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Solar Powerd Based Automatic Pick & Place Packaging System

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Abstract: *In this proposed system, we have designed a Smart Solar based Multipurpose Military Robot. This type of robots can be used in war fields, where the risk of sending human is much high. Using this system Operator can view the Remote location of war field using Wireless camera. This system is also equipped with a Ultrasonic sensor and an arm with gripper. This entire system is Power using Solar Panel and movement of this robot is controlled using IOT application. Concept of object pick-and-place and Line follower robot which will be functioned following a particular line may help an industry to attenuate the labour cost or may be alternatives of the labours. Nowadays the industries are following the concept of automation and for this purpose robots are the best alternatives. Single type of robot is most commonly used in industry is a robotic manipulator or simply a mechanical arm. It is an open or closed kinematic mechanism chain of rigid links interconnected by movables joints. We have pile up a mechanical arm with a Bluetooth operated robot which will be able to pick an object from a certain place then carry it to the defined place by following a predefined line. A robotic system that is capable of both picking up and releasing microobjects with high accuracy, high precision, reliability and speed.*

Keywords: Pick & Place Mechanism, Microcontroller, Automation, Bluetooth Operated Robot, Solar Power, etc.

I. INTRODUCTION

The Pick and place capabilities are commonly used in manufacturing plans. In today's advanced technology man power are critical constrains for completion of task in large scales. The automation is playing vital role to save human efforts in most of the regular and frequently carried works. One of the major and most commonly performed works is picking and placing of jobs from source to destination. These moves of objects on a specified path to pick the components from one location and place them on desired locations. Basically, the object carrying robot is a microcontroller-based mechatronic system that finds out the object from the particular place, picks the object from location and places at a specific destination. A robotic arm is a robot manipulator configuration, usually using a sequence of function by the controlled program, with resembling functions to a human arm. The robot arms can be self-explanatory or operated manually and can be used to perform different tasks with great accuracy in this highly developing society time and man power are critical constrains for completion of task in large scales. The automation is playing important role to save human efforts in most of the regular and frequently carried works. One of the major and most commonly performed works is picking and placing of jobs from source to destination.

Problem Definition-

- To study the robot will have the ability to follow a line.
- It will be capable of carrying objects and picking and placing them in particular locations using a Bluetooth-controlled arm.
- Pick and place robots are common in businesses with a lot of repetitive work

Aim of Project-

- In our project, we have proposed a line follower robot that can pick up an object from a certain location and transfer it to a predetermined location by following a predefined line, as well as clear obstacles. We are designing

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a prototype model, which can effectively replace a material handling vehicle in industry in very effective manner.

Objectives-

- To make a robot which can be carried load by following line
- To reduce physical effort in industry
- To consume production time.
- The robot will have the ability to follow a line.
- It will be capable of carrying objects and picking and placing them in particular locations using a Bluetooth-controlled arm.
- Pick and place robots are common in businesses with a lot of repetitive work

II. LITERATURE SURVEY

[1] The line follower and pick and place robot [1] by Sri Jagath H R, published in IRJET, Feb 2020.This paper presents the development of an automatic pick and place robot arm controlled using Arduino NANO. The pick and place robots are popular in industries, where repetative tasks are present. Line follower robot is known as a learning tool for Automation. It is machine that follows a line either a black line on white surface or vice-versa. Android controlled pick and place arm with line follower automation,

[2] by lwinHtay, Nyan Phyo Aung, Mo Myint Wai published in (IJTSRD) international journal of trend in scientific research and development (IJTSRD), ISSN: 2456 -6470, volume-3, issue- 5, August 2019. This paper presents the pick and place robot with line follower function for manufacturing application. Manufacturing automaton is widely used in small and medium plants, however, automaton cooperating with other devices is an important aspect for achieving the fully autonomous system. Automatic pick and place robotic arm vehicle.

[3] by Prof. Vijay Matta, Namita Mendole, Leena Lengule, Nidhi Hatwar, Pragati Manohare, Neha Meshram, Shipa Negdeote published in (IJARCCE) International journal of advanced research in computer and communication engineering. Vol.7, issue 2, Feb 2018.Line follower robot

[4] by Abhijit G. Kalbande, Shraddha Koche published in Journal for research, vol 4, Issue 1, Marcp018. It is programmed to move automatically and in accordance with the plot line One of the most crucial features of robotics is line following. A Line Follower Robot is a self-contained robot that can follow a black or white line drawn on a surface of contrasting colour. It is programmed to move automatically and in accordance with the plot line. Design and implementation of a sensor guided pick and place robot.

