iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** V **Month of publication:** May 2019

DOI: https://doi.org/10.22214/ijraset.2019.5077

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue V, May 2019- Available at www.ijraset.com

Self-Driving RC car that Reaches Specified Destination

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Abstract— Now days there's lot of traffic on roads that people tend to scare a bit to commute at some peak times. All because of unstructured and undisciplined vehicle drivers which cause major accidents just for some silly mistakes they make while they drive. If we plan to go out, we just cancel our plans because of the hectic traffics a city road has. Why are we scared? Because of the irresponsiveness and carelessness of drivers and major thing is, time taking to travel is too high. If we travel with some elder medicated person, traffic would be the biggest problem for them. And for this reason, government planned to implement Metro Trains. But is that enough? I don't think so. Because of the curiosity we had, we came up with an idea. We proposed a simple solution for this problem. We developed a RC car that can drive itself to the specified location. The proposed system is to show that how a common man can easily afford to commute to work/home on car that can drive itself. And if this system works properly, then there would be instructed, structured and careful rides only. As there would be structured rides, traffic would be lot less as all goes systematically. By proposing this, all we have in mind was to increase the discipline, reduce the cost to commute, and make use of available resources efficiently.

Keywords*: *self-driving car, autonomous car, self-driving vehicle, car, commute, traffic, price

I. INTRODUCTION

In present generation, no one wants to drive a vehicle on a hectic traffic roads or highways! Even if someone wants to, they tend to get annoyed easily. In one way or the other, they are just stressing out with what they are doing for just a small commute. So to avoid this, people book uber's or some other taxi services just to avoid stress and strain they get while they drive. That's a good choice by the way. But, with increase in traffic, the demand of taxi's, and drivers increases a lot. Simple demand and supply rule. So, as they have demand, they are increasing their prices drastically. A common man can't afford to commute to work only because he doesn't have money?

That's a real issue. Isn't it? So, for this reason, we developed a vehicle that can go to specified location with minimal charges. Now, you can think, who will bear the expenses if a person can't afford to commute? Government? Oh no my dear friend. We can simply reduce the cost by developing the vehicle with best and latest technology. We will use battery powered vehicle to save the cost of fuels. We just have to charge a little for power consumption of battery. That's it. And we can solve this problem too, if we develop solar panels in our battery stations.

So now you can ask, "Its ok, I understood your concern over fuel costs and that's a good idea. You save a bit and there's no pollution. That's a great initiative, and everyone's doing it. But what about DRIVERS? How much do you provide them?" So, the answer for this question is, "We don't pay anything to drivers. In fact, we don't rent a driver, we don't need a driver!" So how? We developed a Project where a vehicle can drive to specified location on demand without any driver. It's a Self-Driving or we can say fashionably "An Autonomous Car" that can drive itself to the desired location. The real question is, How? So, presently we are working on a small robotic car to start the initiative. And we have given five addresses(point) in order to drive itself from one point to another. If you place the car at a specific point, the car scans itself, and it'll know where it is now.

And you'll be provided with an Android Application to give a specific address you want to reach. Now, as you give a point/location where you want to go, it simply drives to the specified location with the algorithm it has been provided. So, in real time application, you just have to sit inside the car, connect the car with your android application with the help of Bluetooth, ask the car to drive to your specified location. Yahoo... Car starts driving itself! With the help of its internal algorithm, it'll scan for possible routes. And drive itself to the specified location. This is possible with accurate sensors, and the algorithm it is provided with. Everything depends on it. With this proposed system, we can achieve less traffic and more and more systemized approach towards traffic and driving.

II. COMPONENTS REQUIRED

A. RC CAR

We used a chassis and two 300 RPM motors to build our own basic RC car that can be controlled. A wooden frame is used as chassis board and two motors are attached below. A caster wheel (free wheel) is attached at the front to move freely in any direction it need to take a turn. Car turns are decided by the motors. If it needs to turn the immediate right, right wheel moves in the anti-clockwise direction and the left wheel moves in clockwise. This movement happen for a specified time. Like for a seconds. And if it wants to turn left, vice versa happens. As the RC car is small and my motors speed are fast, it doesn't take more than a second to take a turn.

B. Arduino Development Board

Arduino development board helps our car to take decisions on its own. We simply say that it's the Brain of our complete project. Without it, there's no autonomous car. Arduino is a development board where we can give some inputs in the form of C++ programming language. And the board converts all our programmed code from Arduino IDE to machine level language. And thus, our machine understands the users concern and works on it. This boards are very useful for making projects easily and economically.

