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AUTOMATIC SELF-PARKING CHAIR USING NISSAN TECHNOLOGY

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Abstract - *In this Project we have built the Automatic Self-parking Chair using Nissan Technology. The main moto behind building this project is to reduce and automate the work of chair rearrangement using Nissan technology stack. In Conference halls, In Meeting rooms or in offices most of the peoples doesn't arrange the chair as it is on its original position after meeting is over. And main problem is to sometimes last person can cater the problem of finding the way through the non-arranged chairs. And arranging the chairs for immediately after meeting is over is most time-consuming task. But this project we don't need to change any extra interior change it can be able to implement using all stuffs which are present in meeting halls like Web Camera of meeting room. With the help of MATLAB image Acquisition, we can be able to detect the unarranged chairs and with the algorithm we can park those chairs to an appropriate location.*

Key Words: **L293D, RF Module, MATLAB**

1.INTRODUCTION

The Vision-guided robotics has been one of the major research area in the mechatronics community in recent years. The aim is emulate the visual system of humans and allow intelligent machines to be developed. Self-parking chair is one kind of parking units that follow various working area. Nowadays the creation of self-parking chair model can be found from Nissan technology. As it gives advantages in our lives. It works just like a robot as it is able to sense and response to the environment. Considering that, Self-parking chair should be well developed to optimise its benefits to our own living. The aim of this project is to build a prototype of an self-parking chair model that can move on a flat surface with its two driving wheels and a free wheel. Camera is interfaced with PC for image acquisition MATLAB is used for image processing. Path can be easily determined by user on working are image by GUI application.

In this project we are implementing the normal room's webcam as an image capturing camera that will take the image and send it to the MATLAB software installed on PC. And in the chair, we have implemented the controlling circuit for the movement of chair with the L293D motor drives which will drive the motor to adjust the accurate chair parking. The communication between the PC and that of Chair is wireless with the help of RF module. First webcam will capture the image and then will decide that where to park the specific chair by detecting all chairs with the help of MATLAB image acquisition and then it will send the commands for movement of chair over the RF link. As shown Fig-1.

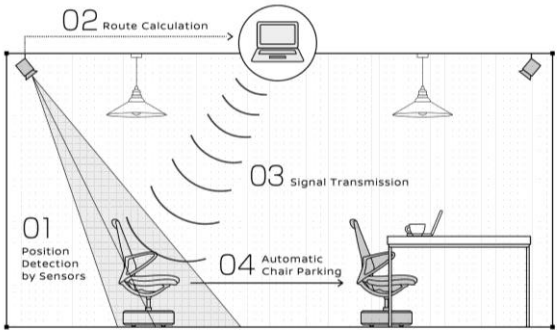

Fig -1: Webcam Capturing Chairs Location.

2. System Description

This project is divided in to the two parts one is Camera and MATLAB Image acquisition and another part is Chair Design as Follows.

2.1 Matlab Image Acquisition:

In first part of our project module. We have implemented the Web cameras across the top corners of the rooms which can take the Birds eye view of entire room area.

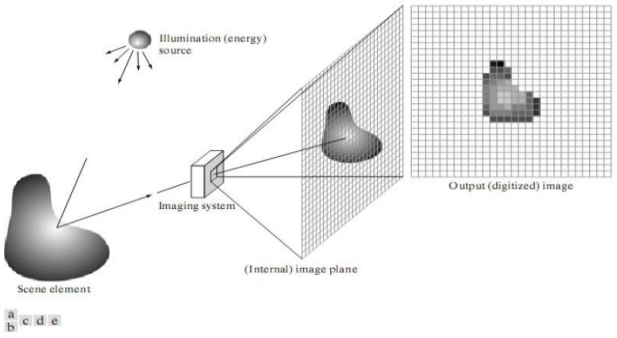

Fig -2: Object Detection.

After the image is taken the various processing methods we will apply on it and then we will detect the various objects present in the room. MATLAB has built in object detection algorithm is there with help of that we can identify and detect all chairs among all other objects which are present in that room. Then it will generate the report of no of Chairs presents and its geographical 3D map. After that by running our program of nearest location arrangement it sends the signal to hardware parts through wireless RF link.

2.2 Chair Design:

This chair is designed by taking the consideration of all aspect as per user convenience. The main hardware of this chair is built using the FPGA Controller board. And then we have attached the motor driver Module to this board. whenever the chair is gets misplaced the MATLAB send command through the RF link to the main FPGA board then this FPGA board will decide what to do like forward, reverse, left, right movements.

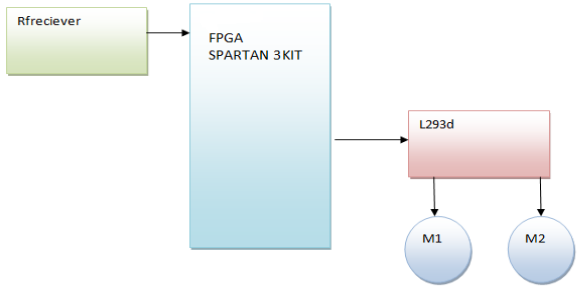

Fig -3: Chair Assembly.

3. Hardware Design:

A. FPGA (SPARTAN 3):

This is a Spartan XC6SLX9 with CSG324 package. Having DDR memory of 166MHz 512Mb LPDDR. With 16mb SPI flash memory with on-Board USB 2.0 interface for flash programming. It has on Board 8 LEDs, Six Push Buttons , VGA connector, Stereo jack, Micro SD card adapter.

