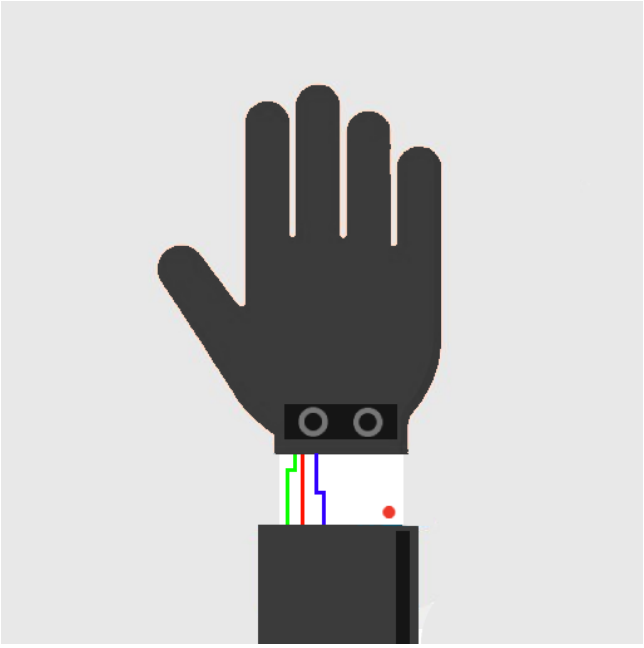


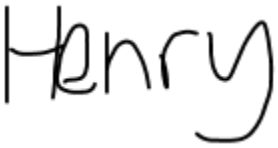
Project Deliverable 4
Smart Prosthetic Arm
Hybrid Prosthetics™

Prepared for:
Haki Sharifi, Austin Tian
CENG 322 - CENG 317

Prepared by:
Team Leader - Samad Agha n01364908
Kevin Santizo n01382533
Narendre Ramdhan n01240746
Henry To n01365792

Project Scope

The focus of this project is a synthetic arm meant to benefit disabled individuals. This arm will have many functions, including temperature measurement, object detection, rotational axes (servos) and supports bluetooth/wireless connection. These functionalities will all be displayed to an app for the user to get all the information and control necessary to help with their everyday lives.

Name	Id	Signature	Effort
Samad Agha	n01364908		100%
Kevin Santizo	n01382533		100%
Narandre Ramdhan	n01240746		100%
Henry To	n01365792		100%

Github Repo

https://github.com/KevinSantizo2533/SmartProstheticArm

Sprint Goal:

Implement send and retrieve sensor data

Now that we had all layouts and basic functionalities in place, the most valuable next step would be to add the working hardware information to be sent dynamically to the application and vice versa. Although the status screen could definitely use work to support more use cases, it did work in its current form.

Completed Goals:

- Retrieve Degrees from servos
- Send Position from servos
- Retrieve temperature from hardware
- Retrieve distance from hardware
- Display Dynamic data

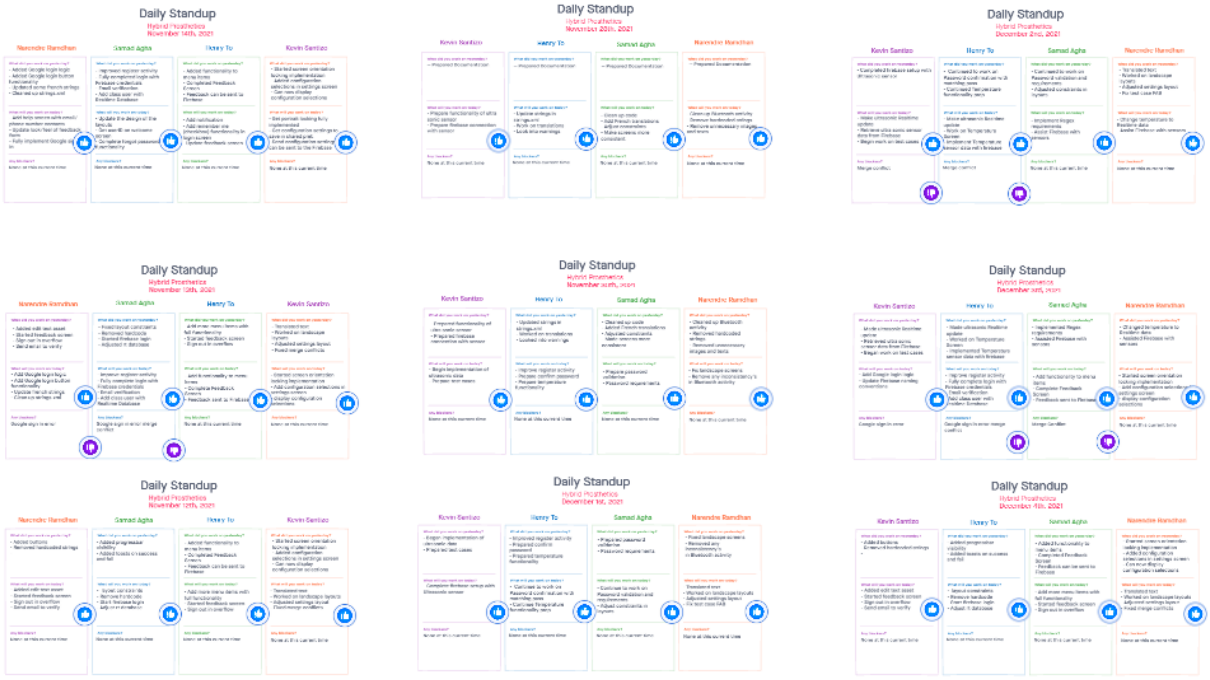
Backlog:

- Bluetooth implementation

Due to hardware implications, bluetooth is unable to be implemented at the time.

