C.R.O.P.P- CubeSat Research of Plants Platform

Jacob Liberman - Computer Science

Other Members - Aerospace & Electrical Engineering

Alexis Girard - agirard2016@my.fit.edu

Trevor Stephenson - tstephenson2018@my.fit.edu

Bryan Flanagan - bflanagan2018@my.fit.edu

Bennett Koenitzer - bkoenitzer2016@my.fit.edu

Devon Madden - dmadden2017@my.fit.edu

Travis Priller - tpriller2019@my.fit.edu

Harrison Auger - hauger2017@my.fit.edu

Nichole Choplin - mchoplin2018@my.fit.edu

Ryan Sousa - rsousa2017@my.fit.edu

What is a CubeSat?

- CubeSats are a type of miniaturized satellite made up of 10cm^3 units
- Typically made with COTS components
- Commonly put into orbit by the ISS
- Typically used for smaller experiments with higher risks, due to low cost
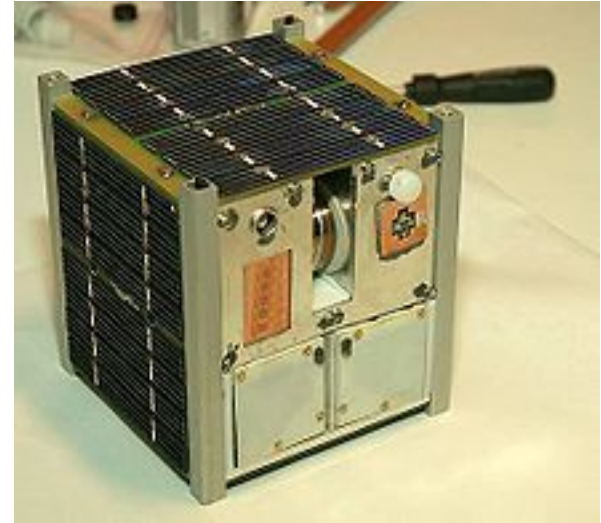
The Mission

- Testing the effects of radiation on Brine shrimp and microgreens in Low Earth Orbit (LEO)
- Finding a viable food source for long term space missions
- Some hurdles have emerged

CS Approach

- Programming the onboard sensors to monitor environmental conditions
  - Tracking humidity, temperature, pressure, radiation levels, etc
- Controlled with Arduino or similar microcontrollers
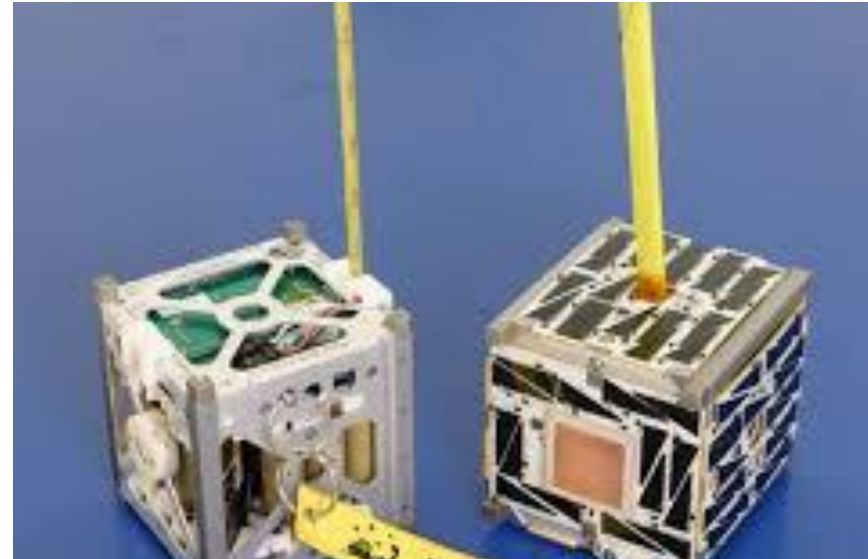

RANDOMNERDTUTORIALS.COM

CS Approach

- Recognize and count population of brine shrimp via multispectral imaging
- Help determine affects of LEO on the shrimp based on population changes

CS Approach

- Specialize one of the current available control systems
- Many open source options exist
- Customize features for mission at hand

Novel Feature

- Use of multispectral imaging to identify separate organisms to determine population

Technical Challenges

- I never have used the control system software before
    - Open source, lots of documentation
- Challenges brought by being in LEO
    - High radiation can affect the logic state of memory
        - Error-correcting code such as checksums or cyclic redundancy checks
    - Large temperature fluctuations can affect performance

References

- https://upload.wikimedia.org/wikipedia/commons/thumb/f/f2/Ncube2.jpg/220px-Ncube2.jpg

- https://sc02.alicdn.com/kf/HTB1v52tXcfrK1Rjy1Xdq6yemFXaG.jpg

- https://i0.wp.com/randomnerdtutorials.com/wp-content/uploads/2016/01/List-Arduino-Shields-Thumbnail.jpg?resize=702%2C457&ssl=1

- https://media.wired.com/photos/5932499926780e6c04d2ab6a/master/pass/i_photo6.jpg

- https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcQIkf-J_Y2YkWtF3Th0R9k3wAqvcd98fSDfZw&usqp=CAU

- https://aquariumbreeder.com/wp-content/uploads/2019/12/Brine-Shrimp-Artemia-Salina.jpg

- https://cdn-images-1.medium.com/max/964/1*P7qerQbII2EONLHVfm6N6A@2x.png