C. MIT App Inventor

App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT). It's an MIT's app invertor where we can develop android applications easily. Though we cannot make a fancy coolly designed application, we can pretty much work it out as according to our requirements. It supports all the major available options that we need. We just have to simply drag and drop to avail some options. No need to code and debug.

D. Bluetooth Module

Bluetooth module uses 2.4GHz ISM band frequency. It is designed for wireless serial communication. Once it is paired to a master Bluetooth device such as Personal Computer, smart phones and tablet, its operation becomes transparent to the user. All data received through the serial input is immediately transmitted over the air. When the module receives wireless data, it is sent out through the serial interface exactly at it is received.

E. Ultrasonic Sensor

Ultrasonic sensor is a distance measurement sensor. It measures the distance of any object near it. So, if we place anything opposite to it, it recognizes the distance. It a high precision sensor and this sensor has a range to detect the distance of objects from 2cm to nearly 400cm. Its operation is not affected by sunlight or black material. Basic operation of this sensor is, it has two major components embedded in it. A transmitter and a receiver. Firstly, it sends an ultrasonic wave from the transmitter. And if there's an object near it, the object reflects the ultrasonic signals back. While it returns, its fed to the receiver. And with the time measurement and the wave speed, it calculates the distance.

F. Color Sensor

Colour Sensor is a complete colour detector including RGB sensor chip and 4 white LEDs. It can detect and measure a nearly limitless range of visible colours. It has a High-Resolution Conversion of Light Intensity to Frequency and it communicates directly to Microcontroller (in our case its Arduino). It has lots and lots of applications. We just have to think the best application that can be made with this sensor.

G. Compass Sensor

Compass sensor is a 3-axis digital compass used for two general purposes: to measure the magnetization of a magnetic material like a ferromagnetic, or to measure the strength and, in some cases, the direction of the magnetic field at a point in space. Magnetometer measures the direction and magnitude of the Earth's magnetic field and hence is used for low cost compassing and magnetometry. It measures the Earth's magnetic field value along the X, Y and Z axes from mille-gauss to 8 gausses.

H. L293D Motor Driver

The L293D is a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction. The Motor Driver is a module for motors that allows you to control the working speed and direction of two motors simultaneously. We can use it to control small dc motors like - toy motors.

I. Arduino IDE

The open-source Arduino Software, Integrated Development Environment (IDE) makes it easy to write code and upload it to the board. An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go.

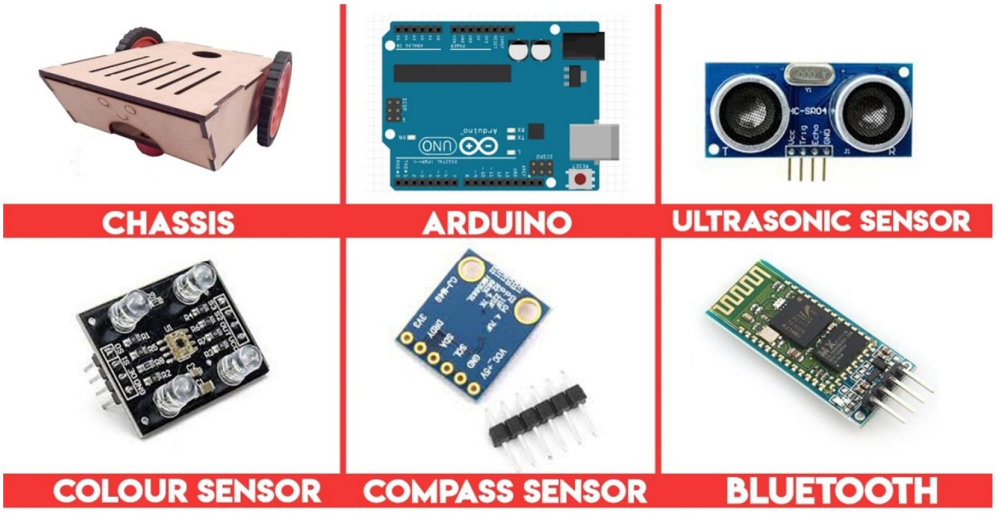

Figure 1: Components we used to build the Self Driving RC Car.

III. WORKING PRINCIPLE

We made a small RC car with all the sensors and components fixed to it. And we designed a route map where we can allot some locations. The map has 5 alternative points given. Each can be assumed as a physical address points. And if we place our RC car at any given point it recognizes the point automatically and asks for drop location. That you need to provide it from android application. Once you've done that, our RC car selects the best route no matter in what direction it is, it'll start moving and reaches its final destination as fast as possible.

