CubeSat Control Platform + ACTIV

11/28 Meeting

EMBRY-RIDDLE Aeronautical University

EasyControls.org

EPPL ENGINEERING PHYSICS PROPULSION LAB

General Updates/Reminders

Coursework is wild right now, so lab productivity will decrease

However, the following is a list of open-items for the various projects

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2

CubeSat

- Continuing expanded 1U development
  - Determining electronics placement
  - Setting CubeSat up for multi-motor testing
- Print gimbal rings
  - Design gimbal ring locking mechanism
- Configure for ACTIV 1-DOF testing
- Refactor O-Drive Can control code
- Setup database for CubeSat trials
- Alternate attitude determination
  - Using star tracker concept with onboard camera

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Inverted Pendulum

- Get encoder working and finalize encoder mount design
- Update database to use encoder rather than IMU
- Perform torque reaction time test
  - Integrate real data with Python simulation
- Look at other control types
  - Gain scheduling PID
  - LQR
  - Full-State Feedback
  - Sliding Mode
- Refine current pendulum design
  - Bushing to restrict motion to pivot axis

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ACTIV

- Design 1-DoF ACTIV design
  - Should be straight-forward setting motor torque = 0
  - CubeSat can be testing in this
- Wire up R80/60 with ODrive Pro and wire up encoder

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System Tutorial

- Intro to Raspberry Pi
  - Theory, application, communication pro
  - Flashing Pi with OS
  - SSH into Pi
  - Writing code in IDE > GitHub > Pi
- Inverted Pendulum System explanation
  - Goal is to catch everyone up with system as a whole
  - Give those interested in electronics a more graceful entryway
- ODrive Can Control explanation

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[Isaac] +[2DOF/3DOF Cube Sats]

