Autonomous smart car-EQ fortwo

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ABSTRACT

With vehicle technology becoming more and more advanced, it's only a matter of time before sharing the roads with self-drivers. This paper describes you about the smart vision EQ fortwo will be able to make the most out of the limited amount of space. Our system will be minimizing human interaction with cars; with the use of the mobile device, the passengers will be able to summon the smart EQ fortwo to pick them up at any location.

Keywords— *Grille, ADC, Taillights, Android application, Bluetooth*

1. INTRODUCTION

The Smart-Vision EQ Fortwo is a new vision of car sharing. Because transforming "urban traffic" into "city flow" in future will not only benefit the users but the public at large too. It heralds a new era in car sharing because users do not have to look for the next available car it will find them and collect the passengers directly from their chosen location. Cities and municipals authorities are also a target group for the future car-sharing concept.

The concept vehicle demonstrates how autonomous driving could make future car sharing even more convenient, simple and economically efficient. Smart Car innovation overcomes all driving difficulties and makes a drive smart, safe and efficient.
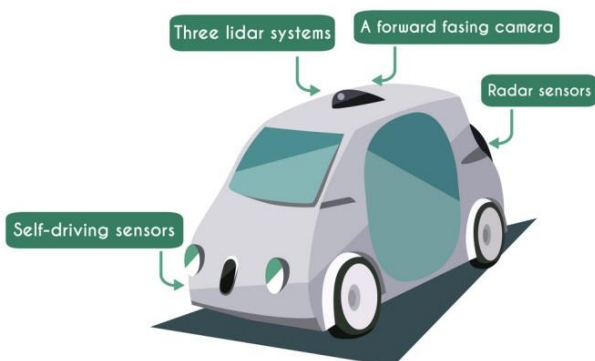

Fig. 1: Autonomous smart car

Those who want can use the 1+1 sharing function to make contact with other interesting users. Possible passengers are suggested on the basis of their saved profiles and current travel plans and can be accepted or rejected. When two passengers are on board, the large display in the interior shows shared interests such as concerts they have recently attended or sports that they play. The extra time gained as a result of travelling in the vehicle can be used to chat and interact.

2. LITERATURE SURVEY

An autonomous vehicle is based on a remote controlled (RC) 1/10th scale of the original car, which we basically change it to add some features to the car by initially replacing its electronic speed controller (ESC), DC servo motor, microcontroller (Arduino Mega), a gyroscope and capable terminals among other components.

Fig. 2: An Autonomous Vehicle

Speed encoder is fitted on right side back wheel and the front bumper a 9 DOF IMU. This includes an accelerometer, a gyroscope, a magnetometer as well as an ATmega328p, which runs fusion sensor firmware which in turn calculates the displacement in 3 axis and transmits it via the serial port. These three infrared and three ultrasonic sensors as well as LED'S, that serves as flash and stop lights. There are also two infrared arrays in the front of the car, to detect dash line between the lanes through detecting the colours of the street lane. The

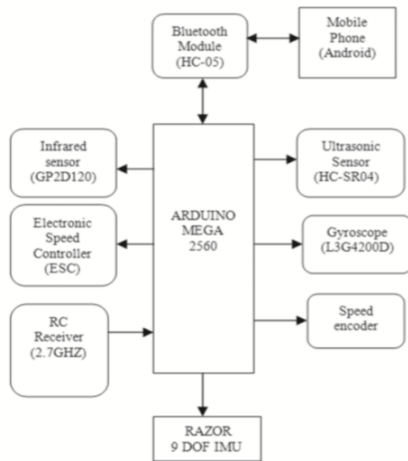control system block diagram of an autonomous vehicle is shown in figure 3.

Fig. 3: Block diagram of an autonomous vehicle

The control module consists of an inbuilt AT mega 2560 microcontroller. An ATmega 2560 on the board channels the serial communication on USB and appears as a virtual port to software on the computer. Arduino Mega board has 16 analog pins and 54 digital Input and Output pins. It also has an analog to digital converter which converts the analog value obtained from the output of the sensor to a digital value and transfers the data to the smartphone via Bluetooth.

The sensor module consists of ultrasonic distance; sharp infrared sensors integrated into it. These sensors sense the distance of the object and produce a corresponding analog voltage output. This analog voltage output is fed to the analog pins of the control module which is then converted to a digital value by the analog to digital converter (ADC). The distance sensor in the sensors module needs to sense the data from the object passed through the readings.

Image processing is one of the techniques to follow the street lane by utilizing OpenCV [8]. This enabled to capture the real environment by mounting the Android mobile phone at the top of RC car to test the track by using various machine vision algorithms. Then it could visualize the various transformations on phone's screen by on the spot debugging techniques like line detection and Canny edge detection and Hough line transform to get a bird- eye view of the video stream, captured from the smart phone's camera.

Path of Autonomous Vehicle\ Lane following is the features of our autonomous vehicle and it using image processing conducted through the OpenCV library, to make the car has capable of driving within the appropriate street lane. It used OpenCV to define what a valid street lane is and as long as we are able to find them, we make sure stay in the middle of the lane. Model street land for prototype model testing is shown in figure 4.

