

Automatic Valet Parking Using Arduino Uno

*Nirmalk Thomas, **Nithin Johny, *Sivalakshmi M, **Roshan Raju

*(Asst.Prof. ,Dept. Of Electronics And Communication Engineering,VISAT,Elanji ,Ernakulam ,Kerala ,India

** (Student, Dept. Of Electronics And Communication Engineering,VISAT,Elanji ,Ernakulam ,Kerala,India

Corresponding Author: Nirmalk Thomas

ABSTRACT

Automobiles Are Synonymous For Mobility And Freedom. An Increase In The Growth Of Population Led To Rapid Increase In The Number Of Vehicle Being Used. In Densely Populated Areas Parking Is A Real Challenge For City Planners, Architects And Developers. The Need To Offer Sufficient Parking Spaces Is A Task For Specialists. This Situation Calls For The Need For An Automated Valet Parking System That Not Only Regulates Parking In A Given Area But Also Keeps The Manual Control To A Minimum. Automatic Valet Parking System Is The Sole Solution To Park As Many Cars As Possible In As Little Space As Possible. This System Employs Parking And Exiting Cars Using Sequence Detecting And Sensing Devices. We Design This System With The Help Of A Line Follower Robot Using Arduino Uno As The Microcontroller. This Method Is Based On The Most Modern Technology Of Storage Systems. Our Demonstration Facility Presents A Miniature Model Of An Automatic Valet Parking System That Regulates The Number Of Cars That Can Be Parked In A Given Space At Any Given Time Based On The Parking Space Availability.

Keywords: Arduino, Automatic Parking, Robot, Line Follower

Date of Submission: 19-03-2018

Date of acceptance 02-04-2018

I. INTRODUCTION

Parking Task Is Recognized As The Most Difficult Among The Driving Tasks Since It Includes Finding Free Parking Space And Moving Backward In Large Probabilities Of Collision. [1]To Alleviate The Aforementioned Driver's Burden, Two Different Types Of Systems Are Studied And Commercialized. [2]The First Is Smart Parking System And The Second Is Automatic Parking Assistance System. Although These Two Types Of Systems Give Some Degree Of Comfort And Safety To The Driver, They Assume Drivers Presence In The Car, And Still Need Driver's Much Attention And Constrained Environment. In This Project, We Have Been Developing The Autonomous Vehicle Valet Parking Technology To Provide The Full Autonomous Vehicle Valet Parking Service With The Help Of Sensors And Actuators And The Interface Was Done With The Help Of An Arduino Uno Processor.

II. BLOCK DIAGRAM

The Arduino Uno Microcontroller Is The Main Component Used In This Circuit.The Block Diagram Is Mainly Divided Into 5 Blocks. It Consists Of Sensors For Line Detection, A Controller For Decision Making, Motor Driver IC, Motors For Precise Motion (Left & Right) And Ultrasonic Sensor. Here IR Sensor Module Is Used As Line Detecting Sensor. It Consists Of An IR LED And A Photodiode. Arduino UNO Is The Main

Controller. The Data From Sensors Will Be Given To Arduino And It Gives Corresponding Signals To The Motor Driver IC. L293D Motor Driver IC Is Used Here To Drive The Motors. We Have Used Two Geared Dc Motors At The Rear Of Line Follower Robot. It Provides More Torque Than Normal. Ultrasonic Sensor Is Used To Check The Distance Among The Parking Slots.

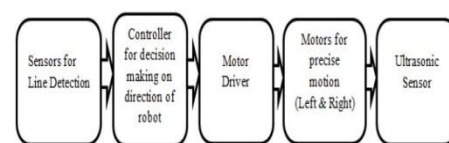


Fig 1: Block Diagram Of The AVP Bot

III. CIRCUIT AND EXPLANATION

There Are Mainly Two Circuits; The First One Includes The Arduino Uno And Line Follower Sensor Circuitry.