Progress completed this past week

-made CAD for electronics panel and large resistors

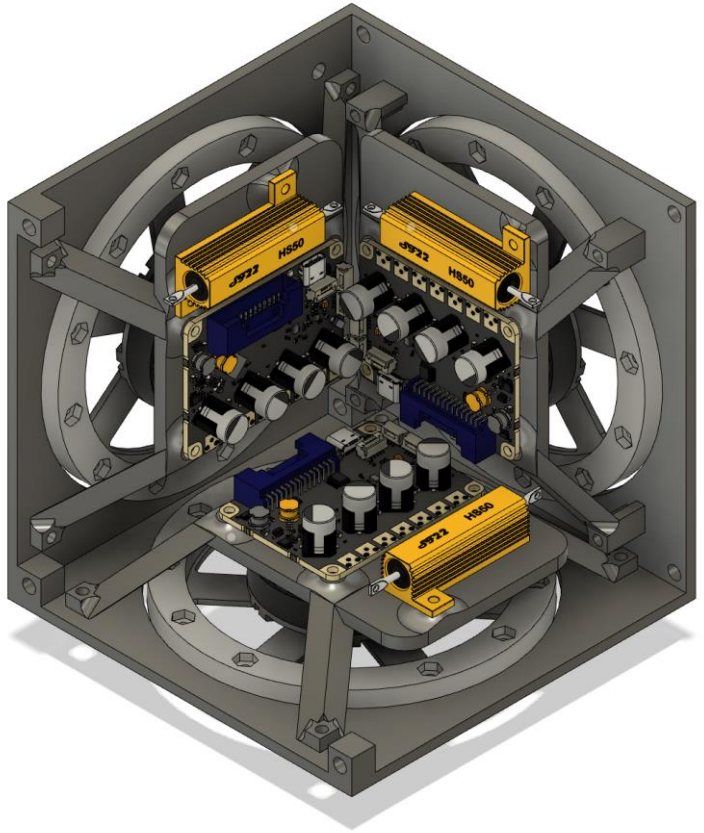
-got cubesat printed

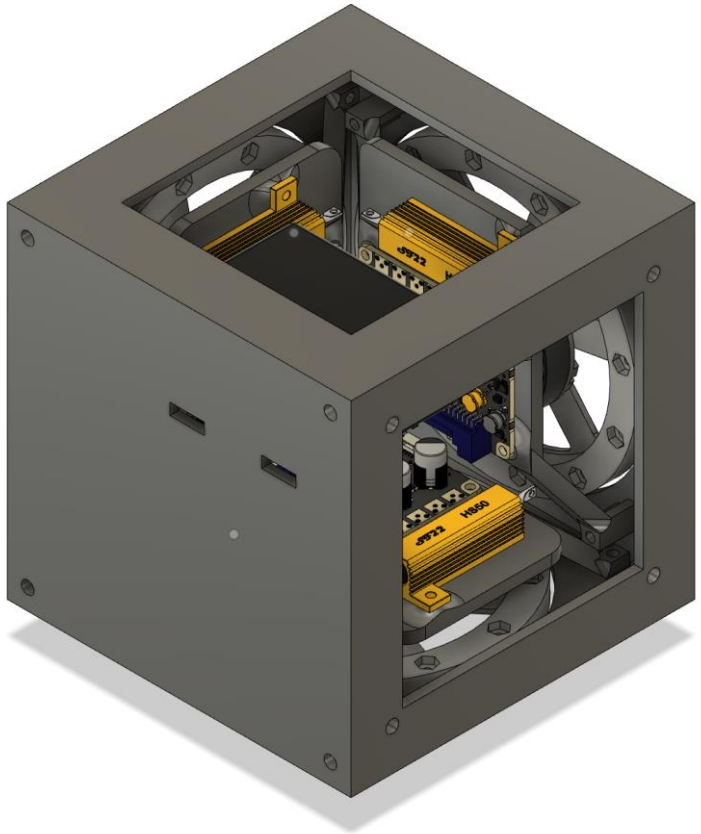
Goals for next week

-assembling the cubesat

Anticipated challenges

-disassembling the old cubesat





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[Ella] + [The Clawwwww]

Progress completed this past week

-Claw for 1.5U CubeSat

Goals for next week

-SRS and Trep (I hope I can make it)

Anticipated challenges

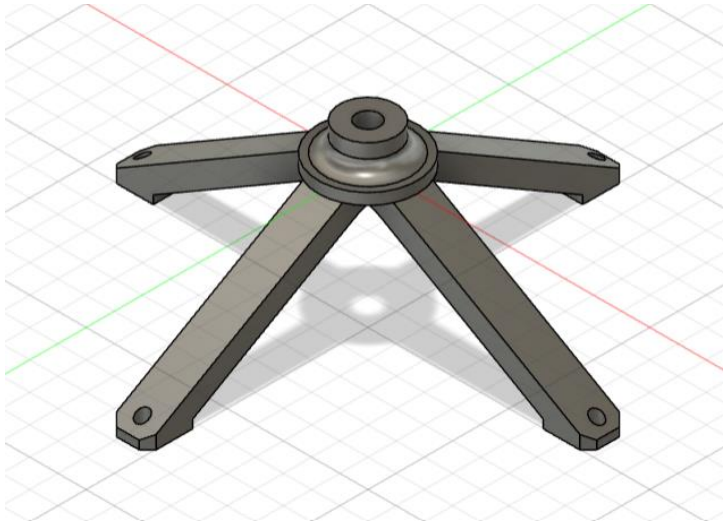
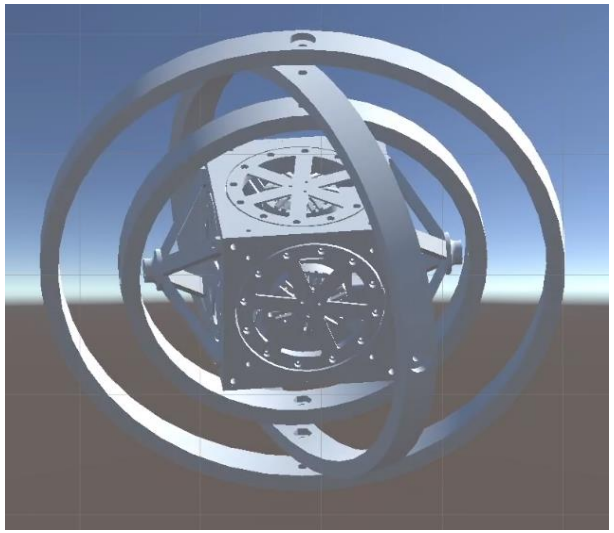


Image stolen from
Dylans cool video



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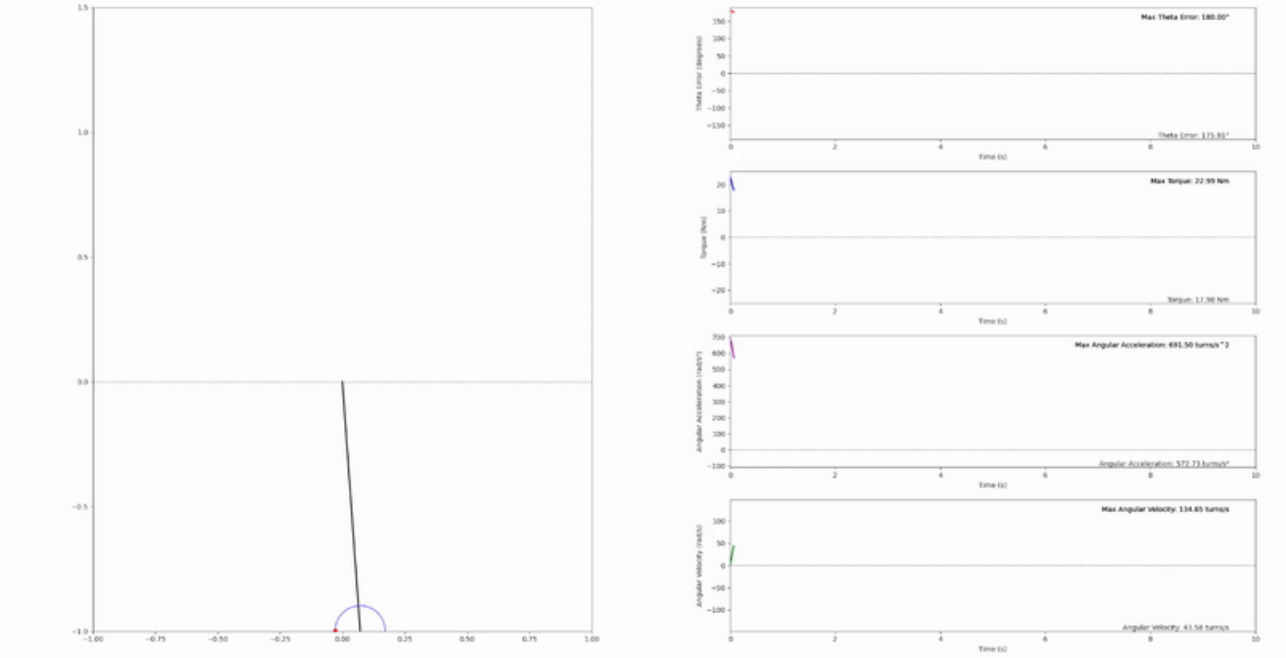
[Dylan] + [Simulations!]