[5] by S.H. Sushmitha and Uma Priyadarshini published in international journal of pure and applied mathematics vol 119, No.16 2018, 2939-2945. ISSN: 1314-3395. In this paper 2. A novel design for autonomous line follower robot

[7] by Md. Majedur Rehman, Hossain Mi, Islam, Rahman MM May 2017 Journal of electrical engineering and technology (JEEET). The line following paper proposes a new model The Autonomous Line Follower Robot is a mobile machine that can recognize and follow a pre-drawn line that may be seen as a black line on a white surface with a high contrasting colour. Technical report of building a line follower robot

[8] by Sayedehson Marjani Bajestani, Arsham Vasohibin. IEEE 2017. The following robot is a temporary intelligent 3 system with robot positions corrected feedbacks, aiming for the black or white line. The voltages of the circuits and the voltages of the sensors are the main sources of income for robots. The following robot is a temporary intelligent system with robot positions corrected feedbacks, aiming for the black or white line. The voltages of the circuits and the voltages of the sensors are the main sources of income for robots.

Pick and place ABB working with a linear follower robot [9] by Nwokomah Wilson Gosim , Trig Faisal HMA A AL-Assad. Published in international symposium on robotics and intelligent sensors 2012 (IRIS 2012). The necessity for higher manufacturing output in industries prompted the development of this project proposal. Industrial robots are commonly utilised in small and medium workshops; nonetheless, the robot's ability to collaborate with other devices is critical to developing a fully autonomous system source.

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M. Mobarak Hossain, et al [2], Both are studied on military robot and also given some features on them designed robot, these are mainly used for the both in civil and military fields. The design and placement of various sensors, wheel system, mechanical arms as well as wireless communication mechanism and remote controlling mechanism is discussed here in details. finally, they conclude that these kinds of robots are used in mainly in civil and military fields. For civil use, it can detect gas leak in home or industry, surveillance of shopping mall, parking lot, office, industry, bank, museums, helping rescue operation during natural disaster and aftermath like searching for human, supplying food and other essentials to the people under unreachable ruin.

III. PROPOSED SYSTEM

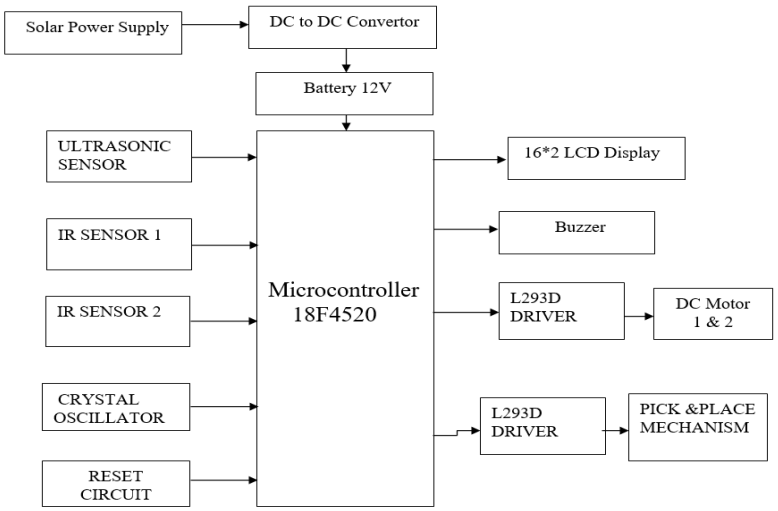

Figure 1: Block Diagram

The figure shows that the block diagram of Solar Powered Automatic pick & place robot System. The hardware requirements of our project are PIC microcontroller, IR sensor module, Motor driver module, Robotic arm claw, 12v battery, Connecting wires, Ultrasonic sensor, Bluetooth HC05. The software requirements are MPLAB IDE for programming. An infrared sensor array beneath the front of robot we have an infrared sensor array beneath the front of our robot. Its senses the line and send a variable voltage signal to the ADC (Analogue to Digital Converter). The ADC send binary signal according to the sensor array to the Microcontroller (PIC 18 f4520).