What we refined during the Sprint:
Knowing that the Sprint would be spent on hardware implementation, our team made a start with all logic required. We also adjusted the work that would be needed for the status page and split out the sensor controls from bluetooth. With this we decided it would be better to implement bluetooth components into the status screen.

What we discovered during the Sprint:
We ended up including validation requirements for password as well as a confirm password into this sprint. In terms of status, we could only demonstrate a basic layout for connection. We actually adjusted the layout during the Sprint Review. We did gather a lot of data from the firebase.



Sprint 5: (Nov. 22 - Dec 4) Send and Retrieve sensor data

Subite...	Person	Status	Date
Implement hardware components to bluetooth	6	AR +3	Done	

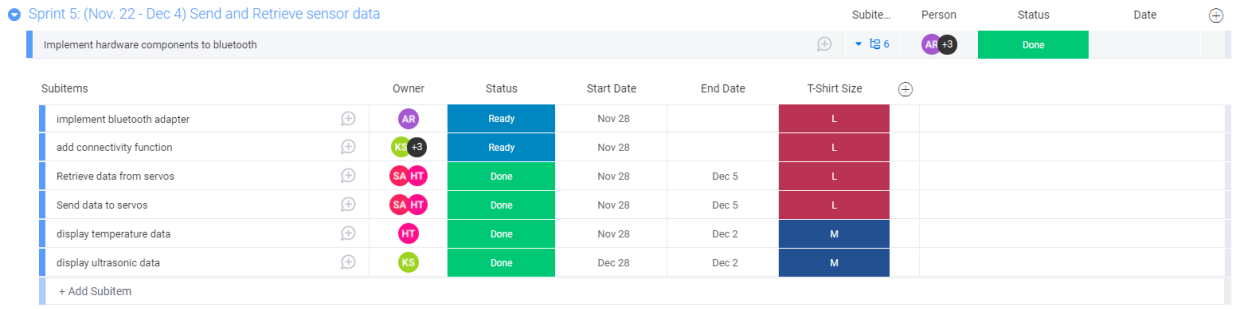
Subitems	Owner	Status	Start Date	End Date	T-Shirt Size
implement bluetooth adapter	AR	Ready	Nov 28		L
add connectivity function	KS +3	Ready	Nov 28		L
Retrieve data from servos	SA HT	Done	Nov 28	Dec 5	L
Send data to servos	SA HT	Done	Nov 28	Dec 5	L
display temperature data	HT	Done	Nov 28	Dec 2	M
display ultrasonic data	KS	Done	Dec 28	Dec 2	M
+ Add Subitem					

Login Credentials (for testing):

Email testemail@gmail.com
Password HakiSharifi@123

Sprint Goals

- Retrieve Degrees from servos
  Using firebase, each time the user sets a number with the slider, send that number to the firebase for the servo to use.
- Send Position from servos
  When the position of the servo is 0 or 180, send this to the firebase to notify whether the “hand” is opened or closed.
- Retrieve temperature from hardware
  Get the temperature, send it to firebase grab the data from the firebase.
- Retrieve distance from hardware
  Get the distance, send it to firebase grab the data from the firebase.
- Display Dynamic data
  Updates information in real-time.