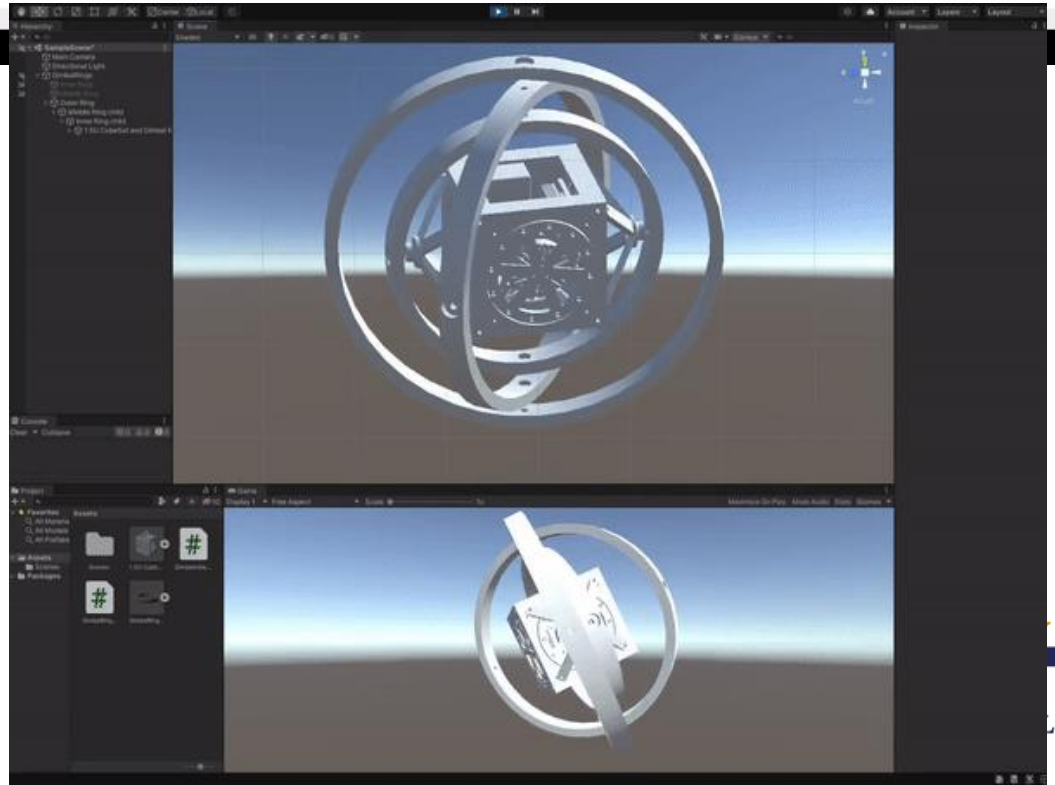
Progress completed this past week

- 3D print and assembly ISSAC 3DoF CubeSat
- TREP expo poster / SRS poster
- Worked on IP python simulation
- Build simple Unity sim with 3 gimbal rings & cubesat

Goals for next week

- ~~Implement simple PID on Inverted Pendulum w/ Justin~~
  - ~~Pending new Inverted Pendulum Arm~~
- ~~Get preliminary design for 3DoF CubeSat Electronics~~
- ~~Try and get 3D print going of the new gimbal rings~~
- ~~Want to work more on livestreaming data with WebSocket~~
- Going to Vegas on Thursday for F1 Race then flying home for thanksgiving.
- Will work more on python simulation while I am gone





[Jacob S] + [Optical Attitude Determination]

Progress completed this past week

- Became familiar with camera calibration for CV. Got some good insight into MQTT over the break and became more familiar working with the Raspberry Pi.

Goals for next week

- Survive.
- Get the camera calibration software working with the pi camera.

Anticipated challenges

- The latest edition of the aruco library has changed a lot of their functions.

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[Assignee] + [Task Title]

Progress completed this past week

-[Discuss progress]

-Highlight based on: Complete, >50%, <50%

Goals for next week

-[Discuss goals]

Anticipated challenges

-[discuss challenges, request assistance if needed]

[Relevant photos if needed]

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