Automatic Intelligence Stair Climbing Robot

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Abstract- Robo-Car, It is a Car which Deliver files and small stuff of college or office into any room inside the building, only we have to put the things that we wanted to send it and just select the room in a mobile application and then robot will automatically deliver the parcel to the desired room. This robot car can also driven in stairs without facing any difficulty. It is an autonomous process which performs behaviors or tasks with a high degree of autonomy. Autonomous robotics is usually considered to be a subfield of artificial intelligence, robotics, and information engineering. And as we are from electronics branch and that thing inspire us to create this type of Autonomous project.

I.   INTRODUCTION

It is a Robot Car which has space to store files and this Robo-Car will deliver the files and small stuff like chalks and duster etc to the desired or assigned room in a building the area of implementation of this project is our college.

If any person wants to share some information or file in a building than that work will be done by our Robo-Car.

We will provide a Mobile Application by which you can control your Robo-Car, application consist of a building structure, at the time you want wanted to send the things to any particular room than you just click on that room and the container will open just put the things that you wanted to deliver and after that robot go through that room

One Interesting fact about this robot is that we drive it in stair, because of its design it can smoothly run in stairs without any difficulty.

The concept was taken by Amazon because Amazon has made its own autonomous six-wheeled delivery robot, the robot delivery game with an electric hamper on wheels it's calling the Amazon Scout. The e-commerce giant is the latest company to try its hand at this sort of automated, last-mile delivery solution, following a crop of startups, as well as experiments by larger firms like Domino's Pizza and PepsiCo. And not only the Amazon is only using delivery robot but FedEx is also entered the market of automatic delivery, FedEx says it will initially use the courier packages between the company's offices in its headquarters in Memphis (pending approval from local government). But if these trials are successful it wants to expand the service to other companies and retailers, eventually making robots a standard part of its same-day delivery service.

II.   DESIGN
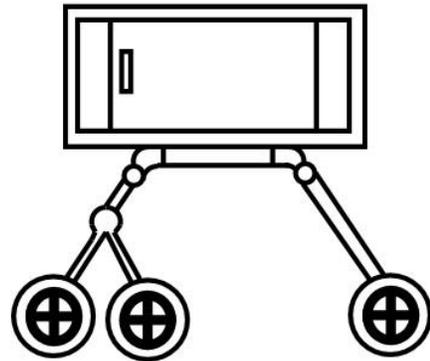
Fig.1: SIDE VIEW
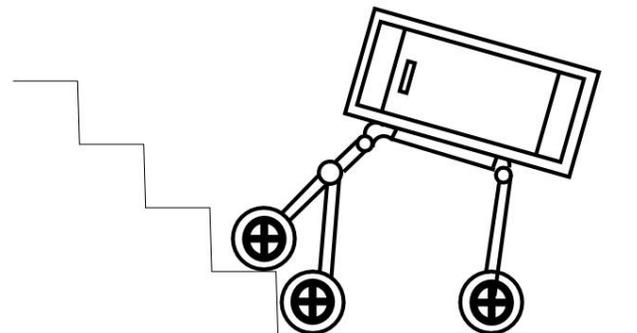
Fig.2: CLIMBING ON STAIRS

III.   COMPONENT LIST

1. Pipes & Aluminum board: ¾ Inch PVC (Polyvinyl Chloride) Pipe
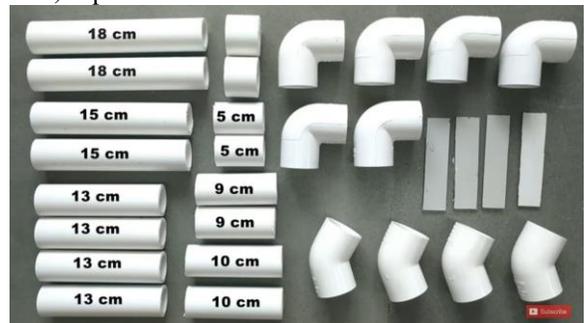
Fig.3: Pipes & Aluminum board

2. Wheels: 65 mm BO Motor Wheels

Fig.4: Motor Wheel

3. Node MCU: Node MCU is a Wi-Fi SOC (system on a chip) produced by Espress if Systems. It is based ESP8266 -12E Wi-Fi module. It is an highly integrated chip designed to provide full internet connectivity in a small package.

It can be programmed directly through USB port using LUA programming or Arduino IDE. By simple programming we can establish a Wi-Fi connection and define input/output pins according to your needs exactly like arduino, turning into a web server and a lot more.

