

# Humidified Shaking Incubator

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Biomedical Engineering, Electrical Engineering, and Mechanical Engineering



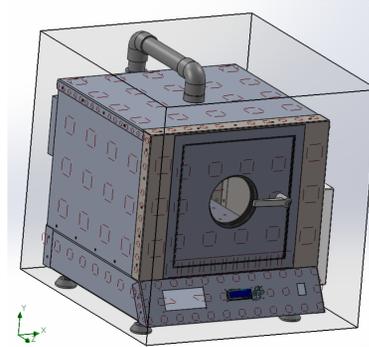
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## Abstract

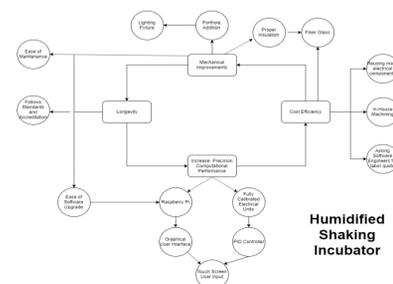
This poster covers the methodology in constructing the Humidified Shaking Incubator, proposed by Dr. Vahabzadeh. The purpose of taking on this project is to fabricate a fixture that can instigate chemical reactions in temperature and relative humidity-controlled environment.

The fixture will have a touchscreen that takes user-defined temperature, humidity, and orbital shaker speed and then send to a microcontroller in order to create an environment with desire parameters.



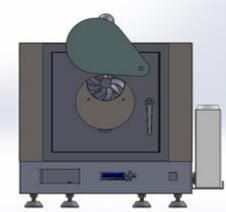
## Introduction

This project will ideally be finished in order to be utilized for biomedical applications and drug delivery. In order to perform such experiments, a control system must be developed to fully control temperature, relative humidity (RH), and orbital shaker base's RPM through user inputs. The controllability aspect is especially important as some experiments are extremely sensitive to the environmental condition. Additionally, it allows users to accurately recreate experiments. Currently, there are little to no options in the market for an orbital shaker that allows control of humidity and temperature in an incubator like environment. Not only will the final fixture be able to compete in terms of functionality, but also terms in cost.

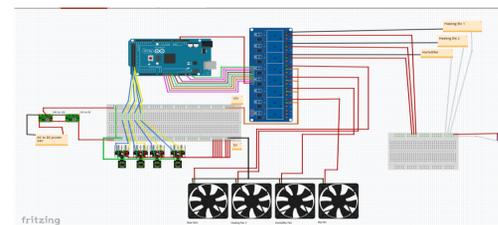


## Methods and Materials

**Porthole Addition:** Porthole will be included in order to monitor incubation. Porthole is designed to be easily covered as some chemical reactions are photosensitive.

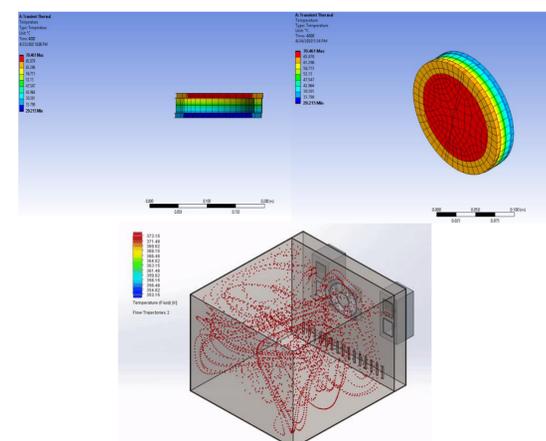


**Microcontroller Design:** Touchscreen GUI was developed using Python and Tkinter in order to give modern user experience. Once user defines desired parameters, information is then sent to the Arduino, which is interfaced with the electrical components to create the desired experimental environment.



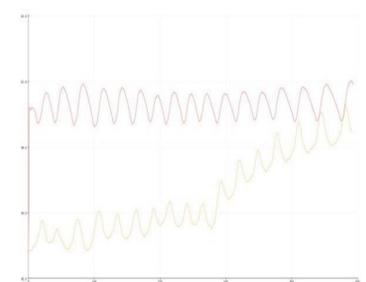
## Results

Below are some of the simulations the team did in order to validate the rationale of our designs.



## Discussion

Due to the stay at home order made by the governor, much of the housing became unobtainable. Physical testing became an issue due to the interest of public safety. Ideally, two-three weeks would have been dedicated to troubleshooting.



## Conclusions

Despite the conflict of interests that arose with the COVID-19 pandemic, based on the results of our simulation and sensors, Team 50 strongly believes the Humidified Shaking Incubator would be close, if not ready to be used by the public. The team was way on top of schedule, all while being under the budget of \$1000.

## Acknowledgements

During a crucial part in the realization of the fixture, a pandemic swept the Earth. Thus, we would like to thank the entire NIU CEET faculty for being understanding of the situation that the team had no way to prepare for. Additionally, we would like to thank our faculty advisors, Dr. Sahar Vahabzadeh and Dr. Hasan Ferdowsi, for all of their tutelage and pointing us in the right direction during this tough transition to online learning. We plan to carry all the knowledge they instilled in us into our engineering careers.