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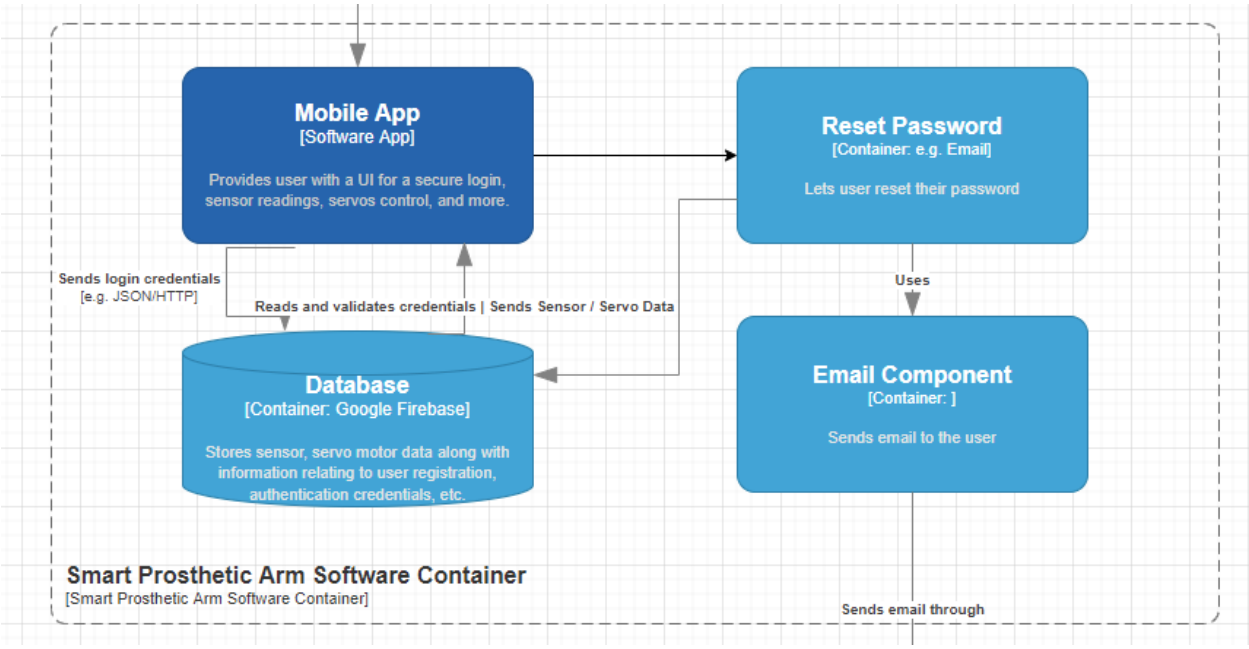
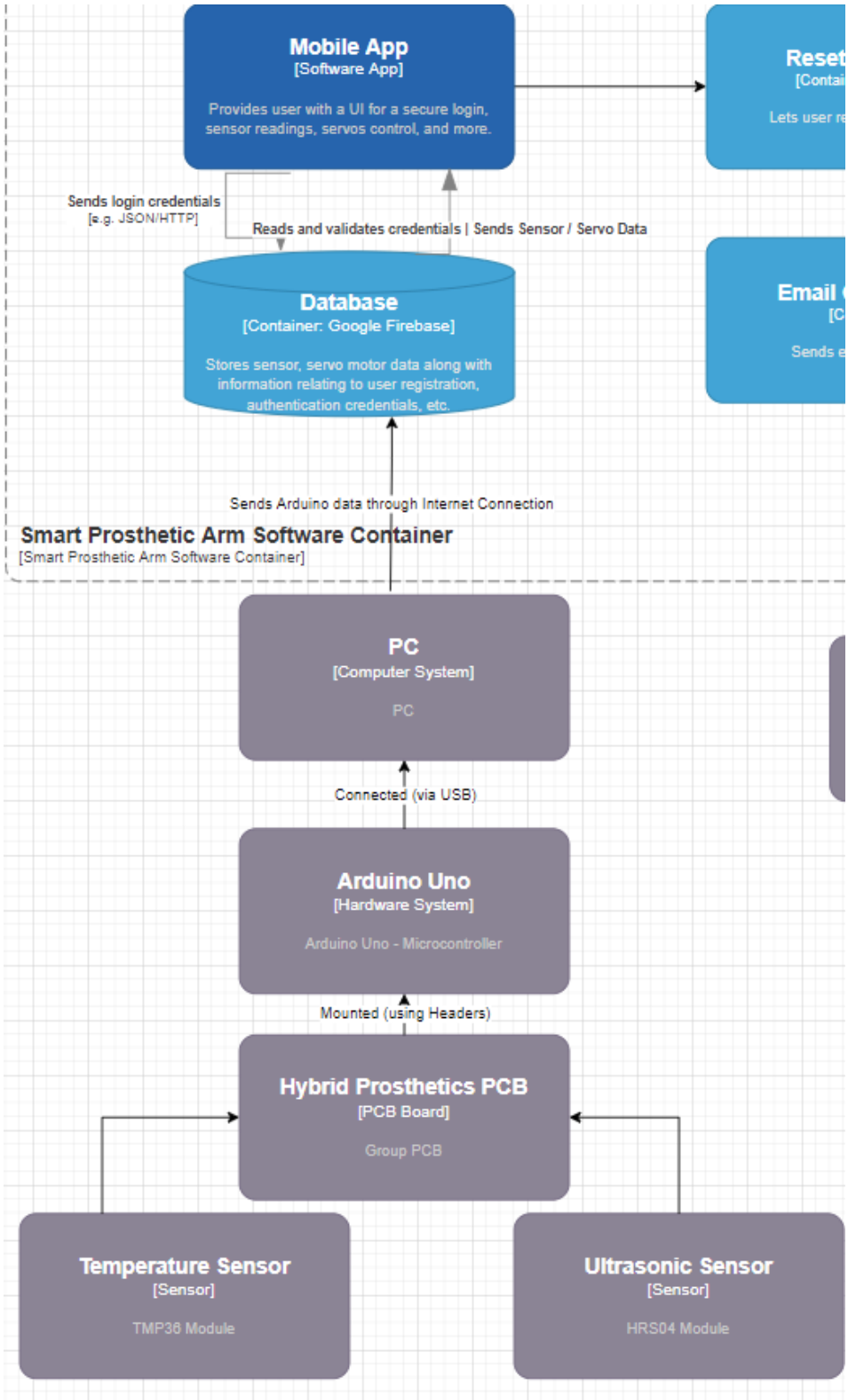
+ Add Subitem					