A sonar sensor which is placed front faced. It senses the object which is placed in front of it. When it senses any object kept in front of it, it sends a signal to the microcontroller and then the controller commands the wheel motors to stop. At the same time, it sends signal to the servo motor to wake up and pick the object up by claw. Claw will be used to pick and place the objects from source to destination wirelessly using Bluetooth and also robot can be stopped in emergency of dropping the object carried by robot over the line of path. We add a buzzer and an indicator light for making a proper understanding between the operator and the robot. When it detects any object by the sonar, it stops and makes a loud sound by buzzer for a couple of seconds and when it reaches to the destination the buzzer begins to make sound continuously till it switched off. A push button is added for manual input

A. PIC 18f4520 Microcontroller

It is an 8-bit enhanced flash PIC microcontroller that comes with nano Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end-user products.

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This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

- Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF.
- Divided into 256-byte banks.
- There are total of F banks.
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bit.
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip External.
- On-chip program memory is either PROM or EEPROM.
- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000.

Figure 3: PIC18F4520

B. Ultrasonic Sensor:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules include ultrasonic transmitters, receiver and control circuit. The basic principle of work 12 (1) Using IO trigger for at least 10us high level signal, (2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back. (3) IF the signal back, through high level, time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level time × velocity of sound (340M/S) / 2).

Figure 4: Ultrasonic Sensor

C. L293D Motor Driver IC

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. The most commonly used motor driver ICs are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. We will be referring the motor driver IC as L293D only. L293D has 16 pins.

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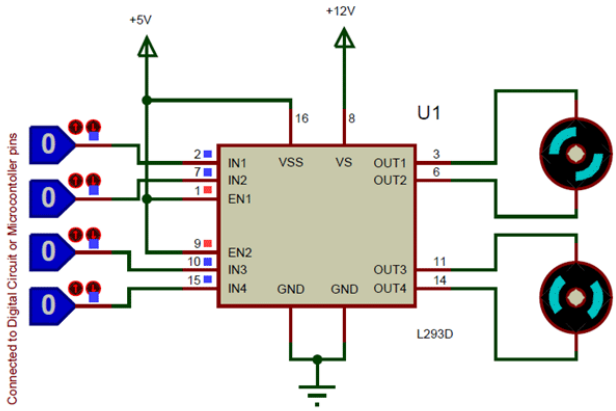

Figure 5: L293D Motor Driver IC

D. LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

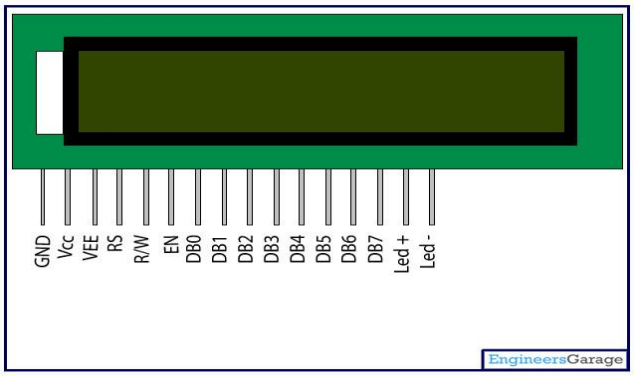

Figure 6: LCD Display

E. IR Sensor

Proximity Sensor are used to detect objects and obstacles in front of sensor. Sensor keeps transmitting infrared light and when any object comes near, it is detected by the sensor by monitoring the reflected light from the object. It can be used in robots for obstacle avoidance, for automatic doors, for parking aid devices or for security alarm systems, or contact less tachometer by measuring RPM of rotation objects like fan blades. Digital low output on detecting objects in *front.*

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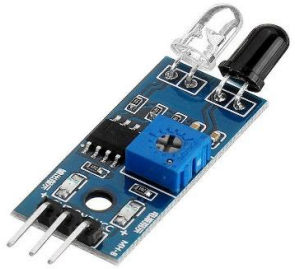

Figure 7: IR Sensor

IV. CONCLUSION

Robot pick and place automation speeds up the process of picking parts up and placing them in new locations, while also increasing production rates. These pick and place robots are more accurate and do not fatigue while doing back-breaking or hard to maneuverer movements that may be difficult for humans. The consistency, quality and repeatability of a pick and place robot system is unmatched. These systems are also versatile and can be reprogrammed and tooled to provide multiple applications for consumers.

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