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Line Following Pick and Place Robot for Green Planet

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Abstract: This project deals with the development and construction of a line follower robot capable to sense multiple colour combinations and placing buds in the given zone by picking it.
These two robots to be prepared are as follows:
1. MANUAL robot
2. AUTONOMOUS robot
Manual robot is operated by a cable connected to it. The various links of manual robot is actuated with the help of electric motor and pneumatics.
Keywords: PMDC Motor: permanent magnet dc motor, PWM: pulse width modulation.

I. INTRODUCTION

The Manual Robot picks up the Leaves in the "Leaves Store" and places them in the 3 Rings in the Southern Hemisphere. Then, the Manual Robot loads "Leaves" which have been picked up from the "Leaves Store" onto Automatic Robot. The Automatic Robot must place at least 3 leaves in the Northern Hemisphere (including two leaves in its own zone and at least one leaf in the common zone), then it is allowed to touch the Bud(s) in the Northern Hemisphere. The Automatic Robot goes to the North Pole Zone and picks up the Buds (made by the team) and loads them into the Manual Robot. The Manual Robot stands below the Limit Line 2 and throws the Bud(s) at the Moon. If the team's Bud stands successfully on the moon, the team achieves "THE GREEN PLANET" and wins the game.

II. HARDWARE DESCRIPTIONS

A. MANUAL Robot

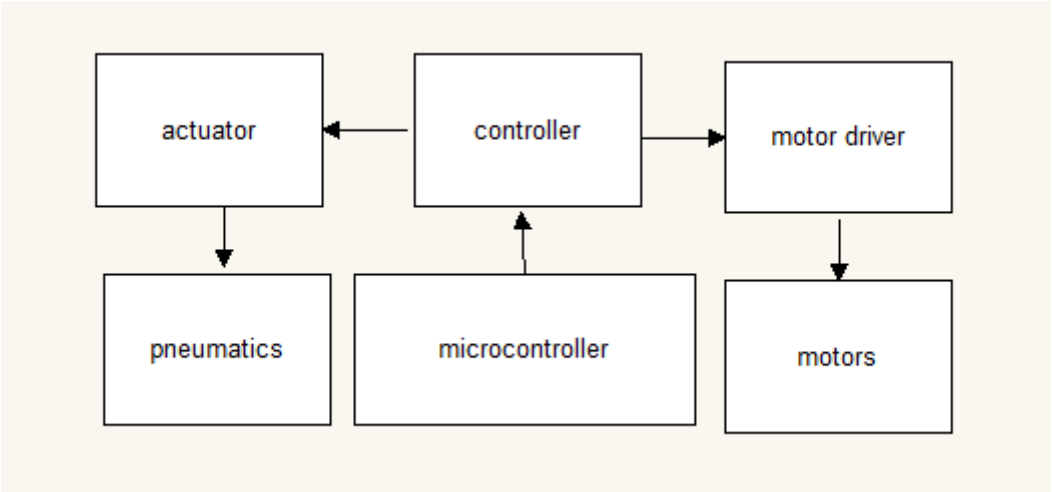

Fig.no.1. block diagram of manual robot

1) Controller: The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analogue inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields.

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2) Motor Drivers: Hercules 6V-36V, 15Amp Motor Driver can take up to 30A peak current load and can be operated up to 10 KHz PWM. Motor driver can be interfaced with 3.3V and 5V logic levels. Motor driver has built-in protection from under / over voltage, over temperature and short. Motor Driver has optional ACS714 current sensor for current sensing. You can choose current sensor installation option at the time of placing the order. The Motor driver has terminal block as power connector and 10 pin 2510 type relimate connector for the logic connection. It is suitable for high performance robots, Robotic contests, Robo-cup, US First, Battle robots etc.

Hercules 6V-36V, 17Amp Motor Driver can take up to 20Amp current if fan is installed on top of heat sink.

3) Motors: In order to move the robot, PMDC motors are used with planetary gearbox.

4) Power Supply: Lithium-ion batteries are incredibly popular these days. You can find them in laptops, PDAs, cell phones and iPods. Lithium-ion batteries are popular because they have a number of important advantages over competing technologies:

5) Infrared Proximity Sensor: Infrared sensors use a beam of light to detect the presence or absence of an object. This technology is used to identify size and contrast of an object. Application areas of photoelectric sensors include industrial automation lines, elevators, parking facilities, logistics services, semiconductor devices, packaging machines and construction areas.

III. SPECIFICATION OF ELEMENTS

A. Controller

Microcontroller	ATmega2560
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA

B. Motor Drivers

Operating voltage: 6V to 36V
Continuous output current: 15Amp (17Amp if fan is installed)
Peak output current: 30Amps
Maximum PWM Frequency: 10KHz

C. Motors

Stall torque- 42 Kg-cm
RPM- 100 rpm
Stall current- 1.2 Amp.

D. Infrared Proximity Sensors

Realisation of long sensing distance (2m) by special optical design.
Operating Supply: 12-24V dc

IV. MECHANISMS

The manual robot mainly consists of two mechanisms, one is for the picking and another is for lifting the buds.

1. Picking mechanism consists of a pneumatic control system containing a piston cylinder of 15* 100 mm, which actuates the picking mechanism.

2. Lifting involves rotation of the picking mechanism and up and down motion of it. After picking the bud it should be taken up in order to do for lifting another bud. Up and down motion of whole mechanism is obtained over the pair of sliders which are connected to whole of the mechanism. It is connected to a belt over a pulley which is driven by a electric motor.