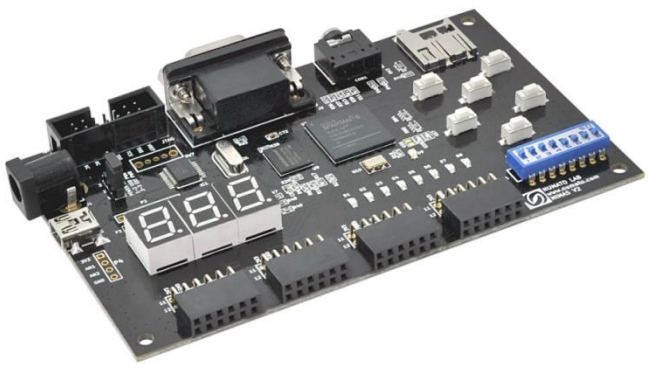

Fig -4: FPGA (Spartan 3)

B. L293D Motor Driver:

The L293D is quadruple high-current half H-Bridge. It is designed to provide bidirectional drive currents of up to 600 mA at Voltage from 4.5V to 36V. Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors as well as other high-current/ High-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit. With a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs with drivers 1 and 2 enabled by 1,2 EN and drivers 3 and 4 enabled by 3,4 EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enables input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

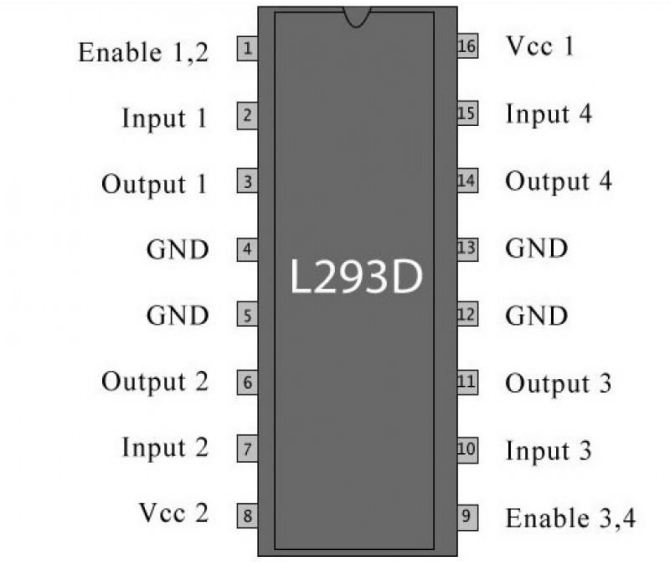

Fig -5: L293D Motor Driver.

C. RF Transceivers:

The RF Transceivers is a transmitting and receiving module which uses the electromagnetic waves for its data transmission. This module is connected with encoders and decoders for data transmission while communicating with each other. We have used this module as because we have a low distance of communication range and low data bandwidth as we are just sending the commands through it. And we can be able to interface this as many ways like 4:1 mux interfacing type or via serial interface. The RF module can be interfaced with any microcontroller as it doesn't needs any library for communication.

Fig -6: RF Transceivers

4. Result & Discussion of Result:

We can see in fig that MATLAB detects various objects in this window with its name. in square block MTALAB has inbuilt feature of this object detection algorithm. So, using this algorithm we have separated only Chairs objects. After that we have created the 3D map of this image so that we can judge the location of each and every chair and after the meeting is over the we just press the auto park button in GUI so that all chairs gets the command from MATLAB PC and starts rearranging.

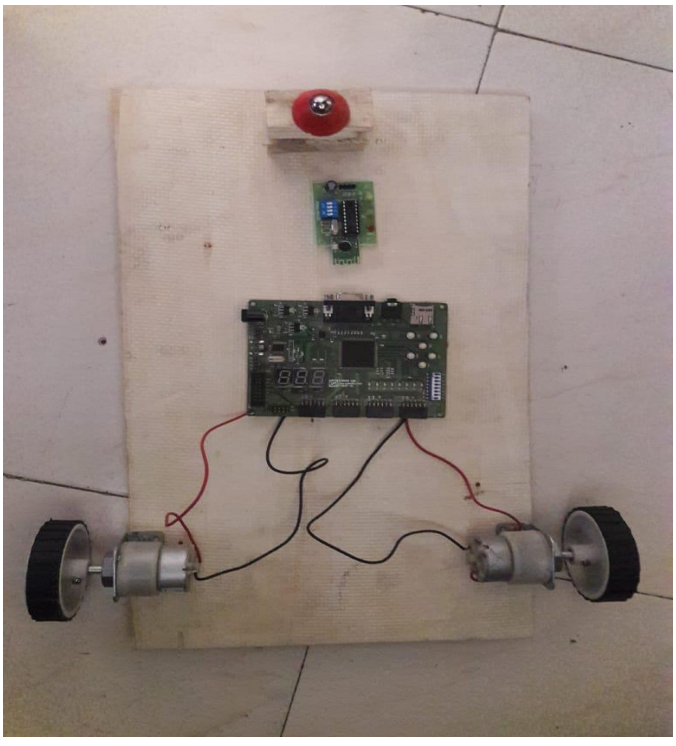

Fig -7: Prototype Chair

5. CONCLUSION

This way we have implemented the Self-Parking chair using Nissan technology stack. As MATLAB has all inbuilt tools of object detection is much easier to classify all objects and sort out them. This way we reduced the bearing task of rearrangement of chairs, after meeting all chairs are gets rearranged in single click.

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