APP Design (Day 5)

- Sample Presentation
- Work on your Project!

Sample Presentation

- Demonstrate problem solving approach

- Demonstrate presentation of app

- Use it as a guide to help with your own design problem, but don't copy; your ideas are sure to be better than mine

Problem Solving Approach

1) Problem Selection

2) Understand the problem

3) Define the problem

4) Ideate (...think of a solution)

5) Prototype

6) Test!

The Amazing Egg Timer

Background

EGGS!

- Filled with high quality proteins!

- Good source of omega-3!

- Excellent source of vitamins!

- And they taste great!

Problem

- Undercooked eggs may contain Salmonella, a dangerous pathogen

- Overcooked eggs are an insult to the hen that laid them

These are best disposed off, preferably sealed in double layered garbage bags

Understand the Problem

Under-cooking

- Eggs needs to reach pasteurization temperature to be safe for consumption

- USDA requires a minimum of 60°C for 3.5mins

Over-cooking

- Over-cooking eggs produces Ferrous Sulphide (greenish layer around yolk) and Hydrogen Sulphide (bad smell)

- What was gold is now dust...

* USDA : US Department of Agriculture

Understand the Problem

- Dr Charles D. H. Williams (Senior Lecturer, University of Exeter) provides us with a solution!

- $$t_{\text{cooked}} = \frac{M^{2/3}c\rho^{1/3}}{K\pi^2(4\pi/3)^{2/3}}\log_e\left[0.76 \times \frac{(T_{\text{egg}} - T_{\text{water}})}{(T_{\text{yolk}} - T_{\text{water}})}\right]$$

- Using the provided formula, we can ensure the perfect soft or hard boiled eggs everytime!

Define the Problem

- Need a way...
  - to calculate the correct cooking time for soft and hard boiled eggs
  - time the cooking process and provide an alert when the time is up to prevent overcooking

Ideate

- Create an app that…
  - Ask for the egg's mass
  - Ask for the egg's starting temperature
  - Ask for the type of egg desired (soft or hard)
  - Provide a timer

Prototype

Settings for mass and initial temperature, with reasonable values pre-filled

Image and time changes according to choice of soft or hard boiled

Click to start timer

Test Results

- Success! Eggs cooked according to the timer were perfectly cooked

- Appearance of the soft and hard boiled eggs matches sample images

- ...however...

Photos of the successfully cooked eggs were taken a little too late

Test Results

- During my regular weekend climb of Mount Everest, the egg timer produced undercooked eggs!

Went well with soy sauce and pepper, but not quite what I've expected

Just before we stopped for afternoon tea. The undercooked eggs was a disappointment to the entire team.

Define the Problem

- Higher altitude reduces boiling point!
- -0.3°C for every 100m above sea level

Ideate

- Need to incorporate altitude into calculation, adjusting boiling point downwards as altitude increases

Prototype

Allow entry of altitude. App uses this to calculate the local boiling temperature

Test Results

- Success! Eggs turned out well when cooked according to the timer regardless of altitude

Code

Sets image according to selection

Calculate boiling temperature based on altitude

Code

Calculation of boiling time using Dr William's formula

When "Start Timer" is clicked, calculate the boiling time, recorded the starting time, and start the timer

Code

Time updates the countdown, and plays a voice message as well as a vibration when the countdown reaches zero

App Demonstration

- Completed App can be downloaded at https://aposteriori.com.sg/projects