Node MCU is the Wi-Fi equivalent of Ethernet module. It combines the features of Wi-Fi access point and station + microcontroller. These features make the Node MCU extremely powerful tool for Wi-Fi networking. It can be used as access point and/or station, host a web server or connect to internet to fetch or upload data
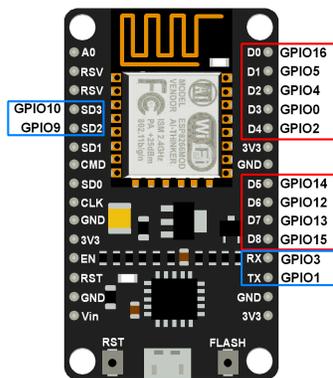

Fig.5: Node MCU

4. Voltage regulator 7805: A voltage regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.

7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.
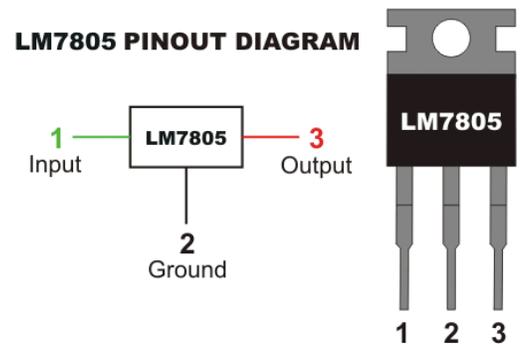
Fig.6: LM7805

5. Motor driver L293N: This L298N Based Motor Driver Module is a high power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L298 motor driver IC and has the onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control this motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro mouse, line following robots, robot arms, etc.

An H-Bridge is a circuit that can drive a current in either polarity and be controlled by Pulse Width Modulation (PWM).

Pulse Width Modulation is a means of controlling the duration of an electronic pulse. In motors try to imagine the brush as a water wheel and electrons as the flowing droplets of water. The voltage would be the water flowing over the wheel at a constant rate, the more water flowing the higher the voltage. Motors are rated at certain voltages and can be damaged if the

voltage is applied to heavily or if it is dropped quickly to slow the motor down. Thus PWM. Take the water wheel analogy and think of the water hitting it in pulses but at a constant flow. The longer the pulses the faster the wheel will turn, the shorter the pulses, the slower the water wheel will turn. Motors will last much longer and be more reliable if controlled through PWM.
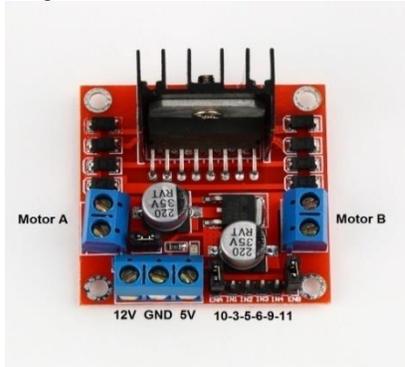
Fig.7: Motor driver L293N

6. 100 RPM - 12V Robo series DC Motor: A DC   motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications

Fig.8: DC motors

7. 10K Ohm Resistor: A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

8. 10uF and 100uF Electrolyte Capacitor: An electrolytic capacitor (abbreviated e-cap)   is   a polarized capacitor whose anode or positive plate is made of a metal   that   forms   an   insulating oxide   layer through anodization. This oxide layer acts as the dielectric of the capacitor. A solid, liquid, or gel electrolyte covers the surface of this oxide layer, serving as the (cathode) or negative plate of the capacitor. Due to their very thin dielectric oxide layer and enlarged anode surface, electrolytic capacitors have a much higher capacitance-voltage (CV) product per unit volume than ceramic capacitors or film capacitors, and so can have large capacitance values. There are three families of electrolytic   capacitor: aluminum   electrolytic capacitors, tantalum electrolytic capacitors,   and niobium electrolytic capacitors.

The large capacitance of electrolytic capacitors makes them particularly suitable for passing or bypassing low-frequency signals, and for storing large amounts of energy. They are widely used   for   decoupling or   noise filtering in power supplies and DC link circuits for variable-frequency drives, for coupling signals between amplifier stages, and storing energy as in a flash lamp.