Mapping the route which has size of 5x5 cells is accomplished by using two-dimensional memory array with a size of 5x5. Artificial intelligence program requires two memory arrays 5x5. As you can see on Figure 2, there are five particular points (locations) that the car can stop. Those points are selected randomly from the map. Each point has a unique set of colour. Here, we used Azure (kind of blue colour) for location A, Brown for B, Cyclamen Pink for C, Dark Magenta for D, European Amber Orange for E.

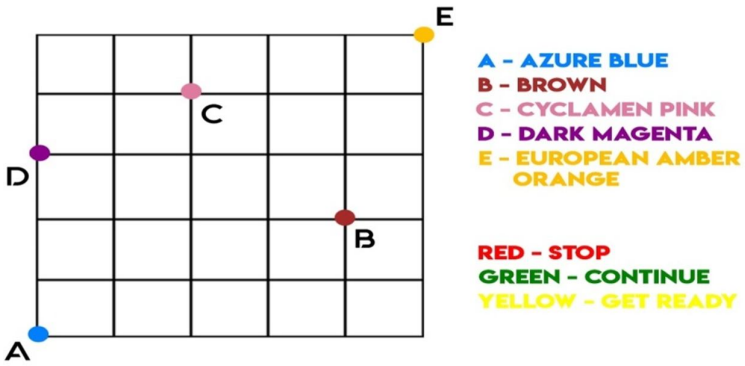

Figure 2: Route map with five addresses (points). Different colour for different points.

For better understanding, assume if this car is located at point B (refer to Figure 3), and we want it to go to location E. And if the car is in south direction which mean, down direction, then car will rotate to 180 degrees to north and starts the path.

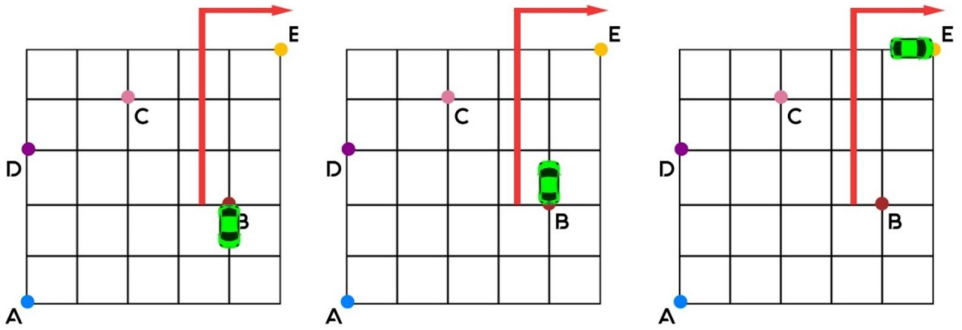

Figure 3: RC car moving from B point to E point autonomously.

With colours provided to every particular reference point, the colour sensor continuously scans for colours. Once it scans for a point, it automatically decides in which point our car is. Thus making this system a small time GPS alternative for only in room project design. Once its scans the source point, it asks to provide the destination point. We have to connect our car with an android application. As we connect to it with the help of Bluetooth, we have to select any option that we need our car to go. The android application user interface can be seen below. I've named it as Auto-Pilot.

