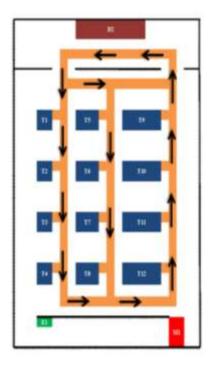

3.5 Cashier Module

This is the simple module just receives the various signals from the above mentioned modules. Then the cashier calculates the bill amount and submits to customer.

3.5 Line Following Layout

4. Conclusion

This paper presents semi automation, an automated product to provide better hospitality in restaurant's dining room. Since it is highly economic, every hotelier can adopt this technology as soon. The future work concentrate over the fully automation in the restaurant by means of replacing the chef by an automated product. Here we only replace the waiter alone.

REFERENCES

[1] K. Hasan, A. Nahid, and A. Mamun, "Implementation of autonomous line follower robot," in IEEE/OSA/IAPR International Conference on Informatics, Electronics & Vision, 2012, pp. 865-869.

[2] J.-F. Dupois and M. Parizeau, "Evolving a vision-based line-following robot controller," in Proceedings of the 3rd Canadian Conference on Computer and Robot Vision (CRV06), 2006, p. 75.

[3] Colak and D. Yildirim, "Evolving a line following robot to use in shopping centers for entertainment," in 35'th Annual Conference of IEEE Industrial Electronics, 2009. IECON '09, 2009, pp. 3803-3807.

[4] M. Ollis, "Perception algorithms for a harvesting robot," CMU-RI-TR-97-43, Carnegie Mellon University, 1997.

[5] Y. Boers, F. Ehlers, W. Koch, T. Luginbuhl, L. Stone, and R. Streit, "Track before detect algorithms," EURASIP Journal on Advances in Signal Processing, 2008.

[6] Data sheets for all electronic components (Micro controller, RF transceivers, LED/LDR, ULN2003)

[7] www.keil.com

[8] www.8051.com