Robotics Engineering Project (LOTI.05.032)

Self - Balancing Robit
MARCH SPRINT REPORT

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01-04-2022

Sprint backlog
4 cards

TUTORIALS REFERENCE DESIGNS FIRMWARE
Firmware v 0.0.1 [3hrs]
Apr 1 2/5 4

ECAD TUTORIALS
Altium tutorials. [3hrs]
Apr 1 2/6 5

TUTORIALS REFERENCE DESIGNS
Reference EE Designs Study. [3hrs]
Apr 1 3/3 5

+ Add a card

Doing
4 / 4
4 cards

FAB
Internal mechanics FAB & ASY [3hrs]
Apr 1 1 7/11 5

TUTORIALS REFERENCE DESIGNS FIRMWARE FAB
1st iteration w/ Nucleo & Steppers [3hrs]
Apr 1 1 6/12 5

REFERENCE DESIGNS FIRMWARE
1st iteration: Digital PID Controller [3hrs]
Apr 1 3/7 5

+ Add a card

Feedback
1 / 3
1 card

+ Add a card

Testing
1 card

+ Add a card

Done
12 cards

Understand fundamental motion dynamics involved. [5hrs]
Apr 1 4 1
5

REFERENCE DESIGNS CAD
model (preliminary) motor mounts & wheels [3hrs]
Apr 1 3 1
3/3 3

* **Progress on all of the cards of the sprint ⇒** ~75% (worked on cards in backlog + doing [checklists!])

** **time spent ⇒** 48 hrs (not incl meetings)

** **number of cards you started with ⇒** 20

** **number of cards currently in each column ⇒** *backlog*: 4 | *doing*: 4 | *done*: 12

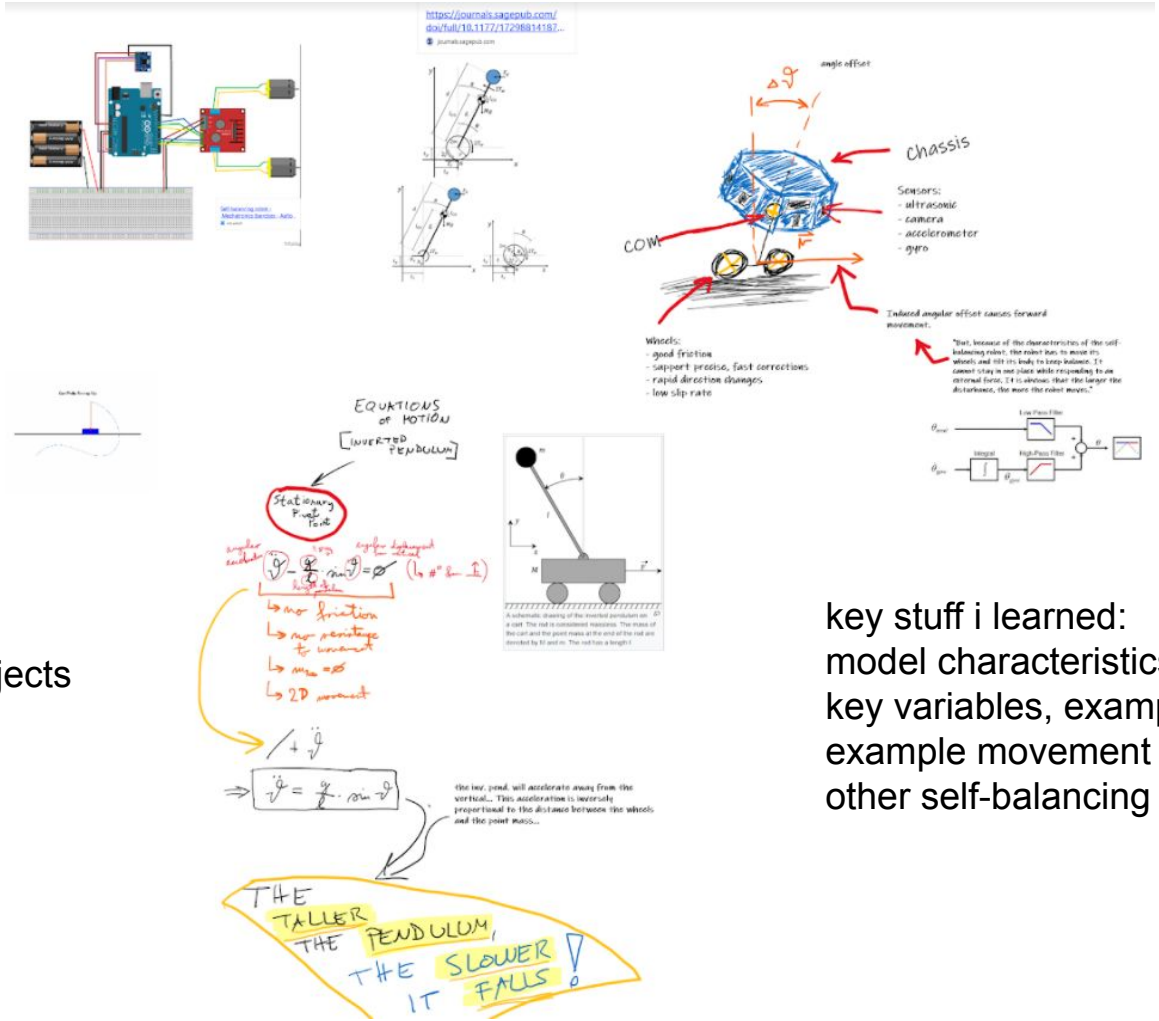
** **number of cards that matched the original time estimate, overspent, needed less time than initially planned**
met original time estimate: **1**
overspent: **19**
needed less time than planned: **0**

