# DIEGO BARRA AVILA

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## EDUCATION

Arizona State University, Barrett, the Honors College
Biomedical Engineering, Master of Science (4+1 Program)
Biomedical Engineering, Bachelor of Science in Engineering,

Thesis: Control of tissue homeostasis, regeneration, and degeneration by coupled bi-stable switches

## RESEARCH EXPERIENCE:

**Devils Invent: Unleashing Data Against COVID** June 2020

- Virtually collaborated with two students to explore applications of public data to lessen the effects of COVID-19
- Helped develop an app, ViraWell, to check on well-being of users and inform them of current trends related to COVID-19 by collecting information from relevant databases
- Determined business model for ViraWell and virtually presented app for possible funding

**Glucagon Rescue Instant Patch Pump(GRIPP)** August 2019-April 2020

- Worked with team of three students to develop biomedical device to address severe hypoglycemia in people with diabetes
- Developed product specifications through comparison of similar devices and verified function using mathematical models
- Followed FDA regulations in developing device for market approval

**Barrett Thesis: Signaling Pathway Modeling and Analysis** August 2019-April 2020

- Searched for links between a signaling pathway and disease phenotypes to build a regulatory network
- Modeled network using differential equations and analyzed system with MATLAB to understand molecular dynamic behavior
- Determined possible steady states using bifurcation analysis with Oscill8 and identified sensitive parameters

**Effect of Growth-Feedback on Synthetic Gene Circuits** January-April 2020

- Modelled effect of cell growth on synthetic gene circuits capable of adaptation using differential equations
- Analyzed systems of differential equations with MATLAB to observe differences in deterministic behavior
- Identified the negative feedback loop with a buffering node as more robust to effect of growth feedback
- Virtually presented findings of effect of circuit-host interactions on different network topologies in FURI symposium

**Devils Invent: Healthcare Inventathon** February 2017

- Analyzed hospital data and determined lack of medication regime adherence as major problem among the elderly population
- Collaborated with team of 3 students to devise a plan and use an Amazon Alexa to remind users to take medication

## ACADEMIC PROJECTS:

**Mouth-controlled Computer Mouse Design Project** January-April 2019

- Worked with three students on designing circuit and used LabVIEW to create program for mouse control
- Researched different mouse applications to identify functionalities to incorporate into our code and improve mouse control
- Tested device and analyzed data using a randomized block design to optimize settings on LabVIEW code

**Eye Movement Desensitization and Reprocessing (EMDR) Glasses for PTSD Treatment** January-April 2019

- Identified therapy cost as leading blocker for treatment of Post-Traumatic Stress Disorder by reading scientific journals
- Worked with a team of students to create an Arduino program for LEDs on glasses to simulate a cost-effective EMDR treatment

**Occluder Design for Atrioventricular Septal Defect (AVSD)** August-December 2018

- Collaborated with two other students in researching different types of heart occluders for AVSD
- Designed three types of occluders addressing AVSD with different materials and characteristics
- Prototyped proposed AVSD occluders on SolidWorks

**Phase Plane Analysis of Prey-Predator Systems (Honors Project)** September-December 2017

- Worked with instructor to fortify understanding of the use of differential equations to study biological systems
- Studied how phase planes can describe prey-predator populations by applying different initial conditions to system models

## AWARDS:

Fulton Undergraduate Research Initiative Fellowship
Proposal: Effect of Growth-Feedback on Adaptive Synthetic Gene Circuits

## ORGANIZATIONS

Society of Hispanic Professional Engineers — August 2016 - Present
Biomedical Engineering Society — August 2018 - Present

## SKILLS

**COMPUTING SKILLS:**

Programming: MATLAB, C++
Software: Oscill8, XPP AUTO, Microsoft Office Suite

Languages: Spanish