

Automatic Self Parking Chair

Tanuja Kanth, Tarique Anwar, Samad Khan, Dr. Mithra.V

Department of Electronics and Telecommunication Engineering, Dr. D. Y. Patil School of Engineering,
Lohegaon, Pune, Maharashtra, India

ABSTRACT

This project describes a system or a product which will reduce the human efforts and save time through the use of image processing technology that provides advantages over other magnetic sensor technologies. It is a system equipped with an camera (web cam) for navigation and a combination of ultrasonic for obstacle detection and avoidance during navigation. To increase the accuracy of the system we have to go with high precision camera which will help it to navigate itself and correctly calculate its co-ordinate and identifying direction towards the destination. There are different methods to complete this product but this proposed method is very much efficient as it wireless and can be installed in prevailing system by the use of cctv cameras and upgrading the chair.

Keywords : camera, matlab, image acquisition, image processing, RF module, motor driver IC, high torque DC motor, At mega16

I. INTRODUCTION

Nowadays we observe in the main buildings like offices, labs and many facilities after completing the meeting people does not arrange their chair to the respected places, so an employee has to arrange each and every chair to their respected places which consumes more time and human effort is also wasted, to overcome this problem or we can say to reduce the human effort and save time we will develop a chair which will work on the basis of self parking or we can say intelligent parking. This self parking chair will be the unique solution to the problem of arranging the chair again and again.

It will locate it's respected place by its self and will reach to it by responding to the signal given to it.

II. LITERATURE SURVEY

The "Intelligent Parking Chair" is a unique chair that automatically moves to a set position. The chair includes a roller to automatically move 360 degrees paired with a system that indicates the target position.

Four cameras placed on the room's ceiling generate a bird's-eye view to wirelessly transmit the chair's position and its route to destination.

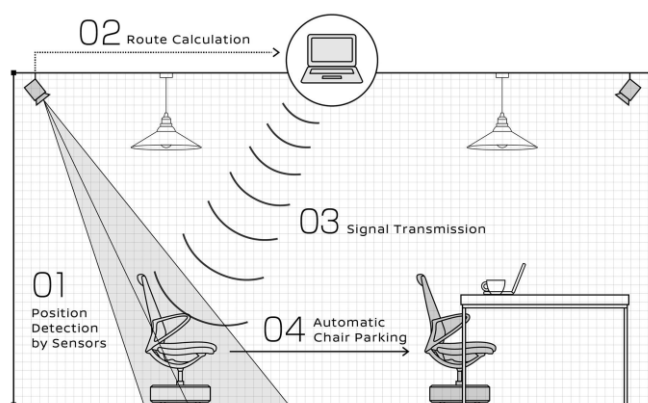


Fig 1. Bird eye view of system

With this innovation in office technology, Japanese businessmen are now freed from the troublesome task of arranging chairs, using this new technology already adopted in the X-Trail Hybrid and other Nissan vehicles.

Self-parking chairs at conference tables show Nissan's auto push 15 February 2016, by Nancy Owano. The "Intelligent Parking Chair" is inspired by Nissan's "Intelligent Park Assist" technology.

Ghosn) announced the first "Intelligent Parking Chair", a concept inspired by its intelligent park assist technology that allows drivers to easily park their vehicles using automatic steering.

TOKYO, Feb. 15, 2016 /PRNewswire/ -- Nissan Motor Co Ltd (Headquarters: Yokohama, Japan, CEO: Carlos

Reference Paper	Author	Date /year of Publish	Subjects used
Self-parking chairs at conference tables show Nissan's auto push by Nancy Owano Self-parking chairs at conference tables show Nissan's auto push	https://techxplore.com/news/2016-02-selfparking-chairs-conferencetables-nissan.html	(2016, February 15) retrieved 23 February 2018	Idea and Overview of the whole system working
Nissan's self-parking office chair is here to make your Monday better	-Cooperative behaviors in multi-robot systems through implicit communication-, ·Robotics and autonomous systems, Vo1.29, Issue: 1, (2007), pp.65-77	2007	Image acquisition through cameras.
Automatic Parking Vehicle System	Ms. Hong Hong		Localization of the object (vehicle/chair)
Home in the range An ultrasonic ranging system	S. Ciarcia	NOV-1980	Wireless transmissions. (RF transmission)
"A multielement ultrasonic ranging array", Robotics Age, pp. 13-20	H. R. Everett	July 1985	Movement of the object thought motors using matlab.
Cooperative behaviors in multi-robot systems through implicit communication-, ·Robotics and autonomous systems, Vo1.29, Issue: 1, pp.65-77	Enrico Pagello, Antonio D Angelo, Federico Montesello, Francesco Garelli, and Carlo Ferrari	2007	Movement of the object thought motors using matlab.

