

Food Serving Robot for Contactless Experience

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ABSTRACT- As the world is emerging towards new trends and technologies; there is a need to invent something that is more attractive and useful for the citizens. This research work highlights a very young area of application and provides a comprehensive overview of the application of robotics in the food industry. In this new technological age, all jobs depend on a technology called automation. New research works are developed in the market instead of human workers being the fashion and new passion today. In this context, we develop the concept of the food serving robots (FSR) in this work. It required Arduino board and the Arduino IDE to build. In this research work the board is predefined by using color sensors and the obstacle sensor to identify the tables. This Application can be used in any hotel and restaurant, regular cycles. The use of robots in the food management system is very trendy. Internet of Things mechanisms (IoTM) are widely used to avoid human manual work. It also reduces the number of employees in a workplace. Once the structure is created, it works according to the user's instructions. Here in this Application we will create this robot for food delivery in hotels. In this paper, we consider two tables to show the operation of the robo and the so-called food delivery robot. In this robo build it required components like Arduino board, gear motor, motor controller, IR obstacle sensor, battery (6 volt), and jumper wires.

KEYWORDS- Food serving robots (FSR), Automation, IR obstacle sensor, Internet of Things mechanisms (IoTM)

I. INTRODUCTION

Nowadays Internet expects a huge part in everywhere, new methods are emerged in the overall population to stay aware of the precision and avoiding the manual work inside a base cost. The Internet of Things is one the moving plan to make the a couple of systems as motorization and can diminish the number human undertakings in every space, alongside this robot making and using the robot in the dares to replace the human undertakings is one of the huge thoughts. While examining the food business, the robots fill for much need, essentially in serving the food [1],[3]. The improvement of computerized applications in food industry progressed and the advancement was not accessible as a result of high development related costs. Directly following getting the consistency of computerized positions, with additional created adequacy and reduced workspace, food industry expanded the use of robots for various applications which achieved high effectiveness [4],[7]. In a push towards more

critical capability and scale to resolve the issues of what might be on the horizon, industry pioneers have placed assets into cutting edge mechanics and automating advancements. A few basic spaces of progress join mechanized water framework, fertilizer, gathering, and duplicating structures. These cooperation redesigns are highlighted lessening creation expenses and observing water, fuel, and manure [3]. Enormous quantities of these headways are not simply useful, they are work providing. Some tremendous business firms have used gathering robots that can cover the grounds of various workers. Robots fundamentally might potentially change the cycles in food planning and managing, food serving. Thus, progressing years saw enormously extended example of robots game plan in food region. Food serving industry is the most forward-thinking approach of robots use in food industry [8]. This is the most imaginative locale not tapped totally as of not long ago. As this directly oversees retail and buyers, thusly, it is seen as an astounding change in lifestyle including a donning development and therefore expects watching out for the thoughts of human structure mix. Food serving industry is the most forward-thinking approach of robots use in food industry. This is the most imaginative area not tapped totally as of recently [9],[11]. As this directly oversees retail and buyers, therefore, it is seen as a shocking change in lifestyle including a sporting this undertaking significantly we are concentrating about the serving of the food as per the guidance of the client, when the food is put on the robot which is moved to the relegated way and arrived at the table which has been as of now modified or taught [12] shown in figures 4 and 5. This robo can contain the ringer for the utilization of the client, once the robo is halted at the allocated table; the signal utters the sound until the client gets the food from the robo [13]. This strategy can stay away from the manual food providing technique and less human interaction shown in figure 5. The development and along these lines expects watching out for the thoughts of human system blend.

A. Objectives

- The general objective of advanced mechanics is to foster machines that can perform indicated complex errands independently or semi independently.
- Doing the Task Right with Minimal Human Interaction.

II. LITERATURE SURVEY

This review can clarify that the troubles and exam of the present day framework and the proposed work. In this writing evaluate, we can clarify that the cutting-edge and proposed arrangement of a utility. The modern-day association of the software can clarify the modern operating status of the utility which has correctly been working. Proposed framework clarifies that our new proposed paintings to defeat the current running detriments [11],[15].

