Modeling Magnetic Field-Based Navigation in Sea Turtles

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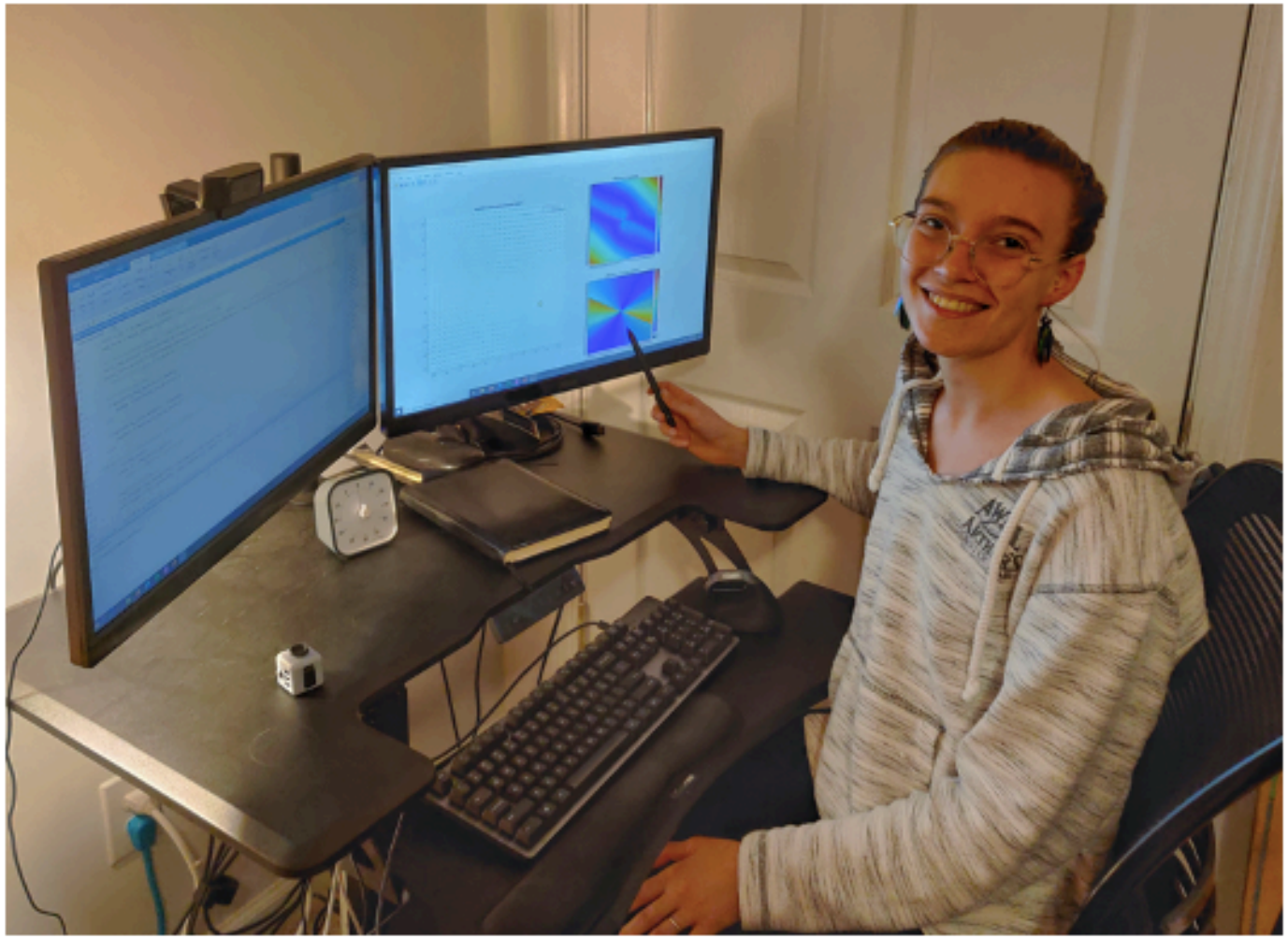
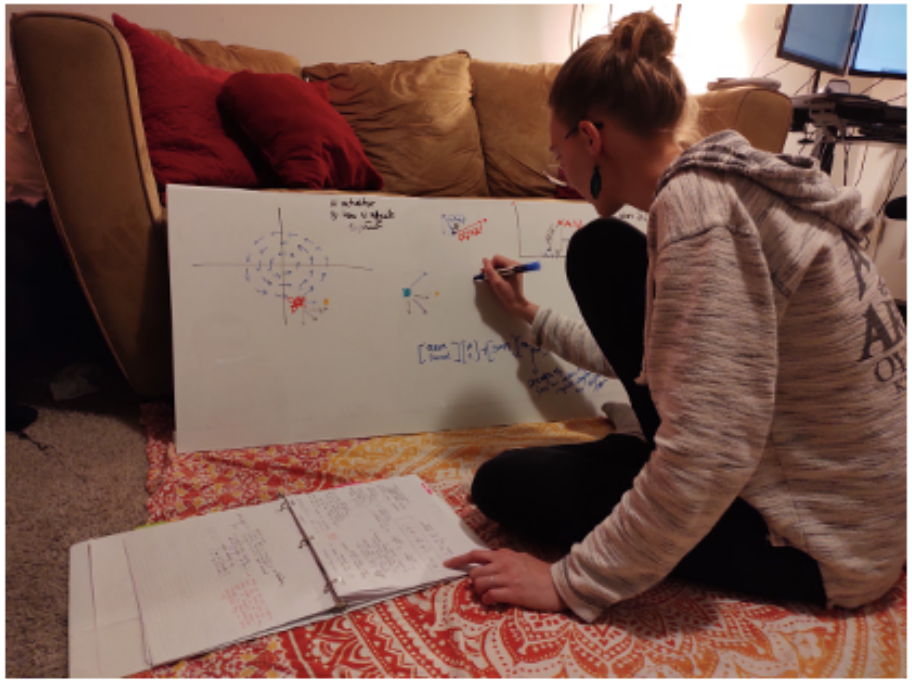


If a turtle uses unique magnetic signatures to navigate, what conditions are necessary for it to successfully migrate through the North Atlantic Ocean?



Answering this question can:

- help us understand how sea turtles process and respond to magnetic signatures during migration.
- aid in the development of ships or spacecrafts that use magnetic signatures to navigate. This would be useful for traveling in areas where GPS doesn't work, like deep under water or on another planet!

Using engineering methods to create a biological model

- Using closed-loop feedback control – the same type of logic the cruise control in your car uses – we created a model in which an agent senses a magnetic field and adjusts its speed and heading to swim through an ocean current toward a goal point.
- We are currently working on creating a computer simulation of this model. When the model is complete, we will compare the speed and response time necessary for the success of the simulated agent to data from real sea turtle migrations!
- Further studies can expand on this model to include diverse ocean currents, more complex magnetic fields, and realistic turtle physiology to increase our understanding of how sea turtles process and navigate in magnetic fields.
- The model may also aid in the development of magnetoreception-based navigation technologies that serve as an alternative to satellite-based GPS systems.