9. 3mm LED: LEDs are available in a variety of sizes and shapes including the 3mm LED. We carry a wide assortment of the most common models of 3mm, 5mm, 8mm and 10mm models. The size refers to the outside diameter of the LED. 3mm LEDs are the smallest and used in tight-fitting applications, while 8mm and 10mm models are used where you want to get out as much light as possible

3mm LEDs can be used anywhere where you need low power, high-intensity reliable lighting or indication. They go easily into a breadboard and will add that extra zing to your project

10. DC Male and Female Jacks: A DC connector (or DC plug, for one common type of connector) is an electrical   connector for   supplying direct   current (DC) power

11. IR sensor: An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is

sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.
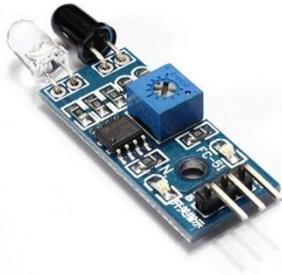
Fig.9: IR Sensor

12. Female header: female header strips are commonly used as low-cost connectors for custom-made cables or perforated prototyping PCB

13. RF Transmitter Receiver Module: The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.
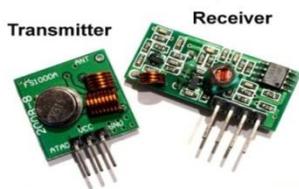
Fig.10: RF Trans Receiver

14. LDR: Light dependent resistors, LDRs or photo resistors are often used in circuits where it is necessary to detect the presence or the level of light. They can be described by a variety of names from light dependent resistor, LDR, photo resistor, or even photo cell, photocell or photo conductor. Although other devices such as photodiodes or photo-

transistor can also be used, LDRs or photo resistors are a particularly convenient electronics component to use. They provide large change in resistance for changes in light level.

IV. OPERATION & WORKING
Operation Block Diagram

FILE/INFORMAT

ENTER FLOOR & ROOM NO IN

ROBO-CAR

DESTINATION
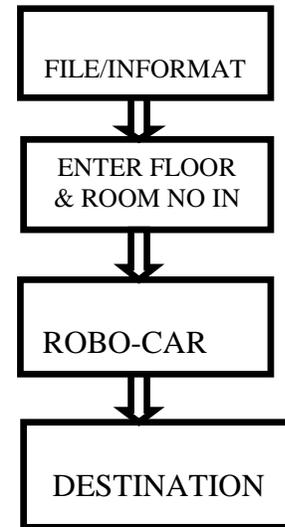
Fig.11: Flow diagram

V. OPERATION

Let's take an example- control room will be a Head of Department Room, suppose a faculty wants to share some file or Information to 15th room of the second floor (and robot is currently in first floor) than that person would keep the file or drop the information in Robo-Car and assigned the room no. the Robo-Car will automatically goes to that room and at the step of the door it will generate a alarm signal due to this a faculty in that room will able know that Robo-Car is arrived with some information or some file than simply faculty will open the container and get the file or simply read the information.

We can control this Robot by using Mobile Application either by assigning room no to it or by manually control it. Application consists of the Detailed mapped of that particular building, in which each and every room no. is marked.

Only we have select the room and rest of the task is performed by the robot.

VI. WORKING

Select the room in which you wanted to share or send the things. After that put that thing into container of the Robo-Car then Robo-Car automatically find that room that we have selected. When it will find the room then make a turn towards the door of that room and produces a sound of "Beep" that makes a person came to know that Robo-Car is arrived at the door step.

Here is the concept that we are using in this Car is nothing but a Home Automation, mean we are placing LDR Transmitter in front door of the every room and at the time when we assign or click on the desired room no. on the application the LDR Transmitter of that room is Turned ON and at the same time we put the parcel that we wanted to sent on Robo- Car after that robot start moving and start searching the Transmitter Beam as our Robo-Car consist of Receiving section and at the time when our robot passing in front of that room and receives the transmitter laser beam then at that time our robot stop can produces a beep sound, that's make any one to understand that the Robo-Car is arrived.

VII.   RESULT OR FINDING

In this Project we using the simple concept of Turning ON & OFF the LDR Transmitter and when robot receives the transmitting beam it can stop and arrived at the destination, here we can also use the concept of GPS but our GPS system is not every accurate of any building or nearby places so it is difficult for robot to understand the latitude and longitude of any particular room.

This thing makes us different from other Delivery Car concept.

As today's technology is increasing day by day and we are moving towards automation of every thing, than why we left for this delivery of things inside a building of office or college. An autonomous process provides us very great accuracy, time saving and security.

VIII.   CONCLUSION

As we tested our Robo-Car, it can smoothly run in stairs and corridors with carrying parcel in it, we have successfully tested it by assigning room no. or by using it manually with the same mobile application

IX.   REFERENCES

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