1. **Restatement of the problem**

1.1 Background

1.1.1 Overview of The Problem

Electric vehicles are gradually developing towards a niche market as a cleaner promising alternative of transportation. Acknowledge of alleviating the dependency of fuel and reducing green house emissions has brought control use of gas cars a serious position and production of electric vehicles has been raised since they are more effective and less polluted (Li et al., 2016). Unlike gas cars, electric vehicles require frequent charges due to limitation of their cursing ability especially for a remote trip over provinces. Therefore, how to distribute charging stations is a main concern for providing cars owners a more convenient and safe experience. Tesla Inc, an energy company, has already produced several models of technologically electric vehicles successfully and created routes of charges for customers to keep their vehicles charged all the time. However, there are still places to improve for the future development.

The first problem for Tesla is that the current design of charging routes in America might not still be reasonable when Tesla cars become numerous. Secondly, for other countries, population density and geographies are different, the charging routes deign varies as well. Moreover, numbers of charging stations and their distribution in a country are different when cover of electric cars is in evolution. Therefore, it makes great sense to consider the main influential factors of a charging route design and to improve the charging network.

1.1.2 Current Tesla Charging Design

At present, there are two types of charging stations in addition of at-home chargers. Destination charging is for once charge lasting for several hours or over night. It is always set near a restaurant or in a hotel spot where owners could have couple hours break. The other type is supercharger which is allocated most in well-traveled routes. This charger is to provide longer trips that are up to 170 miles and is within 30 minutes of charging. Both of charging stations are built up in different areas so that people living in urban places can also charge their cars without traveling. The density of charging station s could sufficiently support local Tesla cars usage.

Tesla charging stations could be spotted from in-vehicle navigation map and owners could control battery charging condition from application. Navigation design in the vehicle could search the closet charging station and after setting the destination, it will automatically design a proper route along with charging station for driver in case non-sufficient power. Tesla cars are charged by costing network credits so it is convenient for users. Also, the battery condition could be monitored by the car or applications all the time and users are able to check it for charging or for when completing charging at stations.

It could be seen that the technology of Tesla cars is advanced and intelligent. One way to facilitate the development of electric car is to pursue a more effective design of charging stations routes. Since there will be expansion of charging station to fit fleet grows of electric vehicles, it is worth evaluating and analyzing main factors to design a suitable route for different countries and areas.

* 1. Main Tasks

∆ Study the current charging network in America and design a distribution plan for different areas.

∆ Create a network of charging stations in one of countries of South Korea, Ireland or Uruguay, find factors of determining when and how to develop a charging network and purpose a timeline for a whole evolution of electric vehicles.

∆ Improve previous model and generate more advanced models that could fit different conditions.

∆ Analyze how other techniques might influence use of electric cars.

∆ Prepare a national plan to migrate gas cars to electric vehicles and make specific ban date.