III. RELATED WORKS

A. Arduino Board

It is an open-source hardware and software corporation that designs and manufactures single-board microcontrollers and microcontroller packs to be used in computerized gadgets, in addition to a project and user community [6],[8]. Arduino sheets may be constructed collectively by everybody and used to offer code. arduino sheets are to be had for buy immediately from the authority's internet site or via accredited resellers. Arduino boards hire a huge range of microprocessors and regulators. the sheets offer a variety of complicated and simple information/yield (i/o) sticks that may be connected to extraordinary improvement sheets ('safeguards'), breadboards (for prototyping), and circuits. Sequential interchange interfaces, together with generic serial bus (usb) on some fashions, are highlighted on the sheets, and also are used for stacking applications [11],[15] shown in figure 1. c and c++ programming languages, in addition to a preferred api called the "arduino language," may be used to customize the microcontrollers. The usage of conventional compiler tool chains is not the simplest option.

B. Arduino Uno

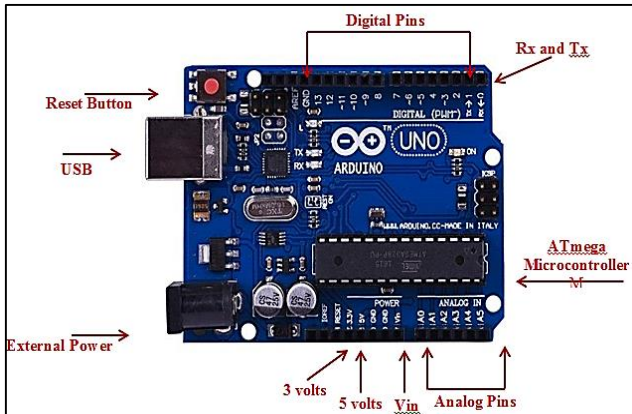


Figure 1: Auduino Uno Board

Table 1: Descriptions

Microcontroller	Atmega328
Operating Voltage	5V
Input Voltage	7-12V
Input Voltage (limits)	6-20V
Digital input/output pins	14
Analog Input Pins	6
DC Current per I/O Pin	40 ma

DC Current for 3.3V Pin	50 ma
Flash Memory	32 KB of which 0.5 kb used by bootloader
SRAM	2KB (ATmega328)
EEPROM	1KB (ATmega328)
Clock Speed	16 MHz

C. Motor Driver

Actually, a motor cause pressure is some factor that reasons the motor to move in reaction to instructions or inputs (excessive and low). It takes use of the controller's low voltage to be able to pressure a motor that requires a high enter voltage. The time period "motor force," or definitely "power," refers to device velocity manage system. Many commercial processes, including assembly lines, must function at variable charges depending at the commodity [7]. Whilst process conditions necessitate pump or fan go with the flow adjustment, adjusting the pressure's velocity can be greater power efficient than different float manipulate methods [12]. Motor driver makes use of a bigger chip or discrete fets which could control better currents and voltages than a microcontroller pin's normal 5v/three.3v. They enable you to control a considerably large load with a noticeably tiny sign. It's critical to understand that even as talking approximately motor drivers and controllers, the sort of motor have to additionally be considered. The s is a brushed dc motor.

D. Gear Motors

Any electric motors with tools teach is referred to as a gear motor. AC (alternating current) or DC (direct modern) electricity is used by gear vehicles. in maximum circumstances, the equipment reducer's cause is to growth the available output torque while retaining the motor's energy intake low and keeping a small length [2]. Torque multiplication comes at the fee of a commensurate drop in engine velocity. A gear motor is a mixture of a equipment system or gearbox with an electric powered motor, often called a tools motor or geared motor [5]. A green motor, such as an electrically commutated motor, is combined with a gear reducer or gearhead in a gear motor, and are every now and then incorrectly called "gears vehicles" or maybe "geared cars. Their primary aim is to provide for a clean transition from an excessive to a lower velocity without causing damage to the mechanism [8]. A tools motor is likewise in price of adjusting the mechanical energy of a device in addition to this adjustment. The mechanical gain of a gearbox lets in it to decorate output torque even as reducing RPM. The shaft of the motor is fed into the gearbox, which converts torque and velocity thru a series of inner gears. To fulfill a huge range of torque necessities, we offer gearboxes in a spread of sizes and gear ratios. Electric powered tools automobiles are utilized in programs that want a high output torque and a gradual output shaft rotational velocity, especially when space and power are restricted [15]. This term is used to explain a huge range of not unusual system applications in a spread of sectors.

E. Battery (6 volts)

There are some sorts of electric powered batteries which can be arranged into two systems (1) number one cells or for the most part called non-battery-powered batteries,

which are fabricated to be applied just a unmarried time until all its strength is launched. (2) Secondary cells or battery-powered batteries that can be applied on numerous events [11] seen in figure 2. These kinds are available diverse structures, shapes, sizes, masses, and voltages, which buyers take in idea relying upon their necessities.



