Simple Fit

a web application using Polar H10© and Polar Verity Sense©

Agenda

1. Project Idea and scope
2. Project management
3. Demo and Implementation
4. Surveys
5. Conclusion
6. Questions

PROJECT IDEA & SCOPE

Project requirements

Basic requirements

- The basic requirement for the project was to access and fetch data from the H10 and Verity Sense sensors via Bluetooth and display the collected data on a web browser.
- Examine and analyze the possible appeal of a browser based application.

Our own objectives

- The main focus of this project was to explore and research a way to create a browser based application which works jointly with Bluetooth sensors.
- Another of our objectives was to display data in a simple manner, so it would be comprehensive for all end-users

Project planning and progression

- At the start of the project we used HTML, but quickly decided to switch to ReactJS.
- In addition to the basic requirements, we decided to implement some supplementary functionalities for the application:
  - Device dependent page routing
  - Device disconnect
  - Heart rate alert
  - Theme changing feature
  - Project on Cloud (GCP)
- We made an effort to not only create a functional application, but to also make it look pleasant.

Final design

What we thought we would be doing and how far we could take this

what kind of features we thought we were going to implement and when and why we then decided to drop those

How we started with only simple html page and then decided to move to react

Research with ble technology and web bluetooth api

How and why the team splitted to work with different areas of the project as we did

Technologies

Programing Language

- Javascript
- JSX & CSS

Framework

- ReactJS
- Docker

Cloud

- Google Cloud Platform

Programming Environment

- Visual Studio Code

Version Control

- GitHub

Project Management

- Trello

Web Bluetooth API

PROJECT AND TEAM MANAGEMENT

Methodology

Agile software development with inspired by “Kanban” with Trello as management tool

Change Management Principles	Service Delivery Principles
Start With What You Do Now	Focus on Customer’s Needs and Expectations
Agree to Pursue Incremental, Evolutionary Change	Manage the Work, Not the Workers
Encourage Acts of Leadership at All Levels	Regularly Review the Network of Services

- Weekly group meetings
- For research phase we made a frontend- and a backend-team
  - Problems with merging both progressions
  - ➜ Focus on creating component oriented teams with specific tasks

Struggles

- Big communication problems, especially in the beginning
  - slow progress and big divide between branches
  - developed solutions twice
  - ➜ Timetable and Trello helped managing tasks
  - ➜ In the end the whole team was more motivated
- Reading and converting the data into understandable data
  - Plotting ECG-Data into a chart
  - ➜ Brute force and a lot of hours finally solved the issues
- Using GATT Services and Characteristics correctly
  - In particular the custom Service (PMD-Service)
  - ➜ Extra meetings with polar developers
- Many reworks to existing components
  - Big loss of time due to indecisiveness

Successes

- Conditional routing (device dependent) and preventing “unauthorized” access to pages implemented

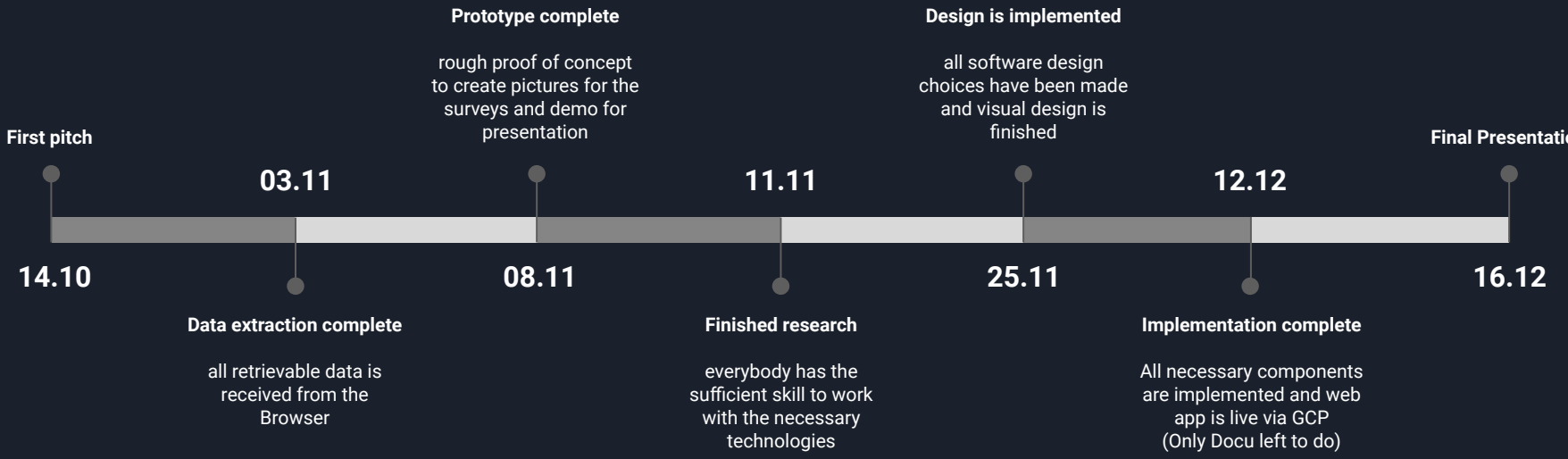
- Retrieve and display real-time data from both of the sensors via bluetooth connection((heart rate, ecg, time, battery)

