

APP Design (Day 5)

- Sample Presentation
- Work on your Project!



MIT
APP INVENTOR

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...

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

The screenshot shows a mobile application interface with a status bar at the top displaying signal strength, 100% battery, and the time 10:22. The app title is "The Amazing Egg Timer!". Below the title are three input fields: "Egg Mass" with a value of 57 g, "Initial Temperature" with a value of 4 °C, and a "Type" dropdown menu currently set to "Soft Boiled". Below these fields is a photograph of a soft-boiled egg. At the bottom of the form is a large grey button labeled "Start Timer".

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

The Amazing Egg Timer!

Egg Mass g

Initial Temperature °C

Altitude m

Type

Time's Up

Start Timer

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

```
when SpinnerEggType .AfterSelecting  
  selection  
do  
  if  
    get selection = "Soft Boiled"  
  then  
    set Canvas1 . BackgroundImage to "soft.jpg"  
  else  
    set Canvas1 . BackgroundImage to "hard.jpg"
```

Sets image according to selection

```
to CalculateBoilingTemp  
result  
  100 - (TextBoxAltitude . Text) × 0.003
```

Calculate boiling temperature based on altitude

Code

```
to CalculateTime
do
  if SpinnerEggType . Selection = " Soft Boiled "
  then set global yolkTemp to 65
  else set global yolkTemp to 77

  set global part1 to (TextBoxMass . Text ^ 0.6666) × 3.7 × 1.0125 / 0.13849
  set global part2 to log (0.76 × TextBoxInitialTemp . Text - call CalculateBoilingTemp) / (get global yolkTemp - call CalculateBoilingTemp)
  set global Time to get global part1 × get global part2
```

Calculation of boiling time using Dr William's formula

```
when Button1 . Click
do
  call CalculateTime
  set global StartTime to call Clock1 . GetMillis instant call Clock1 . Now
  set Clock1 . TimerEnabled to true
  call Canvas1 . Clear
```

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

Code

```
when Clock1.Timer
do
  call Canvas1.Clear
  set Canvas1.FontSize to 40
  set global RemainingTime to (get global Time - (call Clock1.GetMillis instant call Clock1.Now - get global StartTime) / 1000)
  if (get global RemainingTime <= 0)
  then
    call Canvas1.DrawText
      text "Time's Up"
      x 118
      y 100
    set Clock1.TimerEnabled to false
    call Sound1.Vibrate
      millisecs 500
    call TextToSpeech1.Speak
      message "Your egg is ready"
  else
    call Canvas1.DrawText
      text floor get global RemainingTime
      x 118
      y 100
```

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>