Figure 2: Batteries

F. IR Sensors:

An infrared (IR) sensor is a type of electric sensor that detects and responds to infrared radiation in the environment. William Herschel, an area expert, discovered infrared radiation via coincidence in 1800. Whilst comparing the temperature of every color of mild, he discovered that the temperature just beyond the red mild become the maximum great (separated through a crystal) [3],[8]. Because IR has an extended frequency than seen mild, its miles invisible to the naked eye (but it is as but on a comparable Electromagnetic range). Anything that produces warmth emits infrared radiation (that is, something that has a temperature over more or less five ranges kelvin) [9].

G. Arduino IDE

It is one of the IDE that may be used to put in writing the computer code and those codes are useful to upload inside the physical forums for the reason to apply the automatic machine. It's far a totally useful and simple programming for this it's so famous in recent times [1],[6]. Many useful options and features are present in this ide layout. IDE is not anything however the integrated development environment that helps to write the code concerning for the physical board. It could provide massive wide variety of the libraries [13].

H. IoT

The net of factors (IoT) enables humans live and paintings extra brilliantly, as well as manage their lives. IoT is important for enterprise in addition to offering smart devices to automate households [5],[12]. IoT affords agencies with a continuous look at how their systems carry out, delivering insights into the whole lot from system show to storage network and coordination obligations [18].

IV. EXISTING SYSTEM

A few industries' current structures are as follows especially coming to the factor of meals industry (accommodations/restaurants), its miles completely depends at the human hard work for the manufacturing and serving of the meals. A few the business corporations are making an investment to the robo to reduce the hard work price and for

effective Artwork within the industries, now not a great deal option to serve the meals in the restaurants and hotels in place of the human hard work [1],[18].

V. PROPOSED SYSTEM

Regarding to the above said trouble we're going to advocate a food deliver robo for the meals industry (hotels/eating places) [2]. This robo is ready for simplest the purpose of the food serving and makes the Artwork efficient and less human interruption inside the approach [5] seen in figure 5. As soon as the user can region the food on the robo it'll circulate in line with the assigned table and it consists of the 6 volts battery and IR sensor for the higher performance and to discover the assigned table through the IR sensor [8] shown in figures 2 and 4. It is also which include the buzzer that may help gather the meals from the robo in the assigned story of customer. The buzzer makes sound till the consumer can get hold of the meals from it.

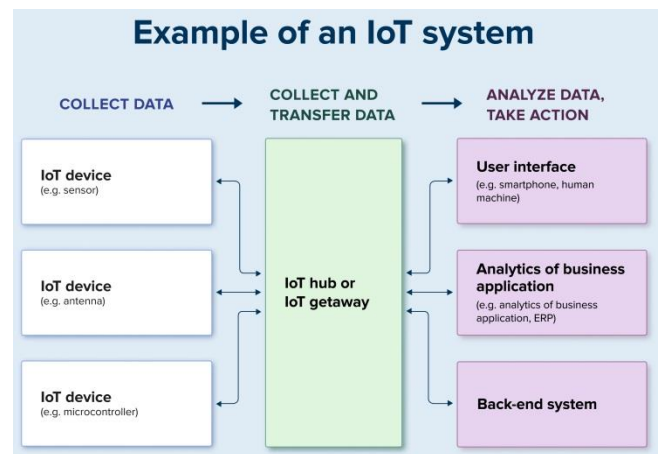


Figure 3: IoT System



Figure 4: Directions

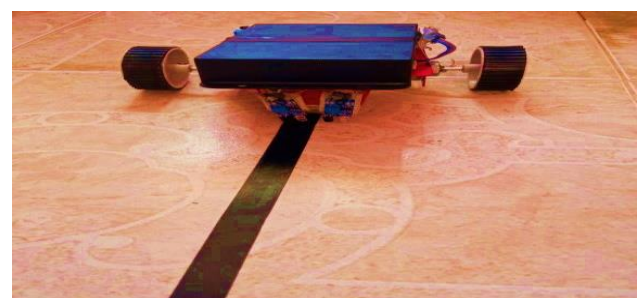


Figure 5: Robo Architecture.