*** Two of your best cards - where you felt that you set out do something and it got done in reasonable time**
> understand self-balancing robot design tips & general requirements
> model (preliminary) motor mounts & wheels

*** Two of your worst cards - which were hard to or impossible to complete with explanation to why was that**
> Collect & measure all parts ⇒ insufficient upfront understanding of infrastructure (part procurement protocol)
> model (preliminary) main truss structure ⇒ added too many features to model, should have split card up

*** You are free to add more information, aim to be done in ~~6 minutes to leave room for discussion**
summary: overspent time doing all the cards,

Research



tons of example projects

key stuff i learned:
model characteristics, model behaviour, key variables, example PID setups, example movement PID error inducers, other self-balancing implementations

OG chassis

wheels

CAD

truss

motor brackets

wheels

brackets

part models

truss mounting

1st printouts

reaction wheel / flywheel

FAB

wheel “wire-tires”

simplified, reinforced motor brackets

Iterative design

firmware prototype

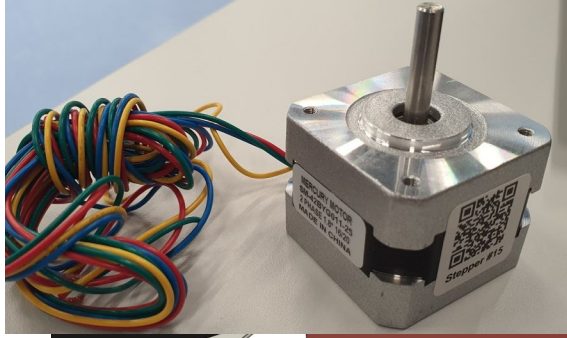
reinforced truss

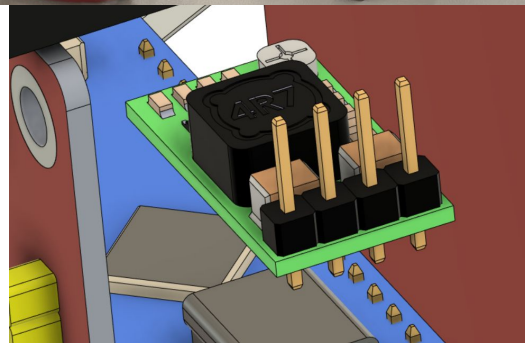
collected all key components

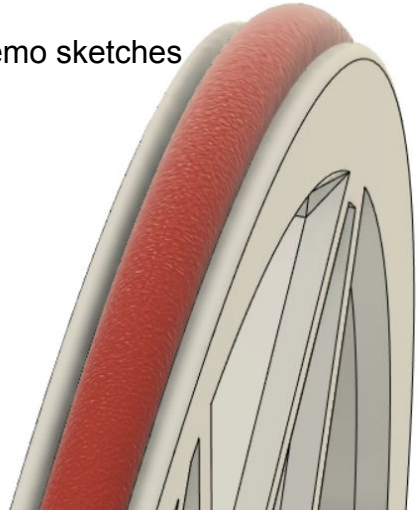
firmware playground

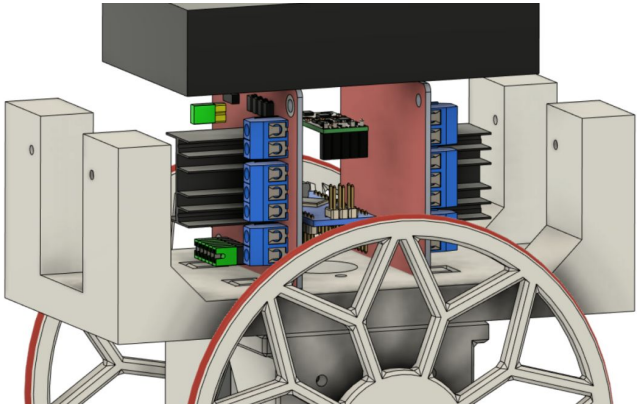
arduino nano refresh

stepper demo sketches









what's next?

IMU demo sketch

firmware v1.0

remote control?

IoT?

battery mount dampeners

working reaction wheel / flywheel
or another form of self-starting

IMU mount dampeners

working demo

ECAD 101