- Deployment on Google Cloud Platform with Docker

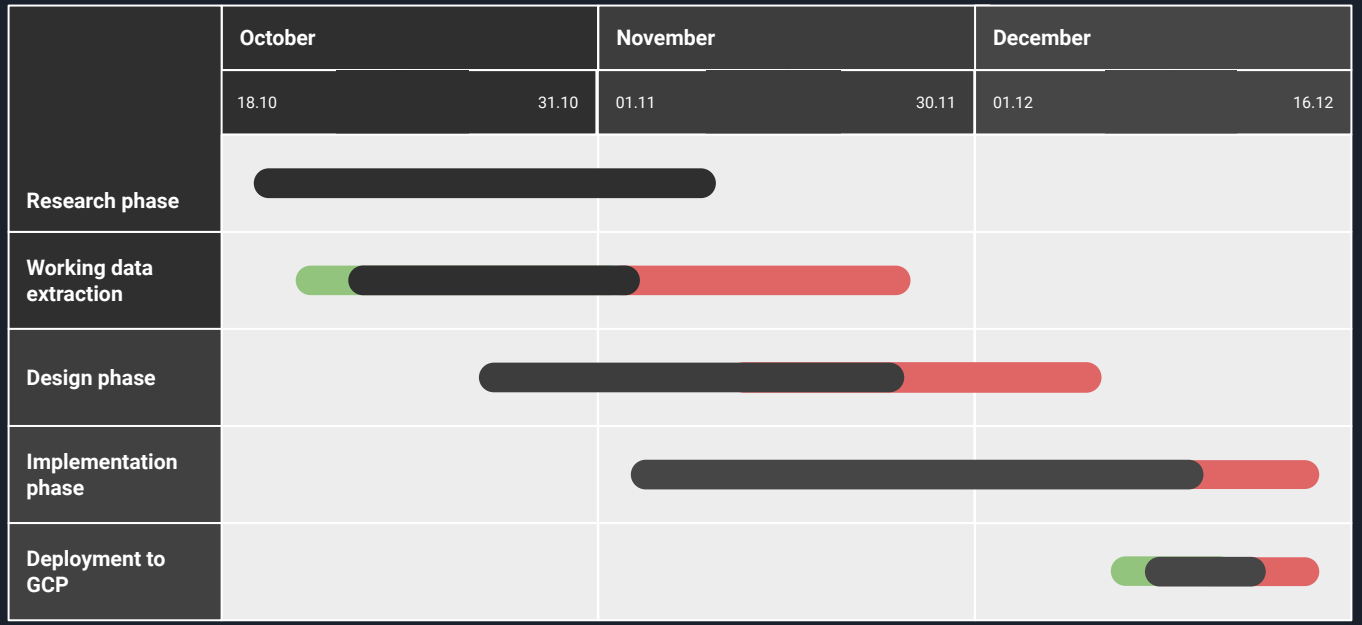
Milestones and timeline

- We had five different presentation milestones
  - 14.10. We presented our first idea for the project
  - 11.11. The research phase had to be done
  - 25.11. The Design phase had to be done
  - 12.12. We presented our progress and to do tasks for the last week
  - 16.12. The final presentation for this project
- In addition for these milestones we had few smaller milestones in our timeline
  - 3.11. Data extraction is working completely
    - This milestone was achieved completely in 25.11.
  - 8.11. Beta version is complete.

