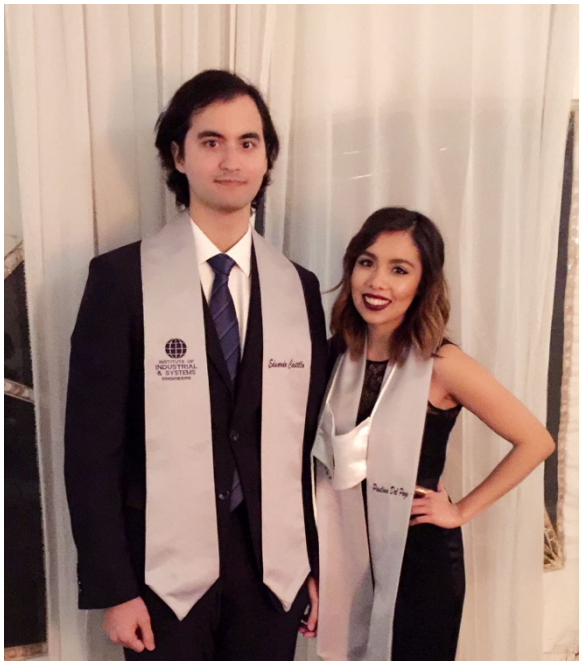
INDUSTRIAL, MANUFACTURING, & SYSTEMS ENGINEERING

SENIOR PROJECT
SUMMARY

Your Name: Eduardo Castillo, Paulina Del Pozo
Type of Capstone (research, teaching, practical application): Practical Application
Type of Project: Applied Research
Project Title: Atmospheric Water Collection System for Agricultural Purposes
Term: Fall 2016



OBJECTIVE

In order to solve the problem of scarcity of water in certain areas of the world, in this case Ensenada, Mexico, new technologies must be introduced. The objective of this project is to find an adequate method of collecting sufficient atmospheric water to supply for agricultural purposes. A prototype was designed and its behavior was first be simulated through Matlab. The prototype should collect enough water to supplement the existing reservoirs already used in agriculture. The way the system will have the best outcome is when the ideal relative humidity is present, as well as a higher outside temperature than the surface temperature in order for condensation to occur. Our goal is to implement the technology with the possible environmental challenges to be faced in El Paso and in Baja California.

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PROJECT OUTCOMES

The concept behind this system is that air will be pushed underground by the use of a pump, and the lower temperature below ground will cause the air to condense inside the copper coil. A passive collection system will be placed nearby where water will be deposited and air will be allowed to exit. Flexible vinyl tubing was selected for the inflow and outflow tubes due to the easiness of use when compared to PVC, as these can be bent and cut without use of couplers or special tools. A coil has been preferred over a straight tube in the condensation unit because of its bendable properties and ease of handling and transportation compared to hard, straight tube. The coil measures 10 ft. in length and has an outer diameter of 3/8 inches. A solar powered air pump has been selected due to its independence from outside energy sources and steady airflow throughout the year.

We ran various tests and analysis on our prototype, including a sensitivity analysis. The three different alternatives for the prototype were compared according to two equally weighted criteria: A. Cost, and B. efficiency. The results show the Control Design to be the best one. The sensitivity analysis also shows 70L/min as the optimum airflow, as up to that point it can compensate a diminished efficiency through increased volumes. The investment return time using the solar air pump (1.6L/min) was calculated to be 34.2 years. Our project was not able to meet its Investment return constraint due to low yield. However, the sensitivity analyses show promising results if the system were to be expanded.

INDUSTRIAL ENGINEERING PROGRAM ASSESSMENT

We think that the IE degree at UTEP is a very wholesome and complete program designed to fully develop all the skills that an industrial engineer needs during his professional life. We are happy to have picked UTEP for our superior education as it helps prepare us for what we should expect during our time after graduation and as we continue our lives as both individuals and professionals.