Australian National University

Wearable Sensor Technologies - Breath Analysis

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Team Members: Chen Li, Betty Xiong, Allissa Li, Jeffrey (Kwun Lam) Li, Qiusi Xiang, Yubo Pan , Elizabeth Zoneff, Lina Abd Rahim

Project Audit 2

1 April 2019

What is our project?

"personalise medicine to diagnose, treat and monitor disease tailored to individual need irrespective of geographical location or social circumstances to enable healthcare to be provided equally & effectively to a rapidly growing world population".

Measure acetone levels in breath

Solid-state chemoresistive acetone sensor

http://time.com/5183350/diabetes-five-types/

https://www.iwebshop.com/en/buy-keyrings-keychains-wholesale/3145-digital-alcohol-breath-analyser-with-lcd.html

Update since Audit 1

- ✔ Completed first prototype
- ✔ Set up meeting with Uwe – software academic
- ✔ Updated ConOps with contingency plan and stretch goals
- ✔ Ordered BOM – delay in CO2 sensor
- ✔ Completed requirements, system architecture and functional decomposition
- ✔ Biomedical researchers are attending Acute Care Conference at JCSMR
- ✔ Conducted additional research on other sensors and relevant materials
- ✔ Summarised feedback from audit 1 and worked on the recommendations

Previous Roles

Name	Role
Allissa Li	Technical Integration-Mechanical
Betty Xiong	Project Manager
Chen Li	Technical Integration-Electronics
Elizabeth Zoneff	Administration
Kwun Lam Li	Technical Integration-Mechanical
Lina Abd Rahim	Stakeholder Engagement & Client Liaison
Qiusi Xiang	Researcher
Yubo Pan	Technical Integration-Software

Refined roles

Name	Role
Allissa Li	Technical Integration-Mechanical
Betty Xiong	Administration/Biomedical Researcher
Chen Li	Technical Integration-Electronics
Elizabeth Zoneff	Administration/Biomedical Researcher
Kwun Lam Li	Technical Integration-Mechanical
Lina Abd Rahim	Stakeholder Engagement & Client Liaison/Biomedical Researcher
Qiusi Xiang	Technical Integration-Software
Yubo Pan	Technical Integration-Software