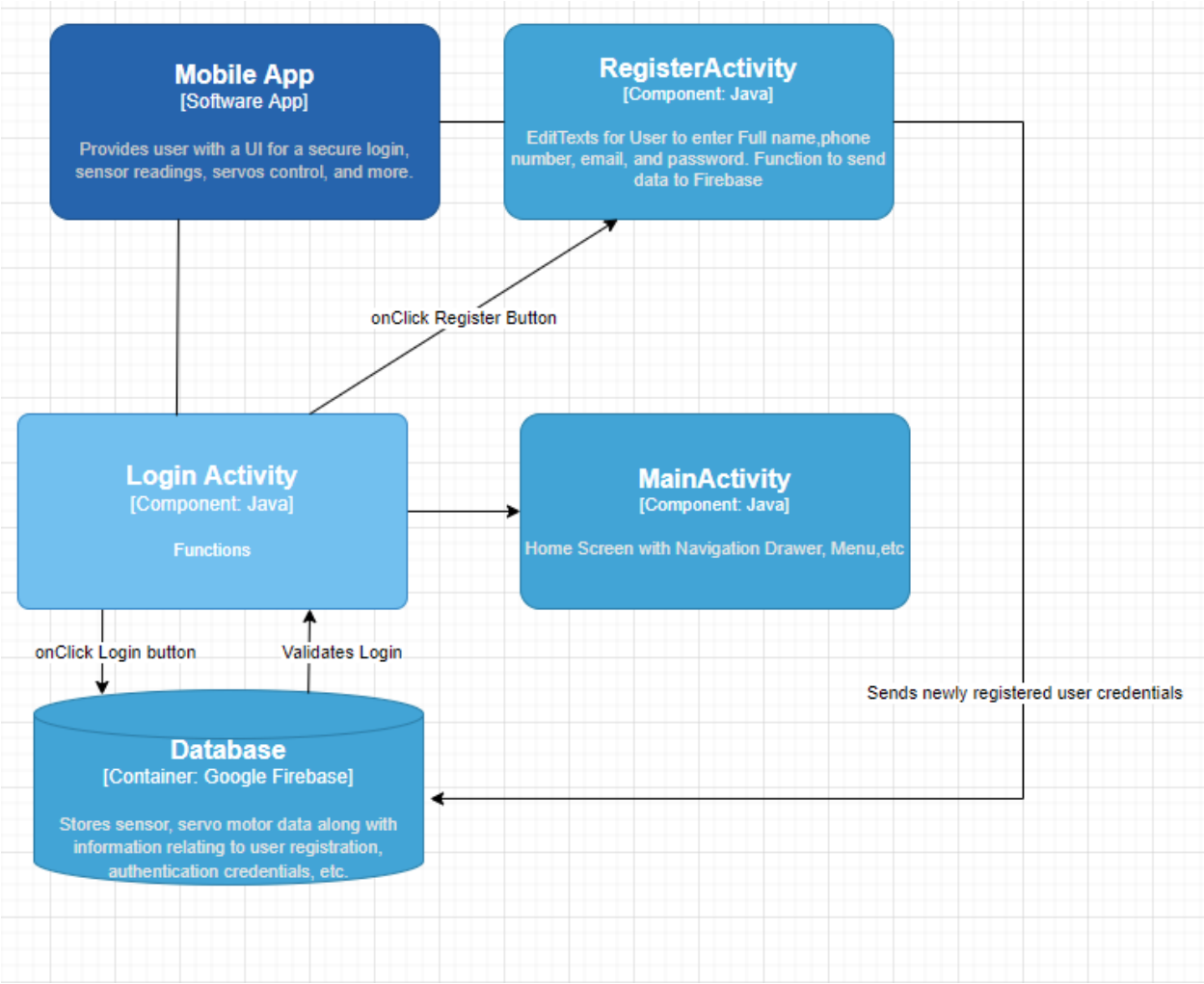
Container Diagram(C4 Model):



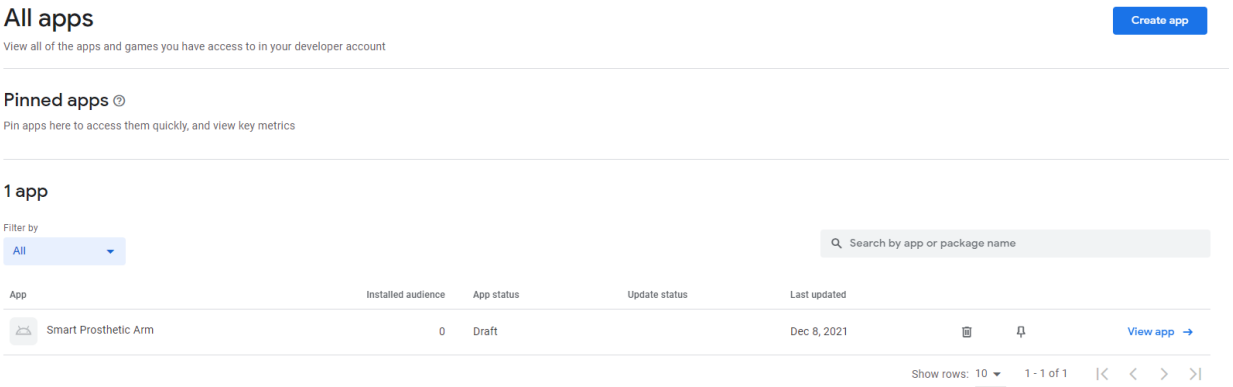
Component Diagram(C4 Model):



