Project Wilbur

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Mentor: Italo Santos

NAU Associate Professor Christopher Mayerl

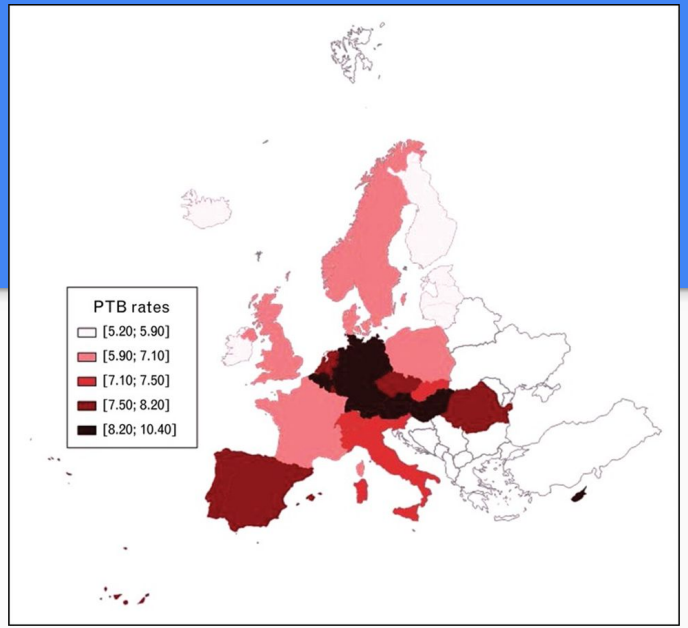
- **Ph.D. in Biological Sciences**, Clemson University
- **M.S. Biology**, Vrije Universidad Brussel (2013)
- **B.S. Zoology**, Humboldt State University (2011)
- Runs the **Mayerl Lab** on campus which focuses on integrated organismal physiology.

- Working with 2nd semester Capstone Mechanical Engineer (ME) team to create a robotic, pneumatic nipple.
- **Our project :** Create software to manipulate and control the robotic/pneumatic nipple system and send data to a Data Acquisition Center.

Citation: https://christophermayerl.weebly.com/lab.html

Problem:

- The CDC recommends breastfeeding for the first 6 months of life.
- In 2022, 3,661,220 babies were born in the U.S.
- 10.38% of those babies were born premature.
- Feeding issues can lead to nutritional deficiencies improper speech development.

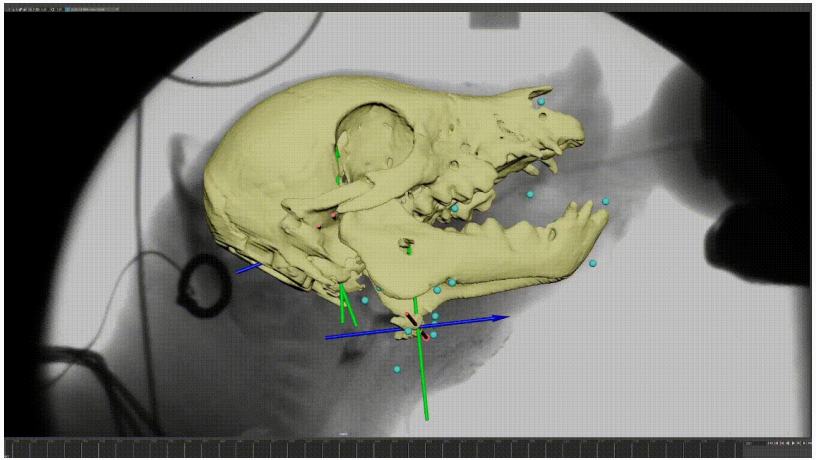


Delnord, M., Blondel, B., & J, Z. (2015, April 27). *What contributes to disparities in the preterm birth rate in European countries?* Retrieved from National Library of Medicine: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4352070/#:~:text=In%20countries%20with%20comparable%20levels,among%20live%20births%20in%20Europe.

Hamilton, B. E., Martin, J. A., & J.K. Osterman, M. J. (2023, June). *Births: Provisional Data for 2022.* Retrieved from Center for Disease Control: https://www.cdc.gov/nchs/data/vsrr/vsrr028.pdf

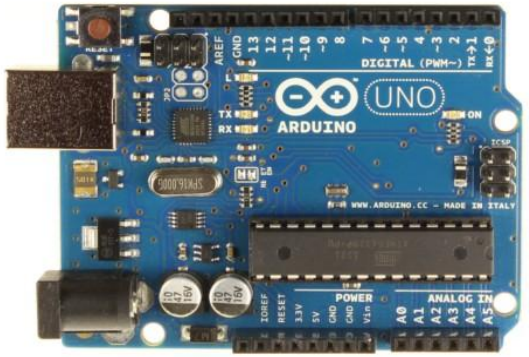
Purpose:

- Can we improve health outcomes for infants using a robotic nipple?
- Right now, a robotic nipple prototype exists, but there is no controls for it.
- **End Goal:** Potential for further funding and possible integration of technology into healthcare.



Solution Overview

- Create control software for the robotic nipple.
- The robotic nipple will be able to control flow rate, nipple stiffness, and viscosity of the milk
- The nipple will be controlled by an arduino, which is controlled in real time via our program.



Requirements Development Plan

Meetings focused on determining requirements for subcomponents

- Frontend
  - Desktop app that connects to DAC and hardware
- Hardware/Arduino
  - Interface with Mechanical Engineering team’s work
- Data Acquisition Center
  - Specific connectors
  - Proprietary file types
- Interconnects
  - Wiring and Software interfaces

Conclusion

Project Wilbur, building a software control solution for Doctor Mayerl

Involved in an intersection between Electrical, Mechanical, and Software engineering

Solution will streamline data that can solve root issues for infants with feeding problems