Research Team 2020-21
Written By: Members of the 2020-21 Research Team

- **Abdulaziz Shebrain and Leo (Tingfeng) Luo:** Abdulaziz and Leo are working with Dr. Fu Liao to identify the concentration of glucose or cornstarch that will yield an optimal concentration of spectinomycin. Abdulaziz and Leo are also investigating to lower the industrial costs in producing spectinomycin. Currently they are at 2 rounds of experimentation, and the optimal concentration they have used for cornstarch is 15-20ml, and for glucose they used 15-40ml.

- **Jessaly Zhu, David Jin, and Malin Nordmoe:** Jessaly, David, and Malin are working with Dr. Pnina Ari-Gur; the group is trying to identify the specific properties to determine the best magnetocaloric effect. During experimentation they found combinations of materials/processes to create more energy efficient magnetic refrigerators. They also analyzed the specific properties that make metals great magnetocaloric metals; the properties include specific magnetization, heat capacity, and crystalline grain structures.

- **Sydney Hyde, Charlie Hinkley, Andrew Salisbury:** Sydney, Charlie, and Andrew are working with Dr. Clement Burns and graduate Student Matthew Cook to see if they can make superconductors that can be used for quantum computing (must withstand 0°C) . It is important because quantum computers are super powerful than the ones we use currently and can be more widespread once someone figures out how to miniaturize them. Not only do quantum computers require less energy they are faster and can offer better Ai, analysis of huge data sets and security. So far they are seeing if AuPb3 can become a superconducting material.

- **Genevieve Kim:** Genevieve is working with Edward Roth & another university student named Lai Yiu Yeung to find out if motion sonification helps with Qigong movements. The experimental results have real world applications as Qigong (physical exercising and breathing control) is for relaxing and can better reduce stress and sonification could help with similar techniques like tai chi. The data was collected through a questionnaire and she plans on using a Mann-Whitney-U statistical test to check for significance.

- **Anna Kitagawa, Kayla O'Donnell, and Aidan Eichman:** This group of three are working together with Mr. Cardwell and his 3D printing machines. They plan on optimizing the sound absorption. Specifically, they want to use "perforated honeycomb-corrugation hybrid acoustic metamaterial" to absorb the sound frequencies between 1250 and 1750 Hz. They will be printing the metamaterial with different sized honeycombs to find the size that best absorbs the sound. A large part of the research is working with the idea of resonation. An example of how resonation is used is with ICE vehicles and the resonators connected in the exhaust systems. At the time of the presentation, they were still in development and had not printed yet.

- **Evie Roth, Taylor Laurin:** This duo has a project that involves working with Robert Ingalls from Pfizer. They are trying to find an equation that connects the color of a solution and its pH. They are going to be running through multiple tests to find a connection of any sort. At the time of the presentation, their data had three steps: 1. Liquid from cabbage would approximately find the pH of the solution 2. The color of the solution would be recorded and 3. True pH indicator equipment would be used to find the pH. Due to COVID, they are going to be working from home.

- **Samuel Rabick:** Sam is working with Jeff Hutchinson from Stryker on computer vision through the software Jupyter. Sam and his mentor will be looking to solve the geometric approach to computer vision through oblique angle calculations via pixel positions, as well as developing an algebraic approach through the calculation of vector formulas.

- **Jonathan Koh, John Wang and Henry Lewis:** Jonathan, John and Henry are working with API Manufacturing Engineers Zachary Wolf and Sam McNaughton in determining the impurity content of waste steam using reagent testing. The goal of the experiment is to determine the efficacy of different regent testing on various substances. So far preliminary data has been collected and work has begun with a spectrophotometer.

- **Malee Davis:** Malee, along with Dr. David Karowe, is studying the effect of nitrogen deposition and elevated CO2 levels on plant phenolic acid levels. Global warming results in both nitrogen deposition and elevated CO2, while phenolic acid is naturally produced by plants to help them defend themselves. At least 40 boxes of cucumber plants were studied, containing different boxes to study: normal nitrogen and normal CO2, elevated nitrogen and normal CO2, normal nitrogen and elevated CO2, and elevated nitrogen and elevated CO2.

- **Brigid Roth:** Dr. Lisa Baker and Brigid are studying the question: "What is the effect of hallucinogenic drugs on basic survival instincts?" To test this hypothesis, they studied the behavior of lab rats in three tests: the sink or swim test, the open field test, and the light box/dark box test. As these drugs are primarily medicinal and used to help patients with mental disorders, this experiment is meant to study the drugs' side effects on the brain.

- **Anna Tai and Tanmay Shekhar:** This group is working with Dr. Shameek Bhattacharjee at WMU. He is a professor in the Department of Computer Science and researches different aspects of cyber security. Anna and Tanmay 's research is focused on creating a focused and accurate smart home decision making model. They began their project by gaining background knowledge on the increased security issues that accompany the increased use of smart home devices, as well as the decision making model for complete automation. They have begun looking at event and actuation scenarios and mathematical modeling. They are working to generalize the model, implement the model with code, and finally engage in simulation using events and data.

- **Stanley Chen, Kyle Liu, and Ben Pilnick:** This group is working with Dr. Kathleen Bolter at the W.E. Upjohn Institute. They are researching the effect of the U.S. presidential election on the volatility of the stock market. They believe that volatility increased leading up to and following the election. They began their project by gaining background knowledge of market volatility, how it's described, and how it's changed in the past. They are presently in the midst of collecting data and hope to begin drawing conclusions based on their data soon.

- **Katherine Opria and Alyssa Park:** Katherine and Alyssa are working with Dr. Yan Lu to investigate the questions: "Does non GMO labeling affect buying behaviors?" and "Is the labeling (or lack-thereof) of a GMO product indicative of GMO content in that product? In this investigation, Katherine, Alyssa, and Dr. Lu are extracting DNA from various food items to see if crops labeled

non-GMO are made from GMO crops. In the near future, the researchers will perform more DNA extraction, PCR, and agarose gel electrophoresis.

- **Leslie Mares-Castro:** Leslie is working with Ben Bylsma at the KVCC Food Innovation Center to investigate the question: "What Percentages of Heavy Metals are Transferred to Different Produce in Urban Gardening?" Lesie and Ben Bylsma are studying this because of an increase in popularity in Urban Gardening in the last 10-15 years, water shortages and arable land, and potential safety concerns. Plants absorb these heavy metals through soil contamination, water irrigation, as well as through airborne contact. In the future, Leslie and her mentor are using their data to analyze the quantity of metals in a sample of plants and then comparing these results.