Component Diagram(C4 Model - Brief explanation of Login/Register Activities):



Google play submission



Offline mode

Instruction Manual, Change settings, Menu Items

Runtime permission feature

Access runtime permission with button, ask for location

Stories

https://kevinsantizo.monday.com/users/sign_up?invitationId=16554461040520670000

Sprint 1 (Sept 28 - Oct 4) - Epic: Create layouts for basic screens

	Subite...	Person	Status	Date
Design base of all basic screens	6	SA HT	Done	Oct 13

Subitems	Owner	Status	Start Date	End Date	T-Shirt Size
Create toggles and Sliders	KS HT	Done	Sep 27	Sep 28	S
Button Redirects to screens	HT KS	Done	Sep 28	Sep 30	M
Input text fields for credentials	SA AR	Done	Sep 28	Sep 30	S
Set backgrounds and fonts	KS HT	Done	Sep 29	Oct 1	S
Make screens complementary	AR +2	Done	Sep 29	Oct 2	M
Add images and constraints	HT +2	Done	Oct 2	Oct 4	S
+ Add Subitem					

+ Add

Sprint 2 (Oct. 1 - 8) - Epic: Interface for sensors

	Subite...	Person	Status	Date
Sensors screen(temperature, ultrasonic information)	5	KS AR	Done	Oct 12

Subitems	Owner	Status	Start Date	End Date	T-Shirt Size
Image buttons to redirect user to their desired sensor scre...	KS	Done	Oct 3	Oct 4	S
Create temperaure and ultrasonic sensor screens	KS SA	Done	Oct 4	Oct 5	M
Create onClick methods in sensors fragment	KS	Done	Oct 4	Oct 5	S
Button(layout) to retrieve temperature/object distance me...	KS AR	Done	Oct 5	Oct 8	S
Program button to retrieve readings from sensors	HT	Done	Oct 5	Oct 8	L
+ Add Subitem					

Sprint 3 (Oct 4 - 10) - Epic: Improve Login

	Subite...	Person	Status
Validate Login/Register	6	SA +2	Done

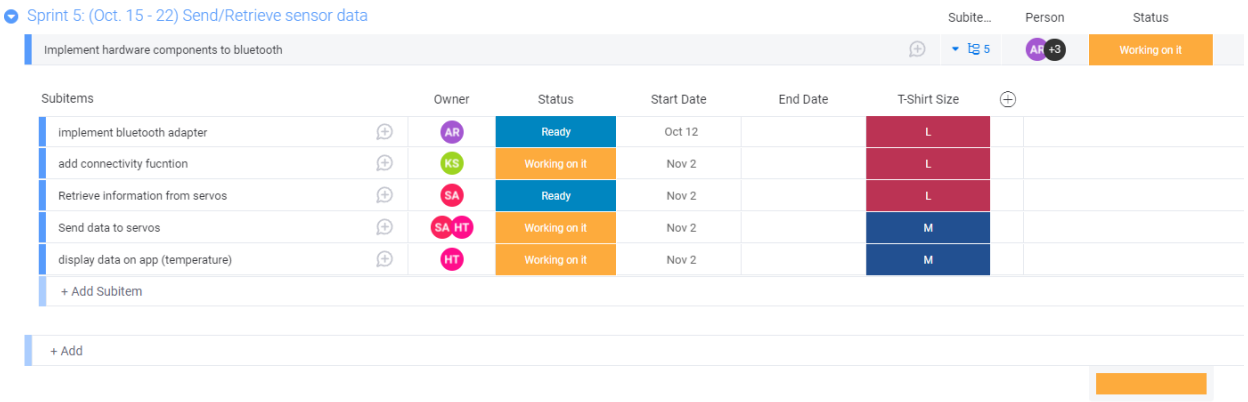
Subitems	Owner	Status	Start Date	End Date	T-Shirt Size
connection to firebase	SA AR	Done	Oct 4	Oct 8	L
store user/pass to Firebase on register	SA AR	Done	Oct 4	Oct 8	L
Display login success with Toast	AR KS	Done	Oct 6	Oct 8	S
Display error if blank/invalid input	SA	Done	Oct 6	Oct 8	S
Encrypt password to Firebase	AR SA	Done	Oct 8	Oct 15	L
Send email for Forgot Password	SA HT	Done	Oct 8	Oct 15	M
+ Add Subitem					

