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Design and Fabrication of Smart Stair Climbing and Stuff Delivering Robot

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Abstract: People who work in office, school, colleges, industries etc. are often running from ground floor to all floors to deliver files or some other stuff. Due to this their works has been interrupt and disturbed. So we plan to design and fabricate a bot which climbs stairs and delivers the stuff. In this project we use microcontroller (Arduino) as a heart of bot, then wheels with belt driver unit to climb the stairs, which was controlled by high torque D.C motors unit. For path finding, we using wireless A.V camera which is an vision unit for robot and which will be controlled by computer using RF modules for serial communication between robot and computer. And the Transmitter (Tx) unit connected to computer will transmit the encode to Receiver unit (Rx) where decoded process takes place and makes the bot to move as per the received signal from computer. And for locating bot position, we used GPS module as an advantage. Thus via computer we could control the bot and delivers the stuff.

Keywords: Stair climbing, wireless camera, Arduino and RF unit.

I. INTRODUCTION

The main objective of this project is to deliver stuffs such as files, documents, e-components etc. from one place to another with the help of robot, controlling wirelessly via computer. This project describes the planning, design and implementation of a wirelessly controlled robot for material delivering from one location to another via laptop or computer. So that human work load and their tension at busy works may avoid. The main advantage of this bot is that it can climb any stairs and run smoothly on all surfaces which will easy to delivers things from any other place to anywhere else. We are replacing old bots with high range wireless communication via RF and wireless camera for vision system which makes the robot to do its task faster. There are many ways to climb stairs but to make the mechanical design simple and easier we adopt belt drive unit over the wheels which easily climbs on all stairs and surfaces. This model consists of high torqued.c motor unit where the motor is controlled by motor driver unit with Arduino uno.

For vision system wireless camera with large range has been mounted on front portion of the bot for clear vision which can be viewed in laptop or T.V. To a saw view in laptop, TV tuner card can be installed on laptop. This entire robot is user control interface so it can be easily operated by anyone else with some knowledge on s/w. The data are send via laptop through serial port on Arduino software. Bot can also be controlled by remote as per user wish. But for vision system we prefer it to control via laptop.

II. METHODOLOGY

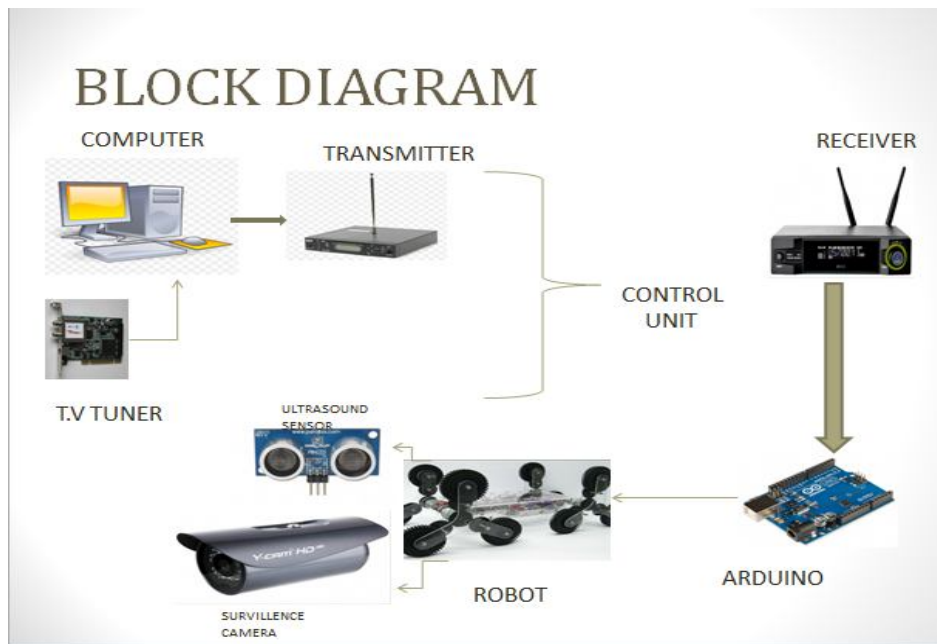
The vision system of the robot i.e. wireless a.v camera turn on, the power supply for the camera is supplied by 9v external power supply which will mount on front portion of the bot. Thus view will be displayed on laptop or t.v monitor so that path can be obtained to move the bot in desired direction to its destination place. Open Arduino ide s/w-> select ports->com 6 and then select board ->Arduino uno. Then open serial monitor for serial communication to send data. As the commands type in serial monitor, the required function will be transmitted over bot wirelessly via RF modules. The transmitter unit is connected to laptop via Arduino uno board, which send the encoded to receiver unit in robot. On receiver unit the received signals decoded and respond according to its function. The bot will move forward if the signal received from the transmitter is “f”, which will decode at receiver section. The vision system for robot is given by wireless a.v camera for path finding via laptop, Such that bot will move backward, right, left when signal received as