VI. CONCLUSION

The food serving robot for contactless experience is the thorough cutting edge uncovers that the space of mechanical technology has unbelievably accelerated the efficiency whilst contrasted with the guide introduction frameworks. It's far featured that the food serving area has the most important capability of innovative paintings. The robot system can work consistent with the pre-described programming within an assigned time, while once the meals can items can be positioned inside the pinnacle of the robo it is able to be moved to the assigned table that's managed via the user, and it could make the sound until the food acquired from the patron inside the table. Concerning this the proposed device of the food supply robotic can make the meals serving approach for the lodges/restaurants easy. this approach can keep away from the guide system of food serving device as well as it could lessen the personnel work with the aid of making the procedure easy.

REFERENCES

- [1] Wilson, Allan. 'Hajime Robot Restaurant, Bangkok, Japanese Yakiniiku Barbecue'. N.p., 2015. 3 Sept. 2015.
- [2] Welcome to Infinium Robotics., 'Intelligent Robotics Solutions - Infinium Robotics'. N.p., 2015. <http://www.infiniumrobotics.com/>. 3 Sept. 2015.
- [3] Tech in Asia., 'Singapore Restaurant Shows Off Autonomous Drone Waiters'. N.p., 2015. <https://www.techinasia.com/singaporerestaurant-autonomous-drone-waiters/>. 3 Sept. 2015.
- [4] Park, Jae-Han, Seung-Ho Baeg, and Moon-Hong Baeg. 'An Intelligent Navigation Method For Service Robots In A Smart Environment'. International Conference on Control, Automation and Systems 2007 (2007)
- [5] Lin, L. and Shih, H. (2013). Modelling and Adaptive Control of an Omni-Mecanum-Wheeled Robot. ICA, 04(02), pp.166-179.
- [6] McInerney, I. (2015). Simplistic Control of Mecanum Drive. FRC Team 2022, pp.1 – 4
- [7] Kuo, Bor-Woei et al. 'A Light-And-Fast SLAM Algorithm For Robots In Indoor Environments Using Line Segment Map'. Journal of Robotics 2011 (2011): 1-12.
- [8] Pei, Fujun, Mei Wu, and Simin Zhang. 'Distributed SLAM Using Improved Particle Filter For Mobile Robot Localization'. The Scientific World Journal 2014 (2014): 1-10.
- [9] N. Fathima, A. Ahammed, R. Banu, B.D. Parameshachari, and N.M. Naik, N.M., "Optimized neighbor discovery in Internet of Things (IoT)," In Proc. of International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques (ICEECCOT), pp. 1-5, 2017.
- [10] M. Asif, M. Sabeel, Mujeeb-ur-Rahman, Z. H. Khan "Waiter Robot – Solution to Restaurant Automation"b 2015
- [11] Hertzberg, J.; Zhang, J.; Zhang, L.; Rockel, S.; Neumann, B.; Lehmann, J.; Dubba, K.S.; Cohn, A.G.; Saffiotti, A.; Pecora, F.; et al.The RACE project. KI Künstliche Intell. 2014, 28, 297–304.
- [12] Hernandez-Vicen, J.; Martinez, S.; Garcia-Haro, J.M.; Balaguer, C. Correction of Visual Perception Based on Neuro-Fuzzy Learning for the Humanoid Robot TEO. Sensors 2018, 18, 972.
- [13] Moley Robotics. MK1—TheWorld's First Robotic Kitchen. 2015. (accessed on 10 December 2020).
- [14] Puerto, K. Un Equipo de Robots Camarero del MIT Sirve la Cerveza de Forma Eficiente. Xataka. 2015. (accessed on 10 December 2020).
- [15] Oña, E.D.; Garcia-Haro, J.M.; Jardón, A.; Balaguer, C. Robotics in health care: Perspectives of robot-aided interventions in clinical practice for rehabilitation of upper limbs. Appl. Sci. 2019, 9, 2586
- [16] V. N. Thanh, D. P. Vinh, N. T. Nghi, L. H. Nam and D. L. H. Toan, "Restaurant Serving Robot with Double Line Sensors Following Approach," 2019 IEEE International Conference on Mechatronics and Automation (ICMA), Tianjin, China, 2019, pp. 235-239, doi: 10.1109/ICMA.2019.8816404.
- [17] Yogalakshmi.C.N and V. Maik, "Autonomous Serving System in Restaurants Using RFID and Weight Sensor," 2019 2nd International Conference of Intelligent Robotic and Control Engineering (IRCE), Singapore, Singapore, 2019, pp. 156-159, doi: 10.1109/IRCE.2019.00038.
- [18] Myoken, Yumiko. 'Japan'S Service Robotics Development'. Science & Innovation Section, British Embassy Tokyo, 2011.

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