+ Add

Sprint 4: (Oct 10 - 15) Settings/Preferences

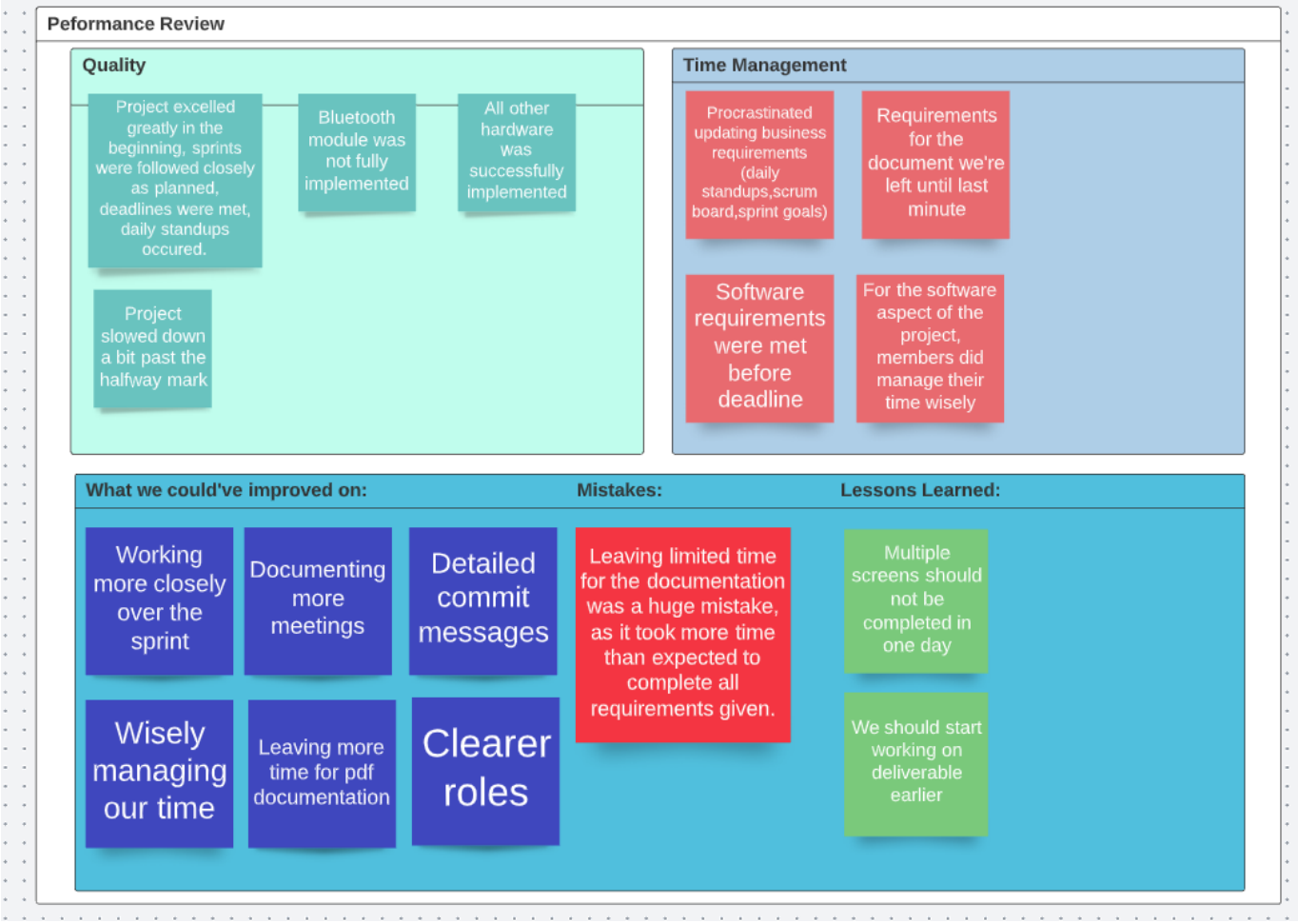
	Subite...	Person	Status
Settings Screen	5	KS SA	Working on it

Subitems	Owner	Status	Start Date	End Date	T-Shirt Size
Setup settings fragment/root_preferences	KS HT	Done	Oct 1	Oct 1	S
Add screen orientation customization(portrait/landscape)	KS	Done	Oct 2	Oct 2	S
Add language preference(French/English)	HT KS	Working on it	Oct 3	Oct 4	M
Reset password	SA	Done	Oct 4	Nov 4	M
Add notifications switch (on/off)	HT	Working on it	Oct 11	Oct 12	M
+ Add Subitem					



Post-Mortem / Project Review:

The project excelled greatly at the beginning, deadlines were met, daily standups occurred and sprints were ongoing on time planned. Past the halfway mark, the project slowed down overall, members procrastinated until the end. Although, for our final sprint we committed to daily standups and meeting requirements to complete the project. As everyone did attend the standups, we did spend less time during these standups than the initial start of the project.



Technical Debt

- Held regular meetings with team members
- Setup coding standards
- Refactored code
- Prioritized working on debt tasks

Refactoring

In ReviewActivity, created a method sendFeedback() to be called when the button is pressed while all fields are valid. We refactored this to improve readability of the code and have a better time fixing the error if the app crashes after the function is called.