“b” – backward direction

“r” – right direction

“l” – left direction

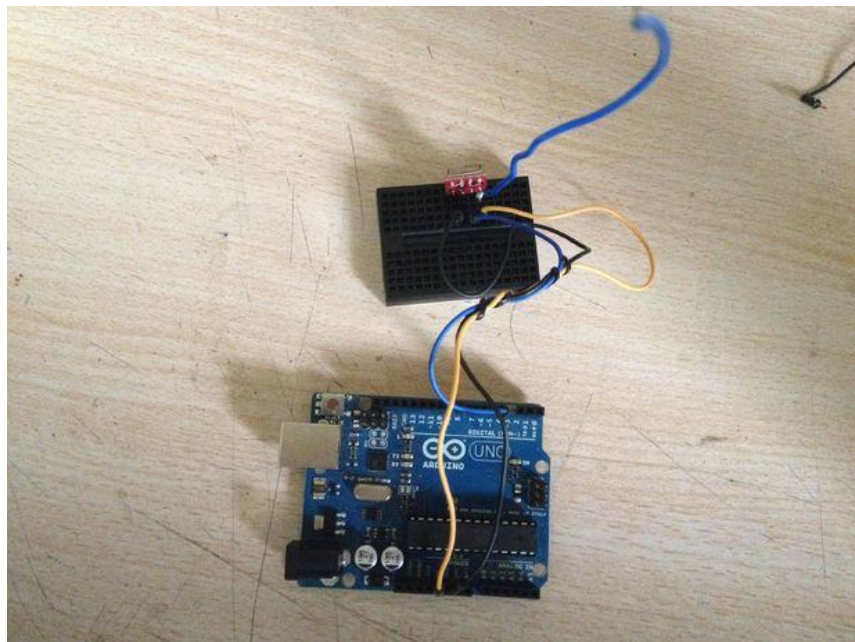
The robot will stop when the code is received as “s” and even if something went wrong during the operation. The belt drive mounted over wheel makes bot to climb stairs due to its robust gripness and high torque motor rotation continuously in which power is supplied by 12v external power supply. Due to this mechanism robot can sustain and run over on all surfaces and terrain.