III. PROPOSED METHODOLOGY

BLOCK DIAGRAM DESCRIPTION

BLOCK DIAGRAM



IV. METHODS AND MATERIAL

1. CAMERA

Four cameras placed on the room's ceiling generate a bird's-eye view to wirelessly transmit the chair's position and its route to destination.

The camera can be web cameras or CCTV cameras. Camera is interfaced with PC for image acquisition.

Specification:

Image sensor: CMOS

Maximum dynamic pixel: 5.0M pixels (352x288, 640x480, 1280x1024, 1600x1200, 2048x1536, 2560x1920) (with software boost/ up scaling)

Maximum static pixel: 50.0M pixels (2560x1920, 2848x2800, 3648x2736, 4000x3000, 6000x8000) (with software boost/ up scaling)

The focal length: 8cm-infinity

Frame rate: 30fps S/N ratio: Above 48dB

Size: 63mm*55mm*50mm



Fig 2. Camera

2. MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical **uses** include: Application development, including Graphical User Interface building.

Matlab is used for image processing. Path can be easily determined by user on working area image by GUI application.

CAMERA CALIBRATION

Geometric camera calibration also referred to as *camera re-sectioning*, estimates the parameters of a lens and image sensor of an image or video camera. You can use these parameters to correct for lens distortion, measure the size of an object in world units, or determine the location of the camera in the scene. These tasks are used in applications such as machine vision to detect and measure objects. They are also used in robotics, for navigation systems, and 3-D scene reconstruction.

Camera calibration is the process of estimating parameters of the camera using images of a special calibration pattern. The parameters include camera intrinsic, distortion coefficients, and camera extrinsic.

3. IMAGE ACQUISITION

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks

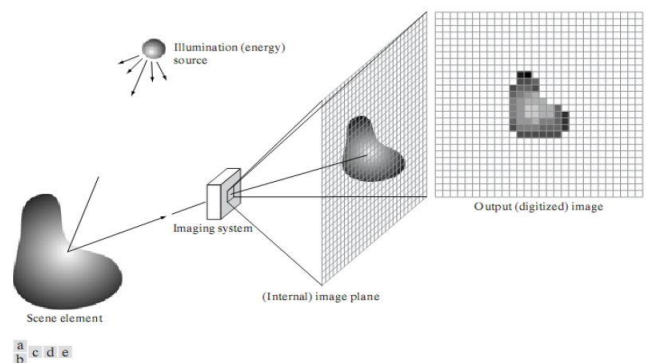


Fig 3. Image Acquisition

4. IMAGE PROCESSING

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some

useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually **Image Processing** system includes treating images as two dimensional signals while applying already set signal processing methods to them

Purpose of Image processing

The purpose of image processing is divided into 5 groups. They are:

- ✓ Visualization - Observe the objects that are not visible.
- ✓ Image sharpening and restoration - To create a better image.
- ✓ Image retrieval - Seek for the image of interest.
- ✓ Measurement of pattern – Measures various objects in an image.
- ✓ Image Recognition – Distinguish the objects in an image.

5. R.F. Module

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In this system RF module is used to communicate between transmitter and receiver section of the system wirelessly. The property of its wireless communication using RF signal makes the system flexible. At the transmitter section the digital information of the location and path of the chair (using camera and matlab) is transmitted over RF signal. At the receiver section this signal is received and used by microcontroller and motor driver IC to move the chair in desired direction.

6. ATmega-16 microcontroller

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing,

Know more about RISC and CISC Architecture) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes.

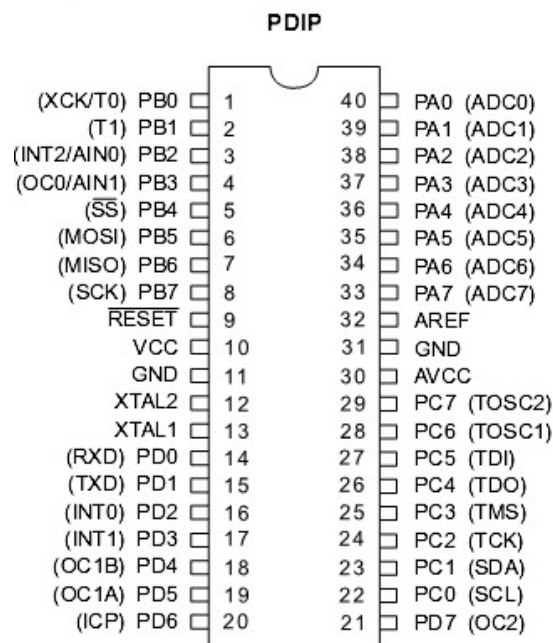


Fig 4. Pin diagram of At Mega 16

It receives the compared result from matlab through RF module .Atmega 16 implements the results of the matlab and serially communicates it with motor driver IC .

