

**Big Data Strategy for Tesla, Inc.**

 There is growing acceptance of Electric Vehicles (EV) as an alternative to cars that run on fossil fuels. The Edison Institute has projected that by 2030 around 7% of the 259 million cars and light trucks on U.S. roads will be EVs (Cooper & Schefter, 2018). Tesla, Inc. is a lead player in the EV industry and is using big data and data analytics to drive the acceptance of EVs in the automobile market. This paper examines the use of big data and analytics by Tesla to achieve its marketing and strategic goals.

**Company Profile**

Tesla was founded in July 2003 by Silicon Valley engineers Martin Eberhard and Marc Tarpenning. Elon Musk became an investor and company Chairman in 2004 and has since become eponymous with Tesla and the EV industry. The company unveiled a prototype of the Roadster electric sports car in 2006, which went into commercial production in March 2008. The company went public in 2010 and launched the Model S in 2012, the world’s first premium all-electric sedan. This model set standards for safety, performance and efficiency which caused EVs to be taken as serious alternatives to internal combustion engine driven cars in the global automotive industry (McFadden, 2019). The image Tesla has created with investors is reflected in a market cap of $ 72 billion in December 2019 compared to $ 52 billion for the auto industry leader General Motors, despite being much smaller. Tesla had revenues of $ 21 billion and a net loss of $ 1.06 billion in FY 2018 compared to GM which had $ 147 billion in revenues and a net profit of $ 8.1 billion (GM Stock, 2019, Tesla Stock, 2019).

**Tesla’s Big Data Strategy**

Tesla has designed its cars with multiple sensors and cameras that send data to the cloud. The cars are fitted with eight surround cameras that provide 3600 visibility up to 250 meters range. Twelve ultrasonic sensors enable the detection of hard and soft obstacles on the road. The cars are also fitted with forward-facing radar that can see through heavy rain, fog, dust and even the car ahead. The signals from these sensors are processed by a powerful on-board computer with real-time communication with cloud-based servers to provide the driver with information far beyond the human senses. The Autopilot software on-board enables the car to accelerate, steer and brake automatically within its lane while the driver remains in control. The Autopilot also navigates the car to the set destination suggesting lane changes to reduce travel time and recommending the correct exits from highways (Tesla.com Website, 2019). These sensors were built-in primarily to monitor car parameters for the company to make improvements to its vehicle’s technology. Using data analytics, Tesla was often able to identify problems before the car owner was even aware of it. The required improvements were made through on-line software upgrades without the need for the owner to take the car to a service center. The data analytics capability also helped the company counter a 2013 negative report in the *New York Times* on battery failure in a Tesla S taken on a test drive (Djuric, 2015).

**Business /Marketing Initiative for transition to Autonomous Cars**

**The Strategy**

 Autonomous or self-driving cars are expected to be the future of the automobile industry. The National Highway Traffic Safety Authority (NHTSA) has identified five levels of autonomous vehicles (Litman, 2017).

*Level 1 – Function-specific automation*: Certain functions such as cruise control, lane guidance and parallel parking are automated, but the driver remains fully engaged and responsible with hands on steering wheel and foot on the pedal.

*Level 2 – Combined function automation*: Additional functions such as lane centering and adaptive cruise control are automated. The driver can take hands off the steering wheel and foot off the pedal but must remain alert monitoring the roadway and to take control when required.

*Level 3 – Limited self-driving automation*: The driver can cede control under specified road and drive conditions and rely on alerts from the system for transition back to driver control.

*Level 4 – Self-driving under specified conditions*: The vehicle performs all functions under specified conditions without the need for the driver to intervene.

*Level 5 – Full self-driving capability*: Where the car self-drives under all road, environment and traffic conditions.

 Tesla’s built-in sensors and on-board computer already provide their cars with Level 2 features. Advancement to the higher levels depends on self-driving technology attaining acceptable levels of safety.

**Tasks, Outcomes and Critical Success Factors**

 Tesla could develop the capability for the data from the on-board sensors and cameras to be analyzed in real time with traffic patterns. This analysis could be used to provide visual and audible alerts to the driver enhance safe driving habits. Since over 90% of all accidents are due to driver errors caused by fatigue or distraction (Litman, 2017), the company could also require the driver to respond to these visual and audible alerts instantly. If the driver’s responses are not in time, the on-board computer can signal an alarm for warning other cars and bring the car to a safe stop at the roadside. Such a capability would correspond to Level 3 and be an important advance towards fully autonomous cars. Tesla could become the front runner in this transition.

**Business /Marketing Initiative to use Solar Power to Recharge Battery**

**The Strategy**

One majordrawback for EVs is that the driving range is limited to around 100 – 120 miles by the battery capacity and power outlets for recharging are scarce and recharging takes a minimum of 30 minutes. Since Tesla is also active in the solar power industry, it could consider a strategy to embed solar cells into the roofs of their cars. The solar energy could reduce the power drawn from the battery during driving and recharge the battery when the car is parked in the daytime.

**Tasks, Outcomes and Critical Success Factors**

 The solar power industry uses data analytics for two major tasks. A mix of weather data, satellite images and machine learning is used to predict power output from solar arrays at various times of the day. The power output from individual cells in a solar array is monitored to identify the specific panels that need cleaning or replacement. This helps maintain power output from solar arrays at consistent levels (Neiditch, 2019). The on-board computer in an EV can be used to monitor the solar cells for output and regulate the power sharing between the solar cells and the battery to extend the drive range. This would provide Tesla with market leadership over other EV companies.

**Summary and Conclusions**

 Tesla, Inc. is already a significant user of big data to monitor the performance of its Electric Cars and to provide periodic updates to the on-board computer to overcome problems and improve performance. This corresponds to a Level 2 capability for autonomous cars which are expected to be the future of the automobile industry. A strategy Tesla could explore is to use the sensor data and analytics to provide visual and audible alerts to the driver to enhance safe driving habits. These alerts would require an instant driver response to show that he is attentive and in control of the vehicle. A delay in driver response would cause the car to signal an alarm to other cars and cause the vehicle to be brought to a safe stop at the roadside. This would be an important advance towards fully autonomous cars for Tesla.

 Tesla could also use its presence in the solar power industry to explore embedding solar cells into the roofs of its EVs. These solar cells would supply part of the power needed for the car and also recharge the battery when parked. This measure would extend the drive range and partially solve the problem of scarcity of recharge outlets and the long recharge time.

**References**

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