(A).Project Working Diagram

III.ARDUINO CONNECTIONS

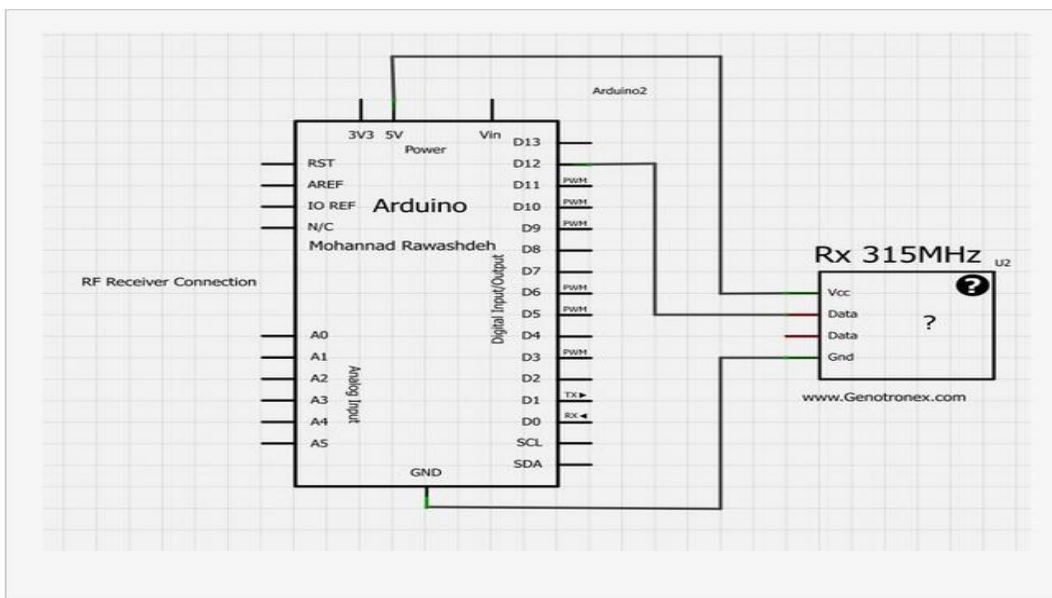
A. Transmitter Connection



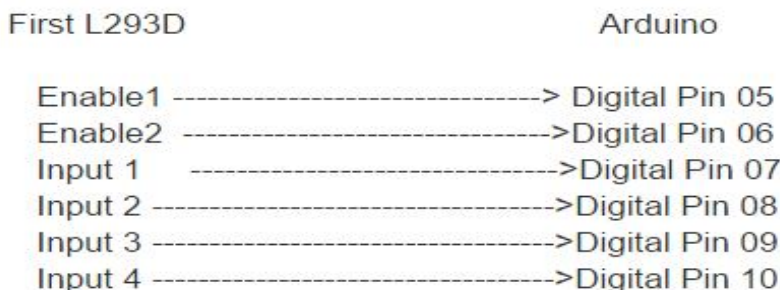
B. The transmitter is the smaller module having 4 pins:

- 1) Ant.....>Antenna
- 2) Vcc.....>power supply, in this case 5V from the Arduino at the Tx end.
- 3) Data>data pin, Transmits the data in bytes.
- 4) Gnd.....>ground pin, connected to Arduino ground.

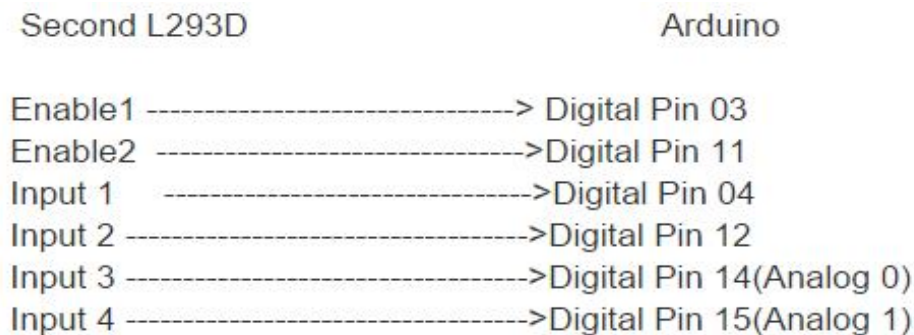
C. Receiver connection



D. First L293d Connection With Arduino



E. Second L293d connection with arduino



IV. CONCLUSION

The intention of the project is to develop a robot that can deliver the stuffs from one place to another so that the people who work in office, school, colleges, industries etc. can be free from their miscellaneous works and concentrate on their on-going work and to reduce the human work. The overall project was successful and it can be useful in many industries for material transferring. It can also be used as spy robot in defense field in borders.

In the future, user control option should be neglected. This can be done by taking the bot from smaller controllers to high level artificial intelligence sector [AI]. So that it can think itself and take decision of his own and act according to it without any human interface. Vision system of robot can be replaced by mat lab interface using image processing techniques to find the path as its own.

V. SNAPSHOTS



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