7. L293D Driving IC

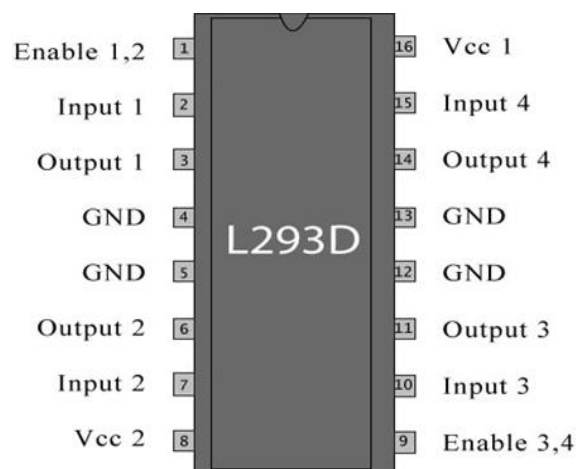


Fig 5. Pin diagram of L293D driving IC

Fig 5 shows L293D motor driver. L293D is a double H-connect engine driver coordinated circuit (IC). Engine drivers go about as momentum intensifiers since they take a low-flow control flag and give a higher-ebb and flow flag. This higher current flag is utilized to drive the engines. L293D contains two inbuilt H-connect driver circuits. In its basic method of task, two DC engines can be driven at the same time, both in forward and invert heading. The engine activities of two engines can be controlled by input rationale at pins 2 and 7 and 10 and 15. Info rationale 00 or 11 will stop the comparing engine. Rationale 01 and 10 will turn it in clockwise and anticlockwise bearings, individually. Empower pins 1 and 9 (comparing to the two engines) must be high for engines to begin working. At the point when an empower input is high, the related driver gets empowered. Thus, the yields wind up dynamic and work in stage with their sources of info. Thus, when the empower input is low, that driver is incapacitated, and their yields are off and in the high-impedance state.

8. DC Motor



Fig 6. DC motor

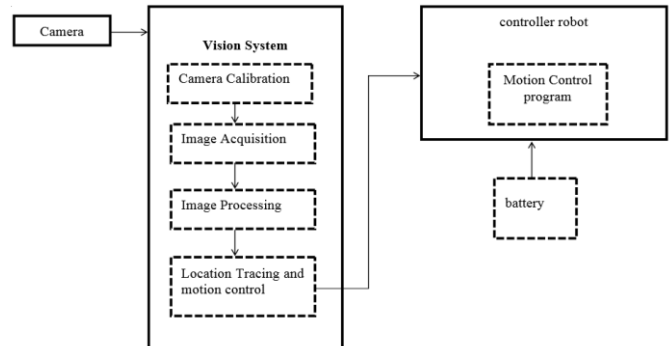
A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. A 30 RPM, 12 V DC supply DC motor is used to move the chair as per the instruction.

Specifications and Features:-

- RPM: 30.
- Operating Voltage: 12V DC
- Gearbox: Attached Plastic (spur)Gearbox

- Shaft diameter: 6mm with internal hole
- Torque: 2 kg-cm
- No-load current = 60 mA(Max)
- Load current = 300 mA (Max).

9. Flow Chart



10. Algorithm

1. Live image of the chair is captured by the camera.
2. Centroid of the red block which is placed on chair is detected through image acquisition.
3. A path is set initially using matlab.
4. The centroid and the points of set path is compared through image processing.
 - a. If the centroid is to the left side of the point of the set path then -move Right.
 - b. If the centroid is to the right side of the point of the set path then- move Left.
 - c. If the centroid is at the point of the set path then- move forward.
5. The compared results are transmitted and received by the RF module.
6. Atmega16 implements the received results and serially communicates to the motor diver IC.
7. Motor driver IC L293D is used to generate voltage required by the DC motor.
8. DC motor rotates and moves the chair as per the desired path.

V. CONCLUSION

Using this system we can reduce the human effort. It is a selfparking system because of this there is no

manual operation required. Due to this we can easily arrange the chairs in their respective places just by giving the interrupt to the chair.

VI. ADVANTAGES

1. Path can be easily updated.
2. Eliminates the need of different sensors (IR, Proximity, Magnetic field sensor) thus makes system more compact and cost effective.
3. Possible to continuously track vehicle and avoid obstacles in path.

VII. FUTURE SCOPE

1. In corporate companies like board room after completion of meeting the employees moves away without arranging the chairs thus, this system automatically arrange the shuffled chairs to their respective position.
2. It may used in schools and colleges like in the practical labs the students moves away without arranging the shuffled chairs hence, by giving the interrupt to the system it arrange the chairs in their original destination.
3. In conference halls the people goes away after completion of conference without arranging the displaced chairs. This system helps in arranging the displaced chairs in their located position.

VIII. REFERENCES

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