Picking mechanism is pivoted at the bottom, which is rotate about pivot with the help of a string wounded over a pulley driven with electric motor. Free end of string is connected to fardest point of the link from pivot point. As motor rotates clockwise string

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gets wounded over pullet and whole of mechanism a pulled towards pulley. Anticlockwise rotation unveils string from pullet and due to self weight whole mechanism comes down.

V. PROTOTYPE MODEL

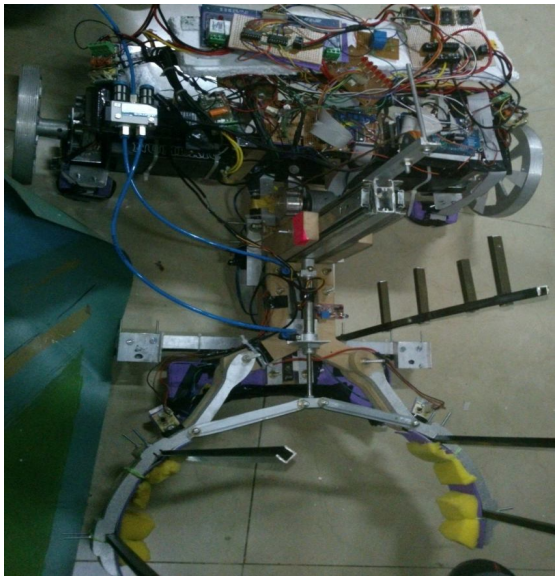

Fig. no.2: Prototype model

VI. CONCLUSION

This project describes simple way of constructing a robot for picking and placing of buds for green planet. With the help of this robot, we can perform picking and placing of various size and shapes of objects, which can be very useful for automation industries. This robot is also capable to sense multiple colour combinations and perform its operation efficiently.

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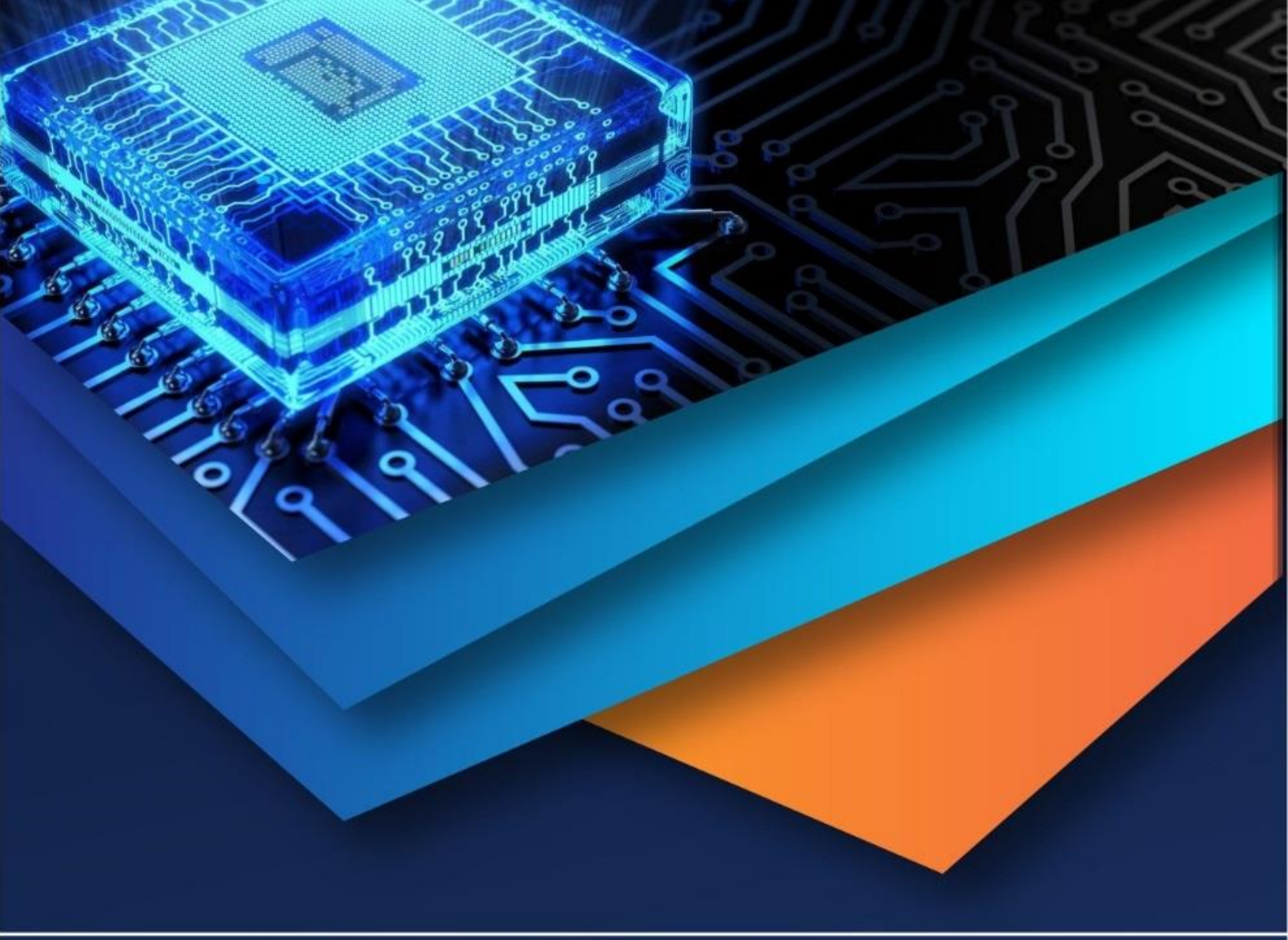

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