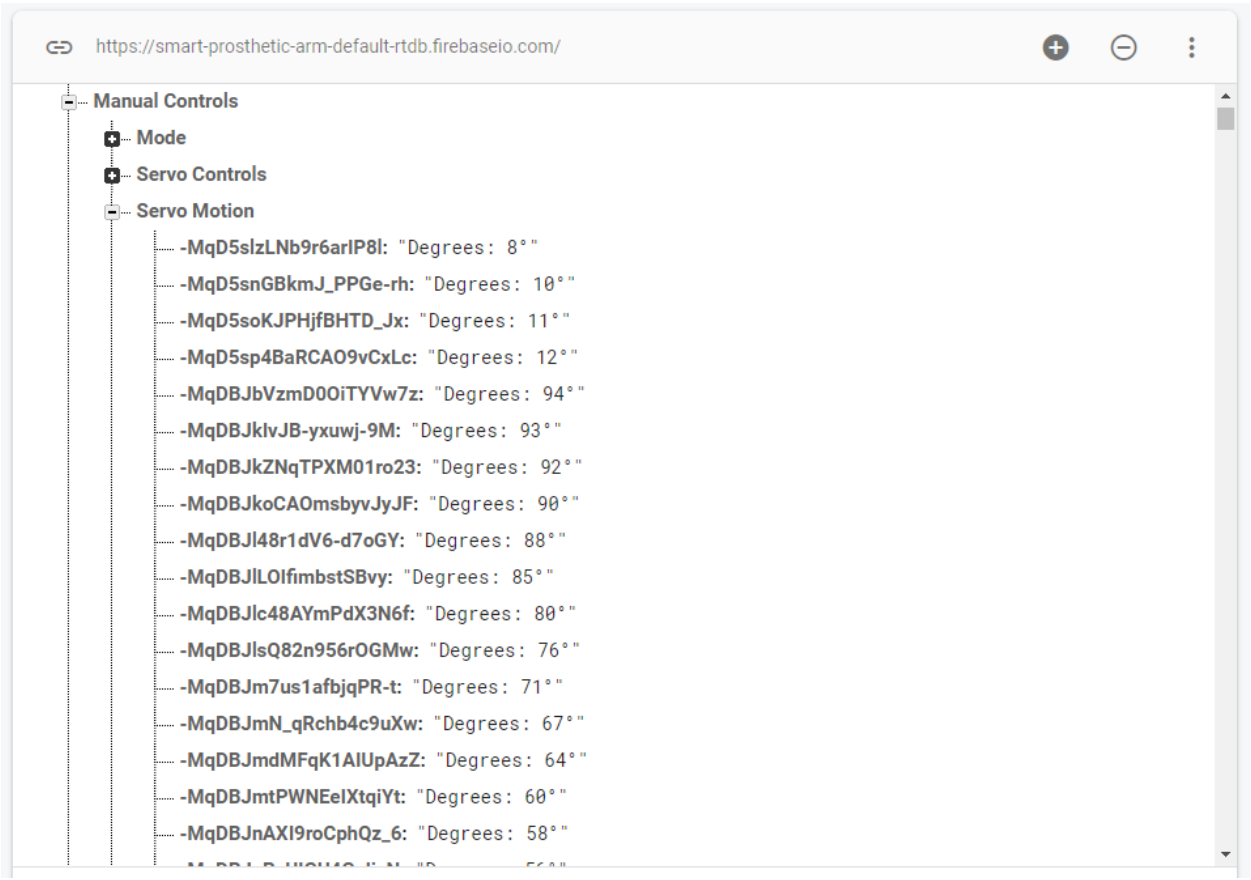
In MainActivity, created a method exitWarning() to display a warning message. We refactored this so if we want to call the same warning more than once we don't have to duplicate the code.

Suggestions for Instructor:

Documentation requirements outvalue the actual software application.

Firebase(Verify dynamic data):