Prototype 1 – Electronics Schematic

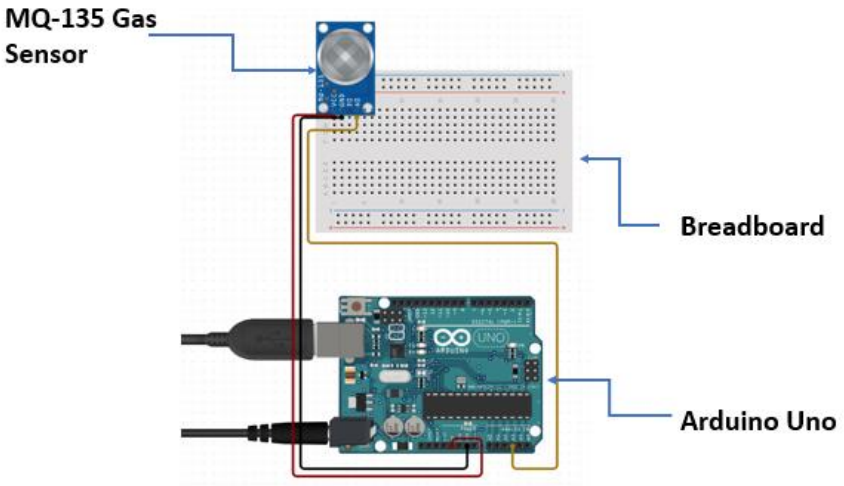


Figure 1: Circuit design with gas sensor

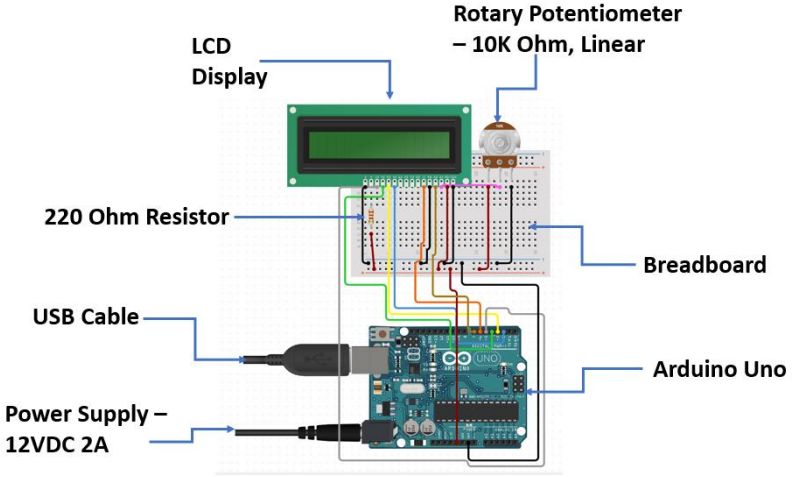
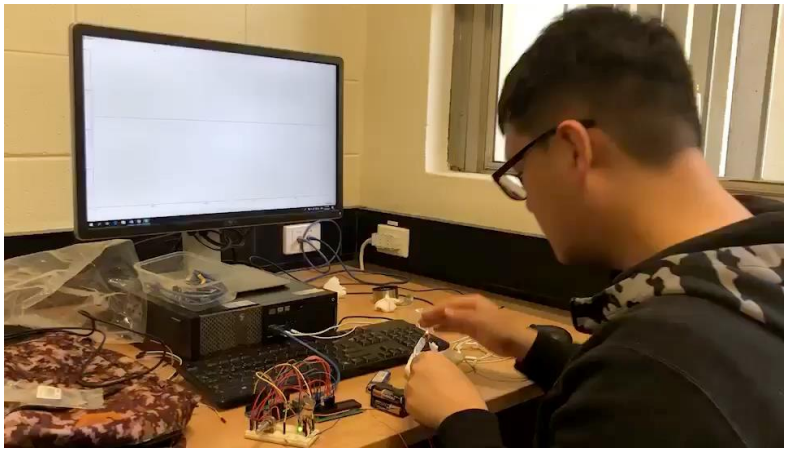


Figure 2: Circuit design with LCD

Prototype 1 - Video



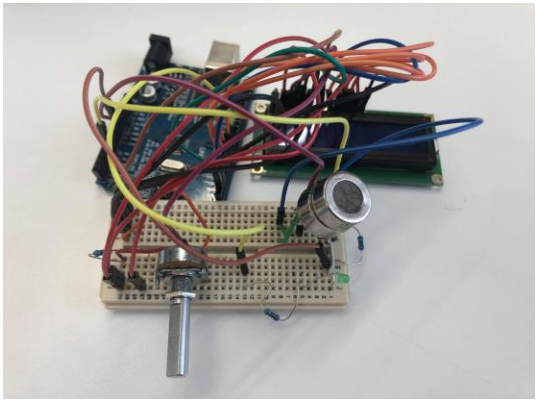
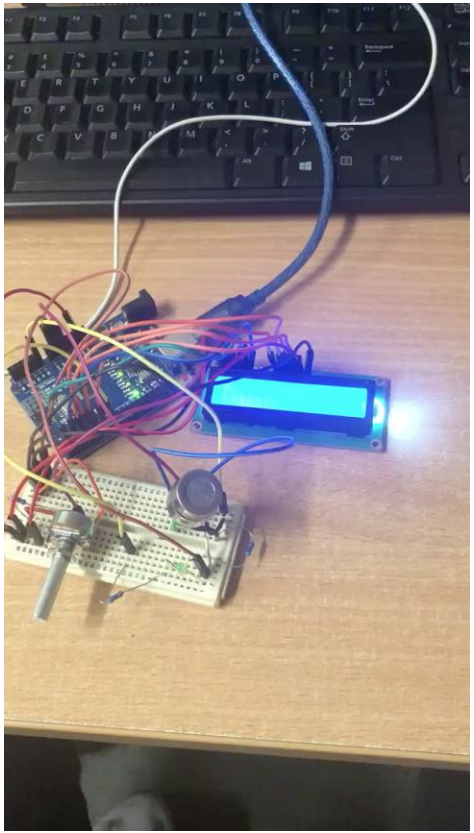
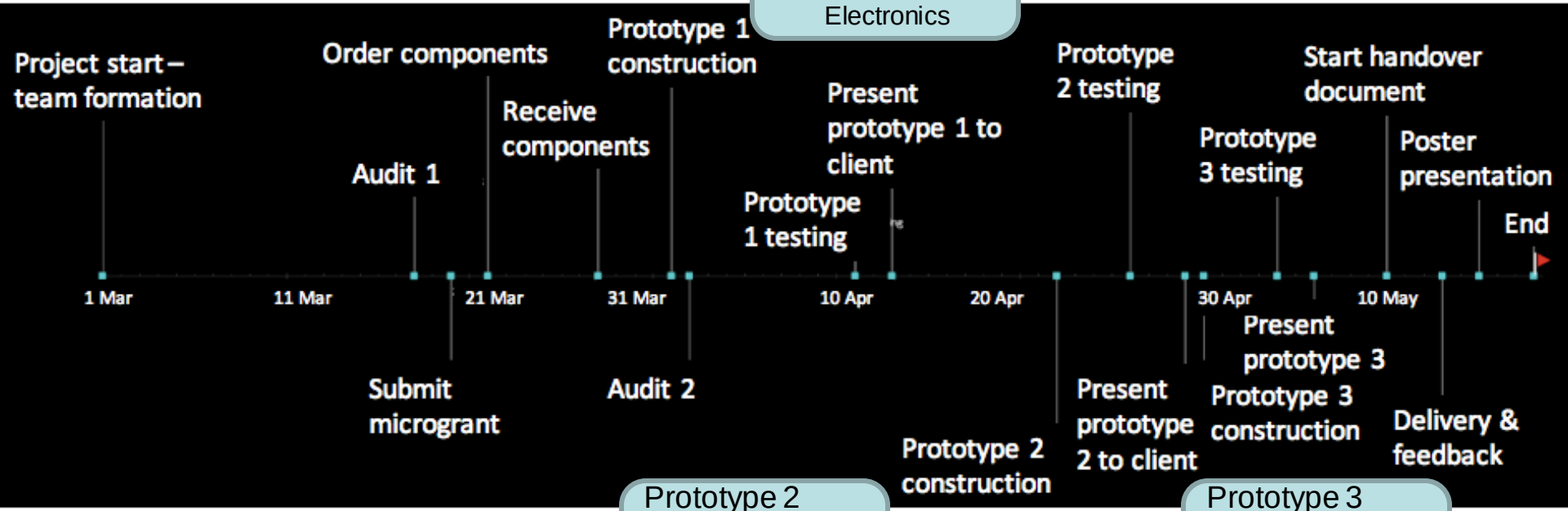