Planned timeline



Actual timeline



DEMO & IMPLEMENTATION

References

https://developer.mozilla.org/en-US/docs/Web/API/Web_Bluetooth_API

https://reactjs.org/

https://googlechrome.github.io/samples/web-bluetooth/

https://www.bluetooth.com/

https://github.com/

https://github.com/polarofficial/polar-ble-sdk

https://kanbanize.com/kanban-resources/getting-started/what-is-kanban

LIVE DEMO

SOURCE CODE

Shortcomings

- Automatic Cloud Update
- Acceleration data is collected but not displayed
- PPG graph is not implemented
- Code could be cleaner and understandable
  - DRY and proper documentation (e.g. JSDocs)
- Multiple measurements from different services are interfering with each other (only Polar Verity Sense)
- ECG chart is only a prototype and not in sync with datastream

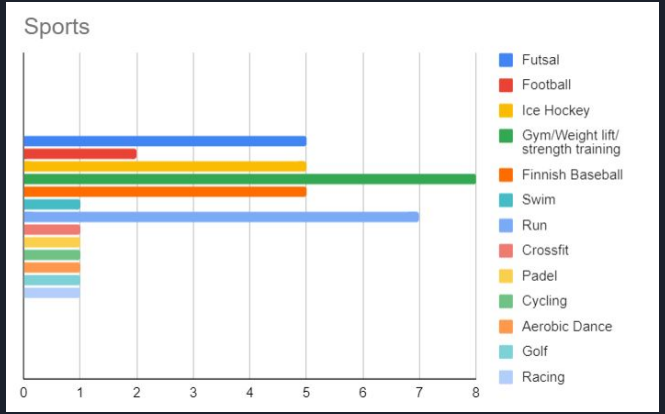
SURVEYS

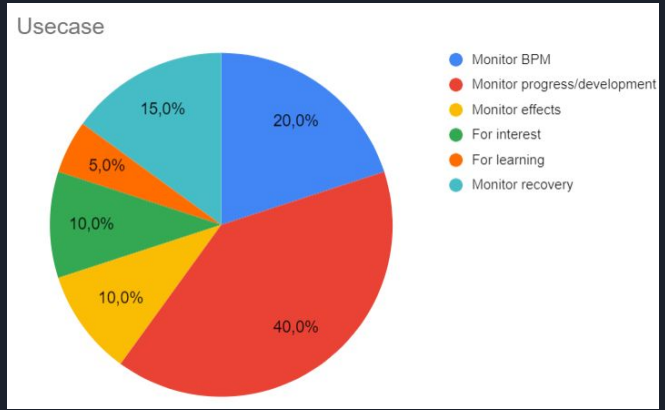
Surveys for athletes

We distributed surveys, so that we would have better idea that what the end users think about the application

- 69% of 29 people would consider using this application
- 40,0% of people would use this to directly monitor their progress
- 81,1% of 22 people thought that the data was presented in a user friendly way

- 78,3% of 29 people do prefer mobile applications over web-applications





Surveys for developers

We distributed surveys, so that we would have better idea that what other developers think about the application

- We asked about the biggest advantages and disadvantages in using a website:
  - Advantages:
    - No installation
    - Easy access from any device
    - Bigger screen
  - Disadvantage:
    - Requires good connection for wifi/internet
    - Requires extensive testing to make sure the website looks the same in every browser
- We also asked about preferences for this use case, a mobile app or a web application? Why?
  - Few thought that the web application would be better, because of the higher resolution for the graph
  - Most preferred a mobile app, because of easier accessibility and an active internet connection is inessential

CONCLUSION

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"From our experience and the results of our surveys we came into a conclusion that insinuates that a browser based application might not gain as much traction or interest compared to a mobile application with the current state of modern browsers."

- JavaScript has problems handling real time data due to asynchronous functions
  - A lot of work has to be done to work around this
- JavaScript does not support reinterpret. casts by default to make bytestreams easily readable
- BLE API feels not fully fledged yet
- **The demand is not high enough!**

QUESTIONS & ANSWERS