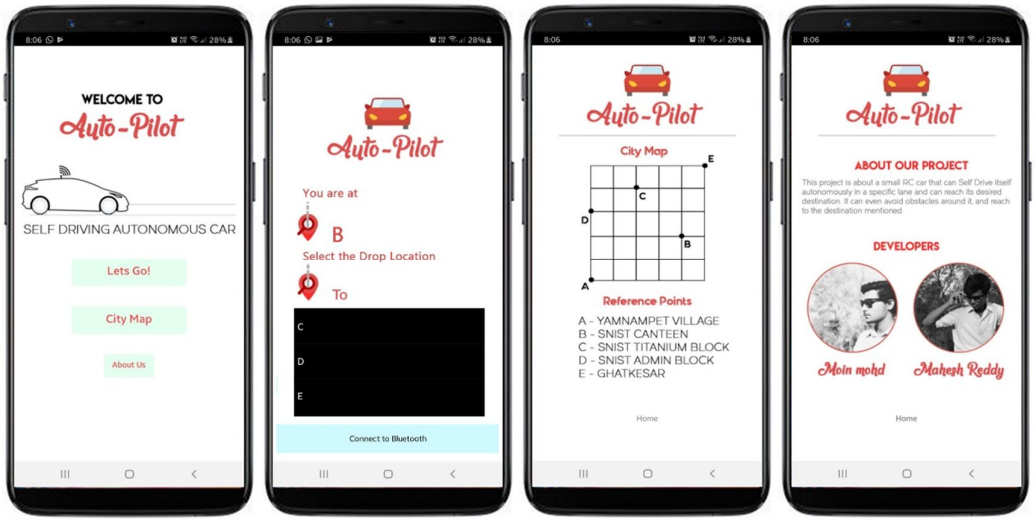

Figure 4: Mobile Application where it automatically recognise the start point and ask to set the Drop point.

The app that we can see above is made from the website MIT App Inventor. The exclusivity of this application is, it has 4 screens. Home as the first screen with three buttons provided. And if we want to move our robot, we just have to select the let's go button from the home screen. Once we open it, we can see where we are now and where should we go. But firstly we have to connect to Bluetooth in order to move the car. Once we connect it, we can select whatever alternate we want to go.

The other two are the map route and about us section in the application. So the main working of this car is like, when we place our car at a location, it first checks for any obstacles near it with the help of ultra-sonic sensor it has been provided with. Now if it's sure that there's no obstacles around, it asks for input to be provided from the application. When we open our application, we have to first connect to Bluetooth and set the drop location from android application. Then the desired location point will be sent to our car. In our car, we have a processor called Arduino.

With given conditions and its own algorithm, it start to process where it has to go. Now, according to its algorithm and according to its direction it is in, it'll try to make the best route from it. At any given point, if it detects the RED colour ahead of it (traffic signal - stop) it immediately stops and only move forward when it detects GREEN colour ahead. So the traffic signal

system can also be applied to it as it stops and moves according to the traffic regulatory rules. The algorithm in our processor is designed in such a way that it will to gain the best and shortest path first to reach its corresponding point.

As the cell are of 5x5, it takes the car to easily move from one place to another with the precise calculations. Not only at first, it always checks for any obstacles around it. And it detects while it's in transit, it stops and try to clear it out. It doesn't move until any obstacle clears its path out. Once the obstacle cleared, it resumes the transit.

IV. CONCLUSION

Self-driving vehicle is widely spread technology. And to implement a proper self-driving car/vehicle, we need to take the accurate measurements and should have precision in each and every step. Nothing is more than a human life. It all concludes at; what kind of methods we are using to develop a certain technology. So, this is my kind of approach to the self-driving car. There are numerous ways that a technology can be developed but it shouldn't affect any living being and should support our economy as well as our nature.

In my approach of self-driving car, I designed it solely for the application of autonomous transit/commute. As the lack of Metro trains everywhere in the city, and as there are very less transportation in villages and low populated, less developed towns, our self-driven car can be the outmost beneficial to the rural public as well as the people in living in cities.

V. FUTURE SCOPE

Self-driven vehicle technology is growing day by day. With the design of our system, we can change a lot in coming days with more advanced and precise sensors. We can use LIDAR technology to always detect the surrounding. We can use a COMPUTER VISION and can drive a vehicle with the help of Artificial Intelligence, Machine learning, Deep Learning, Neural Networks, etc. And we can increase the algorithm in an unimaginable way. We can use this above mentioned methods with the help of Raspberry Pi development boards and Python or Matlab Simulation methods.