Figure 3: Assembled circuit



Project Milestones



Prototype 1
- CO_2 Sensor
- Basic Electronics

Prototype 2
- Add pressure sensor
- Consider CAD/ casing

Prototype 3
- Add acetone sensor
- Integrate heating element

Identified Risks and Contingencies

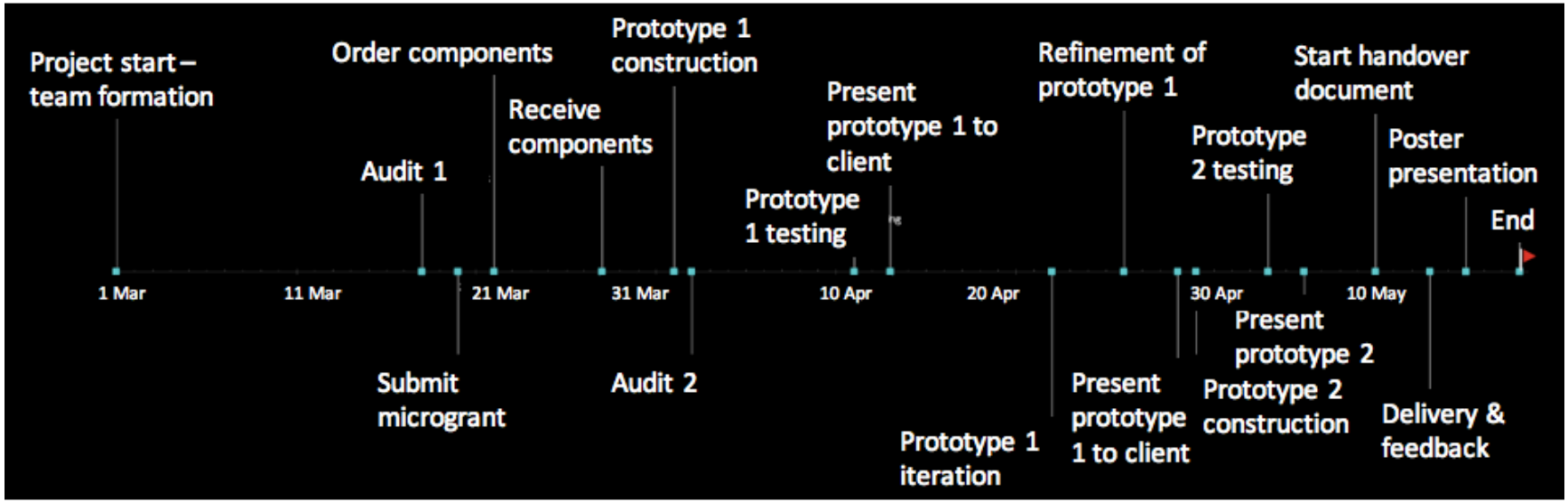
Risk: Third prototype not possible due to manufacturing and assembly issues → Result: Compare two prototypes instead

Risk: Client unable to meet on regular basis → Result: Set up meetings with advisor (Uwe Zimmer)

Risk: Electrical components, sensors, displays do not work properly → Result: Buy extra parts in the first purchase in order to mitigate this risk

Risk: Difficulty in delivering correct and reproducible results → Result: Short iteration cycles and enforce documentation