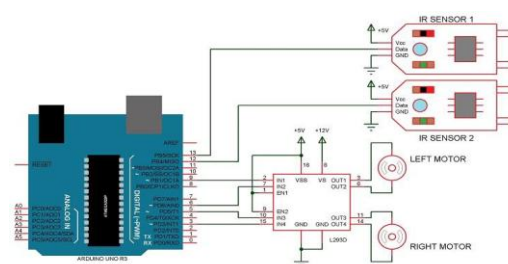


Fig 2: Line Follower Circuit

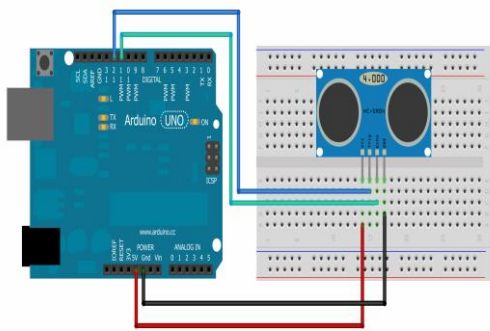


Fig 3: Ultrasonic Interface With Arduino

The Line Following Robot Is One Of The Self-Operating Robots I.E., It Detects And Follows A Line Drawn On The Surface Or An Area. It Will Be A Black Line On White Surface Or White Line On Black Surface. Here We Are Using Black Line On White Surface. Main Components Of This System Are IR Sensor Module, Arduino UNO, Motor Driver IC, Geared Dc Motors, Robot Chassis, And Battery And Ultrasonic Sensor.

IR Sensing Module Is Used As Line Detecting Sensor.They Are Placed In A Reflective Way Ie, Side- By- Side So That Whenever They Come In To Proximity Of A Reflective Surface The Light Emitted By IR LED Will Be Detected By Photodiode. In The Case Of Black Surface Which Has Low Reflectance, The Light Gets Completely Absorbed By The Black Surface And Doesn't Reach The Photodiode. The IR Sensing Module Works Based Up On This Principle.

When The Robot Moves Forward Both The Sensors Wait For The Line To Be Detected. Arduino UNO Is The Main Controller In This System. Arduino UNO Detects This Change In Motion And Sends Signal To Motor Driver. L293D Is The Motor Driver IC Used Here To Drive The Motor Of The Robot. It Drives The Geared Motors At The Rear End Of The Line Follower Robot According To The Signals Received From Arduino UNO. As A Result Robot Moves

An Ultrasonic Sensor Is Also Implemented In This Line Follower Robot. The Ultrasonic Range Detection Sensor Is Utilized With Arduino To Indicate The Empty Slot. Then Check Each And Every Parking Slot. By Measuring The Distance Using Ultrasonic Sensor We Are Able To Find The Empty Slot In Parking To Park The Car And Help To Find The Slot Easily And Reduce The Searching Time. Finally It Parks In The Vacant Slot. As The Parking Place Is Found To Be Empty It Is Detected Using Ultrasonic Sensors Which Report It Further.

We Achieved This By Programming The Sensors With Arduino. IR Sensor Is Used To Detecting The Path Arduino Uno Is The Main

Controller. The Data From The Sensor Will Be Given To Arduino And It Given Signal To The Motor Driver IC L293D Motor Driver IC Used In This Project To Drive The Motor Of The Robot (It Receive Signal From Arduino Based On The Information From The IR Sensor) We Have Used Two Geared Motor At The Rear Of The Line Follower Robot (Here We Using A Robot Chase Kit). IR Sensor Is Used To Detecting The Path Arduino Uno Is The Main Controller. The Data From The Sensor Will Be Given To Arduino And It Given Signal To The Motor Driver IC L293D Motor Driver Ic Used In This Project To Drive The Motor Of The Robot (It Receive Signal From Arduino Based On The Information From The IR Sensor) We Have Used Two Geared Motor At The Rear Of The Line Follower Robot (Here We Using A Robot Chase Kit).When The Robot Moves Forward Both The Sensor Wait For The Line To Be Detected.

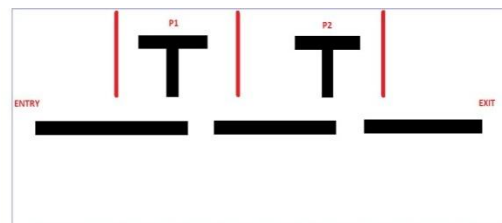


Fig 4: Parking Slots

IV. CONCLUSION

The Robotic Vehicle Is Equipped With Ultrasonic Sensors To Detect Obstacles And Avoid Them. The System Is A Simple One Which Makes It Easy To Design And Maintain. The Same Hardware Can Be Used For Both Obstacle Detection And Android Device To Control The Movement Of The Robot, Which Makes It Small In Size Of PCB. It Can Be Used In Modern Cars In The Future So That The Hectic Parking Due To Over Population Can Be Made Easier .By Using A Night Vision Camera With IP Address The Number Of Cameras Used Can Be Reduced To One. As Future Works Multipath Algorithm Can Be Implemented For A More Efficient Routing.

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