VI. ACKNOWLEDGEMENT

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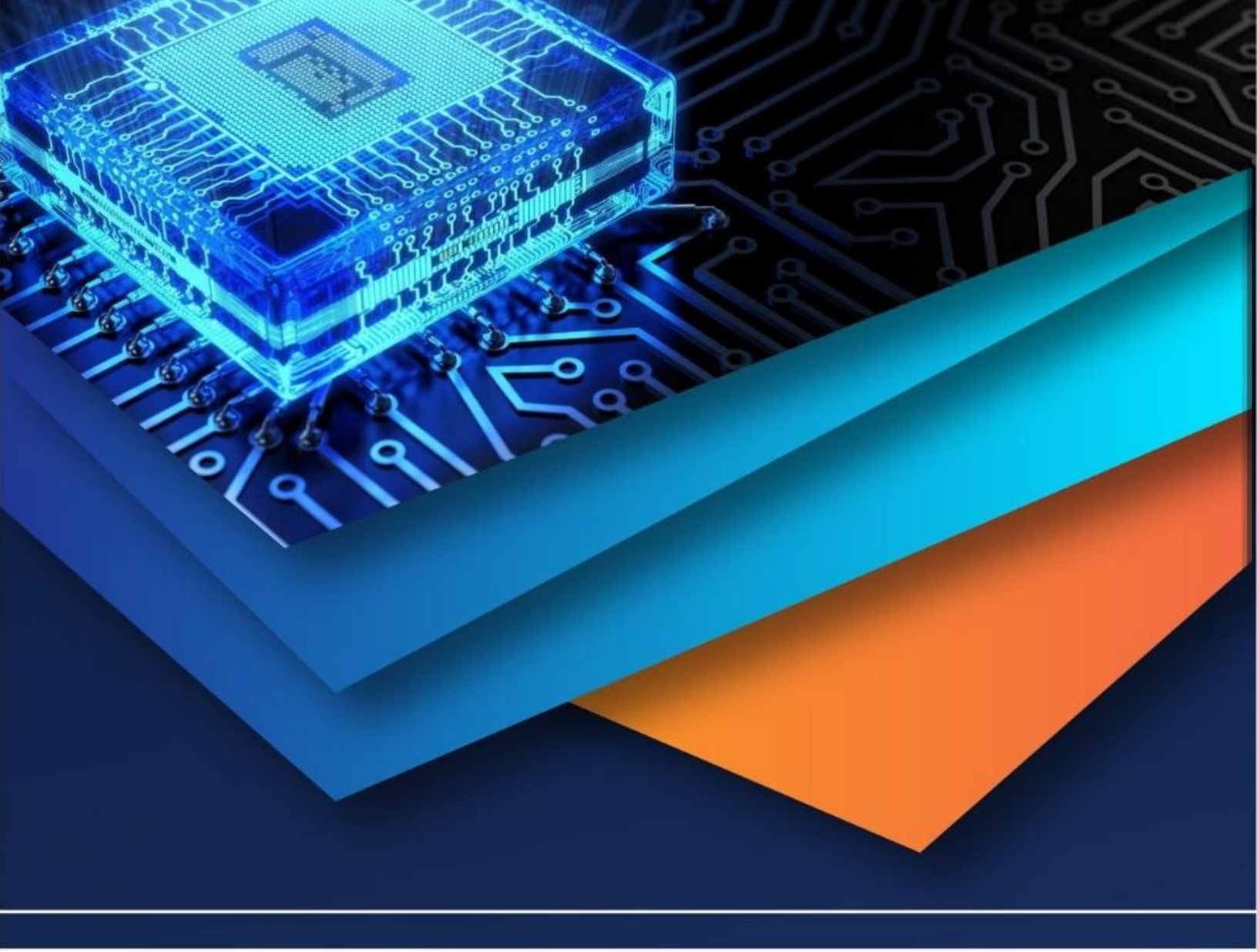
REFERENCES

[1] Paper written with minor changes from - "Autonomous robot motion path planning using shortest path
[2] Planning algorithms" by T. Ravi teja, S. Krishna Chaitanya - IOSR Journal of Engineering (IOSRJEN) e-ISSN: 2250-3021, p-ISSN: 2278-8719
[3] Kanwaldeep Kaur, Giselle Rampersad "Trust in driverless cars: Investigating key factors influencing the adoption of driverless cars" – June 2018 https://www.sciencedirect.com/science/article/pii/S0923474817304253.
[4] S. Koenig and M. Likhachev. D* Lite. In AAAI Conference of Artificial Intelligence, 2002.

[5] JanDe Bruyne, Jarich Werbrouck “Merging self-driving cars with the law” Oct 2018
[6] D. Ferguson, A. Stentz, Field D*: an interpolation-based path planner and replanner, Robotics Research, in:
[7] Results of the 12th International Symposium, ISRR, STAR: Springer Tracts in Advanced Robotics Series Volume28, 2007, pp. 239–253.
[8] Nynke, E.Vellinga “From the testing to the deployment of self-driving cars: Legal challenges to policymakers on the road ahead” Dec 2017.
[9] Spieser, K., Treleaven, K., Zhang, R., et al. (2014). Toward a systematic approach to the design and evaluation of automated mobility-on-demand systems. In G. Meyer & S. Beikers (Hrsg.), Road vehicle automation. http://goo.gl/bu1Q6l. Accessed 10 Nov 2014.
[10] Daniel J.Fagnanta, Kara Kockelman “Preparing a nation for autonomous vehicles: opportunities, barriers and policy recommendations”.



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