Servo Real Time Dynamic Data



https://smart-prosthetic-arm-default-rtdb.firebaseio.com/

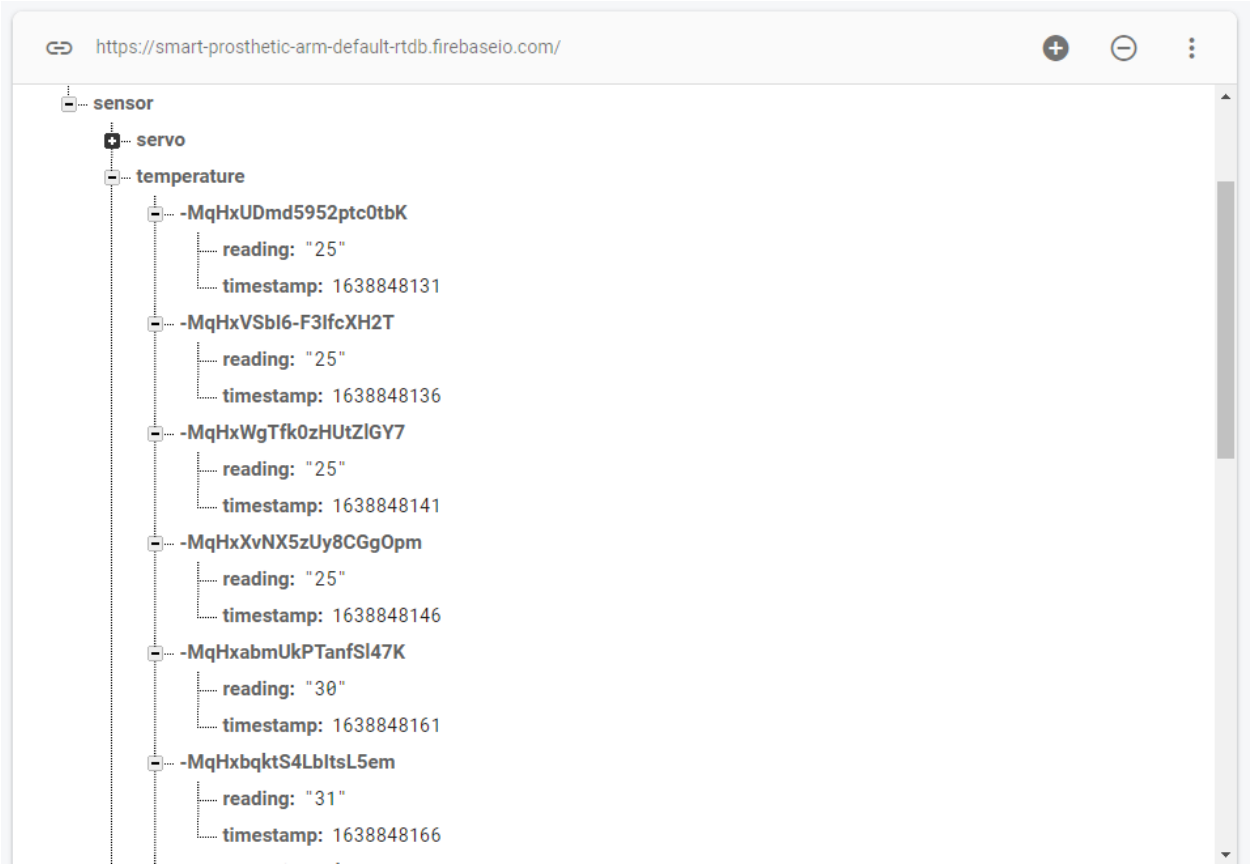
- Servo Motion
- Servo speed
  - -MqGFATEzHEh1Mh0gS3H: "Percentage: 4%"
  - -MqGFAUIDLSaM7xTaWEB: "Percentage: 5%"
  - -MqGFAUZptL1ZB-ahaaC: "Percentage: 6%"
  - -MqGFAV5LmcgQXUyCIdx: "Percentage: 7%"
  - -MqGFAVLpJB8ea4LP6eq: "Percentage: 8%"
  - -MqGFAVsaJzYHeBKe7GT: "Percentage: 9%"
  - -MqGFAkEKcTjEqaBEblE: "Percentage: 10%"
  - -MqGFAmJaFFO7ug4ROgq: "Percentage: 11%"
  - -MqLdIYegtaJRFecfGUP: "Percentage: 5%"
  - -MqLdIYtKm-YKTjnP0zl: "Percentage: 6%"
  - -MqLdIZBygmcUMa4fluJ: "Percentage: 7%"
  - -MqLdIZRxEzgFMhxcUE2: "Percentage: 9%"
  - -MqLdIZeF114p3k1akGQ: "Percentage: 13%"
  - -MqLdIZwiz6_XNdxdRDX: "Percentage: 18%"
  - -MqLdI_BJfk31DVXnUHQ: "Percentage: 24%"
  - -MqLdI_SyZw1p1L9Cf39: "Percentage: 31%"
  - -MqLdIa9qsrsEcgrACls: "Percentage: 38%"
  - -MqLdIce7dbX9wA9X1e2: "Percentage: 44%"
  - -MqLdIcfoXlz2c_5Q-5i: "Percentage: 46%"

https://smart-prosthetic-arm-default-rtdb.firebaseio.com/

smart-prosthetic-arm-default-rtdb

- Feedback
- Manual Controls
  - Mode
    - -MqD5hZ14yxbRFln4LcE: "Firmly Grasp"
    - -MqD5iHRBCEFx8kSa4G6: "No Grab"
    - -MqD5s3EOGCt1qEFOi1z: "Firmly Grasp"
    - -MqDAOGTgHaolWiw47cx: "Firmly Grasp"
    - -MqDAORoxjwhVXDEaqbU: "No Grab"
    - -MqDBKkrG1T66JNVDdv2: "Firmly Grasp"
    - -MqDBKu8I3HE_BsqpjBh: "No Grab"
    - -MqDBL1NFCeiFSD3uQSJ: "Firmly Grasp"
    - -MqDBL8vD7EEkN1LT2gF: "No Grab"
    - -MqDBLFRWs8IZElj_kY4: "Firmly Grasp"
    - -MqDBLf2npCUQRSP_g7o: "No Grab"
    - -MqDBLl245XMnKmnlJZ5: "Firmly Grasp"
    - -MqDBLoh3qJNCInFlE9T: "No Grab"
    - -MqDBLxUDhuAhTwUsc6t: "Firmly Grasp"
    - -MqDBM1wXbS5FqwggpOE: "No Grab"

Temperature Real Time Dynamic Data



UltraSonic Real Time Dynamic Data