Fig. 4: Model of following street lane

3. PROPOSED WORK

3.1 Android Application
The new smart EQ control app supports smart drivers with plenty of handy functions, making electrified travel even easier. The digital co-pilot is always on hand and simplifies the user's life in the city. The smart EQ control app lets you keep an eye on your cars charging state- at the office, while you are shopping etc. To prevent unwanted surprises, the app will also notify you by push message when, for example, your battery falls below 30% or when your tire pressure is low and this app helps users find the next charging station.

EQ control app feature:
- Pre-air conditioning of the interior via preset or instant activation.
- At-a-glance information on charging state, remaining charging time and reach.
- Intelligent and cost-optimized charging.
- Up-to-date information on average consumption, mileage, eco score, tire pressure and the next maintenance date.
- Intelligent push messages.

Fig. 5: Android Application

3.2 Rechargeable lithium-ion battery
The smart Vision EQ Fortwo features a rechargeable lithium-ion battery with a capacity of 30kWh. When not in use, each car makes it's way independently to a charging station to load up with new energy. Alternatively, the cars can dock with the power grid inductively, feed-in electricity and act as "swarm battery", taking the pressure off the grid.
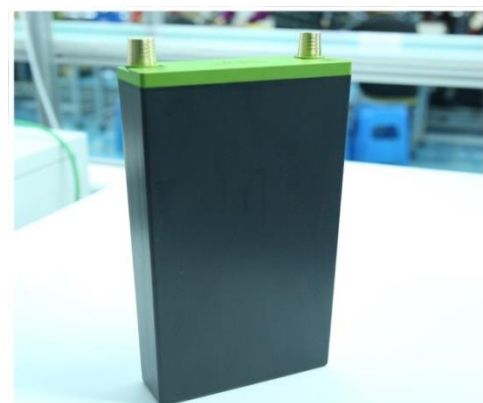

Fig. 6: Lithium-ion battery-capacity 30kWh

3.3 Revolutionizing Urban Traffic
The autonomous, electric, and the connected vehicle was designed to drive the evolution of car sharing. "Hi, Kate and David!" a 44-inch screen signals, adorning the futuristic front of the smart vision EQ fortwo in place of a regular grille. Silently, the electric vehicle glides to the sidewalk and folds up its wing doors over the rear axle. Automatically the passenger's personal digital profiles show up on the screens, while kate sets

the coloured glass doors to shift from translucent to opaque - to ensure privacy.

Inside, traditional trappings like steering wheel, pedals, dashboard, and centre console are replaced by a flexible lounge with 24-inch LED screen and two personal 4-inch displays on the sides, optimized for presenting a fully networked and connected personal digital environment of social media, messenger services, games, movies, or music.

Fig. 7: Communicating the vision

Fig. 8: Spacious interior

3.4 Advantages
- It's able to pick up its passengers from the desired location and transport them to their destination.
- The 'black panel grille and side projection surface to aid in communication between car and passenger.
- The EQ fortwo can find its own way to a charging station.
- The doors have a wing-like pivot over the rear axle, reducing likely collisions with passing cyclists and pedestrians.
- It is summoned using your smartphone or mobile device.

4. IMPLEMENTATION
4.1 Android Application
Algorithm:
Step 1: Login into the Android application with valid user credentials.
Step 2: Establish a connection to appropriate Bluetooth to gain access to the car.
Step 3: The vehicle can be ordered and controlled using the user's mobile devices.

4.2 Revolutionizing urban traffic
The smart vision EQ fortwo experience even starts before we enter the vehicle. Programmable projections on the cars frontal black panel grille can display individual messages, greet the passengers by name, communicate with pedestrians in traffic. The cars digital head and taillights are equally icon and UI ready, able to communicate things like free parking spots, the charging level, traffic signals, or potentially dangerous situations. The frames of doors and windscreen glow in a hue to match the riders chosen the mood.

Fig. 9: Communicating with pedestrians

It has a network connection between the cars and the surrounding traffic infrastructure, the entire vehicle fleet can be coordinated to ensure that it optimally covers a city's demand-driven mobility.

Fig. 10: Communicating with surroundings

The car learns to identify times of high demand, that is during rush hour, at mega-events, or when it starts to pour. Future users won't need to look for the next available vehicle it will find them instead.

5. CONCLUSION
This proposal gives a complete view of the Autonomous Smart Car System. While driving horrifying accidents may occur. So to avoid these they have made a car which provides driver customized features, security, comfortable and luxurious travelling by using some functionalities and by this driver will follow the rules and get relax and it will be easy, safe and efficient driving. It's a reliable digital companion made for car sharing. It is the most radical car sharing concept car of all, fully autonomous, with maximum communication capabilities, friendly, comprehensively personalize-able and electric. The software accesses the user's personal profiles to facilitate a completely new kind of communication between the car and its passengers.

6. REFERENCES
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