UNIVERSITY OF CAMBRIDGE

Report on the Product Design Assignment

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1 INTRODUCTION

The task was set to identify a specific problem with a mode of public transport and to devise a way to improve this situation by designing or redesigning a product, system or service.

The problem that was identified was relating to the fact that commuters will often miss their train due to not leaving to walk to the station on time as they do not correctly judge how long it will take to get there.

The solution was to design and build an android app that would determine the train that the commuter would catch and then notify the commuter of an appropriate time to leave their location in order to arrive at the station in time for their train.

An additional feature that was developed into the application was a live map display of the current locations of trains in the UK.

2 Problem Identification

The initial task in the design process was to identify a suitable problem with a mode of public transport. To accomplish this, the problem space was widened and abstracted in order to allow for a range of problems to be made present. Below are listed a number of problems that were considered to be solved:

- Train related problems
  - Train stops at many stops before your required stop, even if no passengers enter/leave the train
  - Many journeys have the same fare, despite them being different distances
  - Trains can only take you to locations where a station is available
  - Some trains run with very few passengers
  - Other trains run over capacity
  - Trains run slowly around tight corners
  - Many commuters miss their train and must either catch a later train or forfeit their fare
  - Tickets are not always checked on the train for validity
  - Trains require a large number of staff to operate
- Bus related problems
  - Buses experience traffic
  - Buses that have a low demand have very high fares

3 Task Clarification

The problem that was selected was that commuters often miss their trains and thus will be late to arrive at their destination and can sometimes have to pay more for a later train.

The need for a solution to this problem is great as it causes for the trains that are missed to be under capacity and for the trains that are caught late are over capacity. It also means that commuters can be late to arrive to their destination and spend additional money on fares unnecersarily.

This problem was abstracted in order to cause for the widest range of possible solutions to be discovered and explored. After this abstraction process, the problem statement was as follows:

Devise a way to reduce the number of people who miss their train during a commute

Then, in order to realise the solution, a requirements list was drawn up:

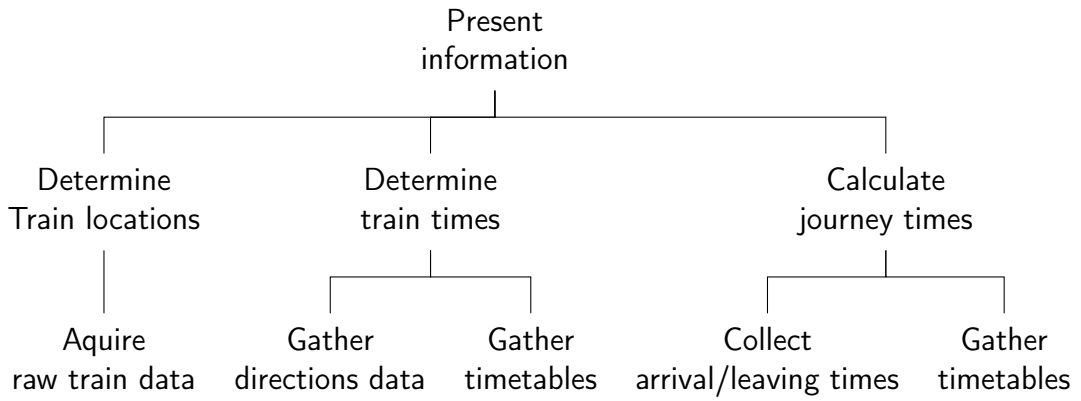
[Key: D/W = Demand/Wish; Wt = Weight (wish importance) between 1 and 3]

D/W	Wt	Requirements	Keyword
		Functionality	
D		The system must determine train operating times	Timings
D		The system must determine live train locations	Locations
D		The system must determine User location and destination	Directions
D		The system must determine required train for journey	Journey
D		The system must calculate an appropriate time for the user to travel to station	Leaving
W	3	The system sets an alarm for when the user should begin journey	Alarm
W	2	The user can select trains on live map and get details of selected train	Details
W	1	The user can review directions for their selected journey	Review
		Efficiency	
D		The system must minimise calls to data APIs thus minimising required bandwidth	Bandwidth
D		The system must minimise calculations on device	Battery
W	3	The device should store minimal information	Size
W	3	The device should make minimal API calls that are general/uniform	API
		Useablilty	
D		The application must have minimal bugs so as to minimise crashes	Bugs
W	3	The user should make as few interactions as possible to recieve the required response	Interaction
W	2	The system should be user-friendly and clear to navigate	Navigation
W	1	The system should be intergrated with other systems to provide a seamless operation experience (e.g Google directions/maps intergration)	Integration
		Aesthetics	
W	2	The application should have a clean and user-friendly design	Design
W	1	The application design should follow Google Material Design requirements	Material
		Timescales	
D		Product and work deadline: 25 April 2017	Work
D		Presentation date: 26 April 2017	Presentation

4 Conceptual Design

In order to begin designing a concept to solve the problem, the overall function of the solution must be determined. The overall function of the solution must be to provide the user with useful information and notification of train locations with respect to them in order for them to have the best chance of avoiding missing their train.

This overall function was then decomposed into smaller subfunctions as detailed below:



Next, solution priciples were determined and combinations of these principles were identified:

Function	**Solution Priciples**		
Present information	Graphically	As Text	On a map lay
Aquire raw train data	From GPS devices on trains	From public APIs	
Gather Directions data	Design bespoke directions system	Use Google directions API	