# Google Car

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***Abstract:-*** **Google's dramatic ascent and subsequent domination in the past fifteen years of the technology and information industries has financially enable Google to explore seemingly unrelated projects ranging from Google Mail to the Google Car.In particular, Google has invested significant amount of resources in the Google car, and integrated system that allows for the driverless operation of a vehicle. While initial reports indicate that the Google car driverless automobile will be more safe and efficient than current vehicles, In particular, the existential threat that the car presents to several large industries, including the insurance, health care and constructions industries, creates an additional challenge to the success of the Google car well beyond the standard competitive threats from other established car manufactures in the automobiles industry, which begs the question, "can the Google car be successful ?" with so many challenges above and beyond the competitive forces typically threatening long-term profitability, will the Google car able to create and sustain a competitive advantage for Google in driverless car space?**

***Keyword-- Competitive Advantage; Automobile Industry; Driverless Automobiles.***

## 1 INTRODUCTION

Research into self-driving cars is not a new phenomenon. In the late 1950s, the first known thoughts on self-driving vehicles were described in Popular Mechanics magazine by a mechanic who argued that altering a roadster to both start itself and back itself into a driveway would be relatively straightforward. Later that year, a GM analyst revealed in Popular Science magazine that the company was already investigating embedding highways with cable and radio-control boxes as a means of developing an infrastructure to support driverless cars. Despite all of the theoretical research into the subject, self-driving cars did not Become a reality until 1968. The first physical breakthrough in

Driverless car technology was the design of a car that used sonar and gyroscopes to drive, steer, and brake an automobile. In 1968, The Cornell Aeronautical Laboratory created the "Urbmobile", an electric car that could be driven on the road but could also glide along a subway-style track thatutilized roadside guides, magnetometers, magnetic nails, and internal computers. The largest breakthrough came years later, however, with the announcement from Google, Inc. of the Google Car in 2010. With the distinctive sensor and camera nub lodged on top of a Toyota Prius, the Google Car quickly became operational and present on roads across the United States. Shortly thereafter, media coverage of the Google Car became increasingly prevalent in addition to promotional commercials demonstrating the benefits of the car (Google, 2013). While the benefits demonstrated in the videos seemed to be promising, the Google Car's entrance into the market seemed a far leap away from Google's core business.

## II. GOOGLE INC.

Google Inc. specializes in Internet-related services and products, with the mission to organize the world's information and make it universally accessible and useful. In 1998, Larry Page and Sergey Brine, two Stanford University computer science graduate students, created a search engine that uses back links, or incoming links, to a website or web page, to determine the importance and therefore rank individual web pages during a web query. Existing competitors, like Yahoo and AOL, on the other hand, were directories of other websites, organized in a hierarchy, as opposed to a searchable index of pages. This allows the Google search process to return more relevant results rather than simply a ranked list of preferred sites. In 1999, Google secured funding from Sequoia Capital and

Kleiner Perkins Caufield& Byers, Silicon Valley's two leading venture capital firms (Google, 2013). Only one year later, Google became the world's largest search engine with over a billion pages in its index, surpassing industry

giants such as Yahoo. Google's dominance of the search market continues today as Google maintains a 67% share of global searches (Miller, 2013).

### *A. Google Car*

In 2010, Google announced that the prototype of a driverless car - the Google Car - was completed (Google, 2010). According to Google executives at the time, the goal of the Google Car was to "… help prevent traffic accidents, free up people's time and reduce carbon emissions by necessarily changing car use" (Google, 2010). With a team assembled consisting of engineers with experience in vehicle technology from the DARPA Challenges, a series of driverless vehicle races sponsored by the U.S.

Government, Google was finally able to bring the driverless car happening to reality. The Google Car is a sophisticated system that integrates proprietary hardware and software, using video cameras, radar sensors, and a laser range finder to visualize traffic and detailed maps taken from Google Maps to enable navigation between destinations. Google's data centres process the incoming data relayed from the sensors and cameras mounted on the Google Car in order to provide the car with useful information about its environment that is later translated into the physical operation of the vehicle.