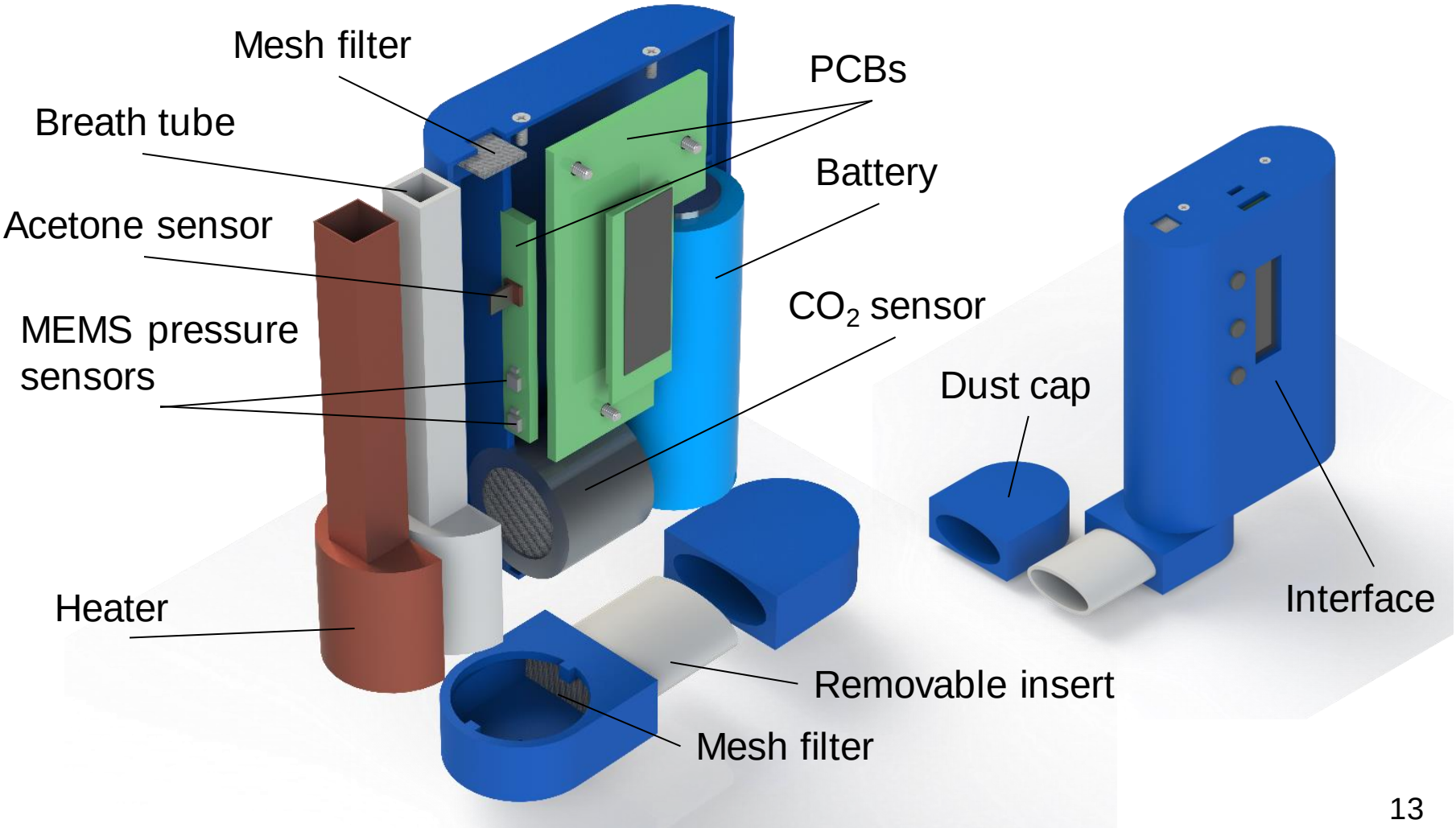
Updated Project Milestones



QUESTIONS?

Technical Constraints

- Casing
  - Size (Portable)
  - Human Safety (hygienic, no sharp edges)
- Breath Sensors
  - Sensitivity
  - Selectivity
  - Stability
  - Response and recovery time
  - Availability/ cost
- Power
  - Size and weight
  - Power capacity
  - Safety
- Interface
  - Size
  - Readability
  - Power consumption
- Breath Capture
  - Safety (Hygiene)
  - Accuracy (Air flow)
  - Shape
  - Cleaning and filtration
- Data Processor
  - Data security
  - Size
  - Software compatibility
  - Processing speed


Mesh filter
PCBs
Breath tube
Battery
Acetone sensor
CO_2 sensor
MEMS pressure sensors
Dust cap
Interface
Heater
Removable insert
Mesh filter