Assignment Software Architecting

Part 2 : Implementation

Leiden University, Software Engineering 2007-2008

Car Navigation System

Context

Several companies are offering in-car navigation systems (CNS). It is a pocket-sized device that has a graphical display. A driver can enter a destination and the CNS will guide the driver to the location by providing instructions on which streets to drive and where to turn. These instructions are shown graphically on the display, and may be supported by text or voice. A CNS knows the current location of the car via GPS (Global Positioning System). Also, a CNS has access to a collection of maps such that it can relate a pair of GPS-coordinates to a position on the map. CNS devices can receive information about traffic conditions (esp. traffic jams) via the Radio Data System (RDS). The CNS can adapt its suggested route based on the current traffic situation.

Assignment

Engineer an architecture for the Car Navigation System.

In this part 2 of the assignment, we assume that you have completed (most of) part 1 of the assignment, that is:
1. Define the requirements in a SMART manner
    - Which will at least include the extra-functional properties: usability, performance, especially accuracy.
2. Define the use cases (at least 7)
3. A layered architectural design that is described by (at least) a structural view and several sequence diagrams for common behaviour and exceptional behaviour.

In this assignment you can use methods and techniques that you have learnt in earlier courses.

The main objectives of assignment-part 2 are to:
1. make a planning of the realization activities
2. realize an implementation of the architecture for the Car Navigation System you have proposed in part 1 of the assignment.

Ad 1) The suggested approach is to make a bottom-up planning; i.e. starting from the architecture of the system, estimate how much time it will take to implement each task, then also estimate time needed for testing and integration.

Ad 2) Implement the Car Navigation System. We will not require you to develop dedicated hardware. Instead you may create a mock-up of several components that are difficult to realize. In particular, we propose that you use work-arounds for:
- CarNavigation Device: use a regular PC for this
- the GPS signal: you may make a mock-up for this
- Map information: this may be obtained via Google Maps:
    - http://code.google.com/apis/maps/documentation/
    An example of the use of this API can be found at:
    - http://world.maporama.com/

For part 2 you will hand in:
- a planning for the realization activities (implementation, testing and integration)
- the source code + including comments & documentation
- you will demonstrate your application at the werkcollege session.

Further Reading

- GPS – global positioning system
    - http://en.wikipedia.org/wiki/Global_Positioning_System
- Radio Data System
    - http://en.wikipedia.org/wiki/Radio_Data_System
    - http://home.wxs.nl/~kreul1/verslagen/rds/rds.html (Dutch)
    - RDS-TMC: ftp://ftp.rds.org.uk/pub/acrobat/tti_article_spring99_e-2.pdf
- Find examples of products at:
    - www.tomtom.com
      www.garmin.com
      http://www.mio-tech.be/en/index.htm

Deadlines

- Deadline for the planning: Wednesday 26 March, 12:00, 2008
- Final submission (all documents): Wednesday 30 April, 12:00, 2008
- Hand in a paper version of all documents in my postbox (floor 1 of Snellius)