CAB Project

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Phase II: Proposal

Internal combustion engines have been the standard for vehicle production ever since the creation of automobiles in the late 1800s with the Mercedes Patent Motor Car and Ford Model T. These engines use a mixture of gas and air to create a chemical reaction that emits colossal amounts of carbon dioxide and other harmful emissions, representing 6.4 metric tons of carbon dioxide per vehicle annually. The burning of gas and diesel from internal combustion disrupts the natural procedure of the environment artificially heating the atmosphere, being a cause of climate change. From an ethical perspective, although cars provide essential transportation for billions of people everyday, there have been detrimental environmental impacts from vehicles that humans are obligated to prevent and sustain for the continuance of life. Climate change is responsible for: intense droughts, storms, heat waves, melting glaciers, air pollution etc. As technology has rapidly advanced other eco-friendly substitutes to combustion engines have been offered.

Heading into the twenty-first century hybrid vehicles rose to popularity following the financial success of Toyota's Prius. In 2021 hybrid vehicles represented 329 billion and a six percent market share. These cars feature a traditional combustion engine while simultaneously being powered through one or more electric motors. As a result hybrids provide superior gas mileage and reduced emissions compared to the traditional counterpart, over benefitting sustainability.

Although fully electric vehicles have been prevalent since the 1920s in the niche demographic of the elite, eventually they became more affordable and popular in the 2010s. Unlike Hybrids, EVs are completely electric emitting significantly less emissions than both combustion and hybrid vehicles and don't use gas. On average EV's produce just 200 grams of carbon dioxide per mile compared to 260 grams for Hybrids and 350 grams for internal combustion vehicles respectively.

Environmentalists praise electric vehicles for their apparent drastically reduced emissions rates. The United Kingdom announced they would be banning the sale of fully internal combustion vehicles by 2030 as a result of the reduced C02 rates from EVs. However, sales of hybrids will be permitted. If the shift from internal combustion to EV's has been so drastic, how efficient truly are electric and hybrid vehicles from a sustainability perspective? Examining data of the overall greenhouse gas and C02 levels from the three engine categories will develop an understanding of the difference in emissions each of these engines produce. Furthermore, the relationship between number of EVs (hybrid or electric) per capita and C02 levels per capita could be explored. If states and or municipalities with more EVs produce less C02 levels by vehicle adjusted for population a correlation between EVs and reduced emissions could potentially be concluded.

Secondly, the impact of gasoline, the necessary fuel for combustion engines, in relation to greenhouse gas levels overall can be examined. Collecting GHG data from gasoline production factories via heatmaps could further reason why combustion engines are influencing climate change.

Electric vehicles have gained lots of popularity in recent years, as they are promoted as being much better for the environment than gas-fueled cars and supposedly fix many issues that stem from conventional cars. The main problems with non-electric vehicles is the harmful impact they have on the environment. According to data from Sustainable Jersey, the municipalities in New Jersey with the highest percent of EV's tend to have lower total CO2 emissions. According to the charts, Pine Valley borough, Tavistock borough, and Walpack township, the leading municipalities in percentage of EV's, are the bottom three municipalities in CO2 emissions. Following a conclusive study done by a team at MIT, they were able to confirm that gasoline cars produce nearly one hundred grams more of carbon dioxide per mile driven than electric or hybrid cars. Moreover, according to the Alternative Fuel Data Center, the annual CO2 emissions for gasoline cars was nearly six times more than electric cars.

Due to perhaps the recency or cost of electric vehicles, there are still far too many gas powered cars on the road, which is why these issues keep persisting. The regularity of gas cars does not appear to be coming down anytime soon either, according to the U.S. Energy Information agency. The agency expects 78 percent of cars on the road to be gas-powered, and only five percent to be hybrid. There are also people who claim that EV's are almost, if not just, as bad as gas cars. One reason is because the batteries, according to a study done in 2023, could possibly lead to an increase in greenhouse gas emissions by reducing the available batteries for non-electric vehicles.

Users will have access to a plethora of information regarding vehicle energy, fuel consumption, and ownership statistics of NJ municipalities. First the count of electric

personal vehicles per municipality will be accounted for, giving users insight into how prevalent these newly established electric vehicles are in their area. Data of electric vehicle ownership will compare historic electric vehicle ownership data from 2015 compared to more current era data from 2020 to compare and analyze the increase or decrease of electric vehicle ownership over time. Traditional internal combustion vehicle ownership records will also be shown in order for the user to compare the percentage difference between the number of electric vehicles and traditional internal combustion vehicles in his or her town. This will allow the user to understand the consumer behavior trend of EVs. Greenhouse gas emissions data of on road vehicles per municipality will also be used allowing the user to see how efficient his or her town is and how vehicle type and quantity can impact it. Locations of charging stations can be used to give the user the ability to find the nearest charging station for their EV. Lastly, green house gas emissions per vehicle will be compared to see the difference in green house gas emissions from internal combustion, hybrid, and electric vehicles respectively to analyze how efficient the alternatives to internal combustion are. These Datasets are located via Sustainable New Jersey and the Bureau of Transportation Statistics.

Use - Cases for the database:

Use - Case 1: Finding EV Chargers Near Me

Step 1: System prompts user to select county from drop down menu

Step 2: User selects and confirms county they want

Step 3: System finds all EV chargers linked to that county

Step 4: System finds graphic for EV chargers in county

Step 5: System presents user with addresses of EV chargers in the county

Step 6: User has option to copy address to clipboard

Use - Case 2: Cars compared to EV's

Step 1: System prompts user to select county from drop down menu

Step 2: User selects and confirms county they want

Step 3: System finds county in database

Step 4: System finds amount of vehicles and EV's in county

Step 5: System presents user with information listed

Use - Case 3: Environmental impact of non-EV's

Step 1: System prompts user to select country from drop down menu

Step 2: User selects and confirms county they want

Step 3: System finds county in database

Step 4: System finds the greenhouse emissions of vehicles in selected country

Step 5: System presents user with information listed

Work Cited

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