

Thesis Portfolio

Pothole Detector

(Technical Report)

How Cultural Differences Affect Cross-Cultural Engineering Projects

(STS Research Paper)

An Undergraduate Thesis

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Introduction

The following Capstone project and STS Research Paper both reflect aspects of how American culture influences the practice of its engineers and highlights some key changes that could be made for its betterment. First, the capstone project will be discussed. This project focused on developing a sensor for tracking potholes on road trips. Next will be the STS Research Paper. The research paper focuses on cultural differences between engineering disciplines of different countries and how these affect larger projects. The automotive industry is the main linking factor between these two projects. Cars are fairly universal and therefore, so are roads, but some roads or public infrastructure projects are better in one country than in another. In America, potholes are a huge problem in most suburban areas which is what the capstone aimed to solve. The research paper exposes some information about why problems like potholes may not exist or might not be so problematic elsewhere in the world.

Pothole Detector

Nothing beats the feeling of driving through your hometown or driving on a road trip, playing sounds that remind you of your childhood and chatting with friends. Suddenly, all of that is interrupted when you run over a pothole. You want to complain to the local government, but you keep driving and you've forgotten where it was in the first place. One solution is a pothole detector that stores critical information, such as location and severity, and makes a map of previously detected potholes from other users. This device incorporates accelerometers and is connected via Bluetooth to a MSP microcontroller to process the continuous stream of data. Simultaneously, when triggered by passing an acceleration threshold, a GPS request will be made from the user's smartphone to track the location of the pothole in the same moment.

How Cultural Differences Affect Cross-Cultural Engineering Projects

The following paper concerns the network relating engineers in the global workforce and the different cultures that they interact with. The overarching question this paper answers is how do cultural discrepancies influence engineering practices and the results of intercultural engineering projects. This relationship is observed through the lenses of specific cultures relevant to myself as well as those most significant in terms of the capstone project such as Japan, Germany, and some South American countries to help form a more unique connection to how these various cultural practices affect engineering results. In order to draw out these answers, this paper explores cultural practices in engineering through the methods of historical case studies and network analysis. Language learning in school, and specifically the cultural research portions of said classes, are just as integral for engineering students as they are for any other liberal arts study program as will be seen through the arguments of this paper. There is much to be gained from interaction with cultures and especially so in the field of engineering. Additionally, I would like to point out what current shortcomings are as to why this is not a part of the engineering curriculum and how it may be incorporated in a way that does not necessarily negatively impact the students, focusing on how things can be changed in the United States thanks to relations and strategies from abroad.

Reflection

Doing these projects simultaneously, it was easier to make the connection about why what we are doing matters. It is easy to be assigned a culminating project and do it for the grade and move on. What is not easy is taking the weight of this opportunity to try to make actual change in the world while the resources are available from a great institution such as the University of Virginia (UVA). The research paper which includes themes from the STS course

helps to develop the ethics and human centric mindset that is so important when creating, in this case, a brand-new device aimed at improving lives. If the device is hard to use or does not work properly without basic engineering knowledge, then it will not be useful to most people and therefore improve nothing. Hopefully, with this experience, our idea or at least the skills we learned to bring our idea into reality will go on to improve the design process as we move out into our engineering careers.