The key to the Google Car's technological capabilities is the laser range finder mounted on the roof of the modified Toyota Prius, allowing for real-time environmental analysis. In addition, the Google Car is equipped with four radars and a velodyne 64-beam laser placed strategically around the car to accurately generate a three dimensional map of its environment. A camera detects traffic lights while a GPS, wheel encoder, and inertial measurement unit control the vehicle's location and logs car movement (Guizzo, 2013). The software system synthesizes laser measurements producedfrom the laser beam with high-resolution maps of the world, producing dynamic data models then translated into the physical operation of the vehicle by the car's internal software system. Altogether, the system allows for seamless operation of the vehicle that adjusts to its dynamic environment without the intervention of a driver. In addition to the generic driverless capability, the Google Car's system also adjusts for local traffic laws and environmental obstacles in real-time. For example, if the Google Car approaches a four-way intersection and senses that the driver with the right of way does not move, the Google Car inches forward slightly to indicate to other drivers the intentions of driving through the intersection. Altogether, the technology and adaptation to local conditions not only allows for driverless transportation, but also increases safety on the road. Since its beginning, the Google Car has completed 200,000 miles of accident-free computer-led driving, beyond one incident that was arguably caused by another driver (Hyde, 2013). The road test results for the Google Car indicate that the Google Car obeys all of the rules of the road and adjusts to its dynamic environment in real-time with no problems. Thus, with this integrated technology, the car has the capability of being safer than a human driver.

## III. ADVANTAGES

There are several advantages that the automated car has over normal cars. With these robotic cars on the road society will experience less traffic collisions, reduced congestion, and the ability to effectively manage traffic flow. Not having to drive a car while sitting in it on route to work or home would save individuals time, and give them the ability to participate in other tasks while in the vehicle. citizens will now be able to read books, edit their work, eat and even talk on their cellular seat of the car. The elderly and disabled who normally would not be allowed to drive will benefit greatly through this technology. Another great aspect of the Google Driverless car is that it would decrease the level of road rage present on the roads during times of heavy traffic blocking as no individual could be blamed for their driving behaviour. In addition, complications that arise while driving would be removed such as finding directions to a new goal. The individual would no longer have to worry about missing street or making an wrong turn. The Driverless car's automated GPS system would be able accurately take the individual to their desired destination without getting lost.

## IV. DISADVANTAGES

A. Although a great concept, the Google car does have some disadvantages. Since it utilizes robotic technology, it may well be possible that it could experience even a minor glitch therefore putting the driver in serious danger.
B. Even though the Google car may be able to drive safely and smarter than the average driver, it still may experience trouble in unique situations. Combination information from difference sensors demands very complex algorithms.
C. One unique situation that may be confusing for the Google car is when a car stops to back in to a parking space
D. It is not unusual to be driving and suddenly be conducted by traffic worker to take detour from the original route. The execution could be very confusing for the robot.

E. Another issue is in the form of affordability. Currently, the driverless car is not monetarily feasible for the vast majority of the population. The radar system mounted on top of Google's self driving automobile costs an estimated $70,000. If driverless car become commonplace in society, service industries like taxis and limousines will surely take a large loss. This leads to idea of the Google car a disruptive technology.

Disruptive technologies introduce new package of attributes to the accepted mainstream products. The autonomous idea very much will disrupt the automobile industry. Impaired drivers and people who don't know how to drive will be able to hope in their robotic vehicles instead dishing out money for car fare. Most people find driving to be found and if sometimes in the future driverless cars become mandatory on all road driving will become boring. Policy like this seems unlikely; it is something to think about.

## V. CONCLUSION

The Google Car has the potential to have a profound effect on energy consumption, efficiency, and traffic accidents. With subsequent productivity increases, and decreases in costs, the Google Car represents a potentially revolutionizing technology. It is precisely this potential, however, that creates a threat for Google to sustaining a long-term competitive advantage in the driverless car space. As the Google Car may radically shift the structure of affected industries and raises serious privacy concerns, vulnerable industries and consumer groups threaten the viability of the project. Thus, the Google Car faces challenges far greater than competing car manufacturers alone. In squaring off against politically and economically powerful industries that are facing their demise, can the Google Car survive? Can the will to revolutionize driving outweigh the costs of potentially ruined industries and massive unemployment? Who will win the war of the road?

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