Software Architecting: Assignment 1

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Car Navigation System

Requirements

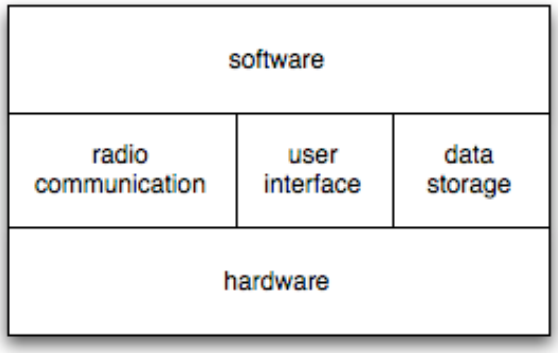
- Usability: be able to set a new direction in less then 15 steps (each touch to the screen counts as one step; thus full address should not be required)
- Performance: recalculation of a new should take less then 15 seconds
- Accuracy: the address should be visible within 50 meters
- Low energy usage (<5Watt)
- Low weight (<200gram)

Use cases

1. user turns on the system
    a. requires on/off button or removable power cord
2. system finds its own location
    a. requires gps
3. user give in driving goal
    a. requires user input
    b. requires database
4. system calculates shortest route
    a. requires database
    b. requires routing knowledge
5. system checks for traffic jams on route
    a. requires rds
6. user ignores system due to road works
    a. requires gps
7. user takes memory card with driving history
    a. requires removable storage

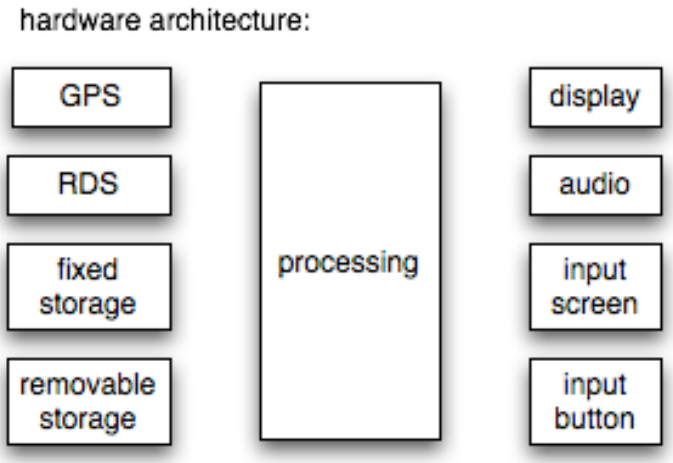
Layered architecture

Abstract view:



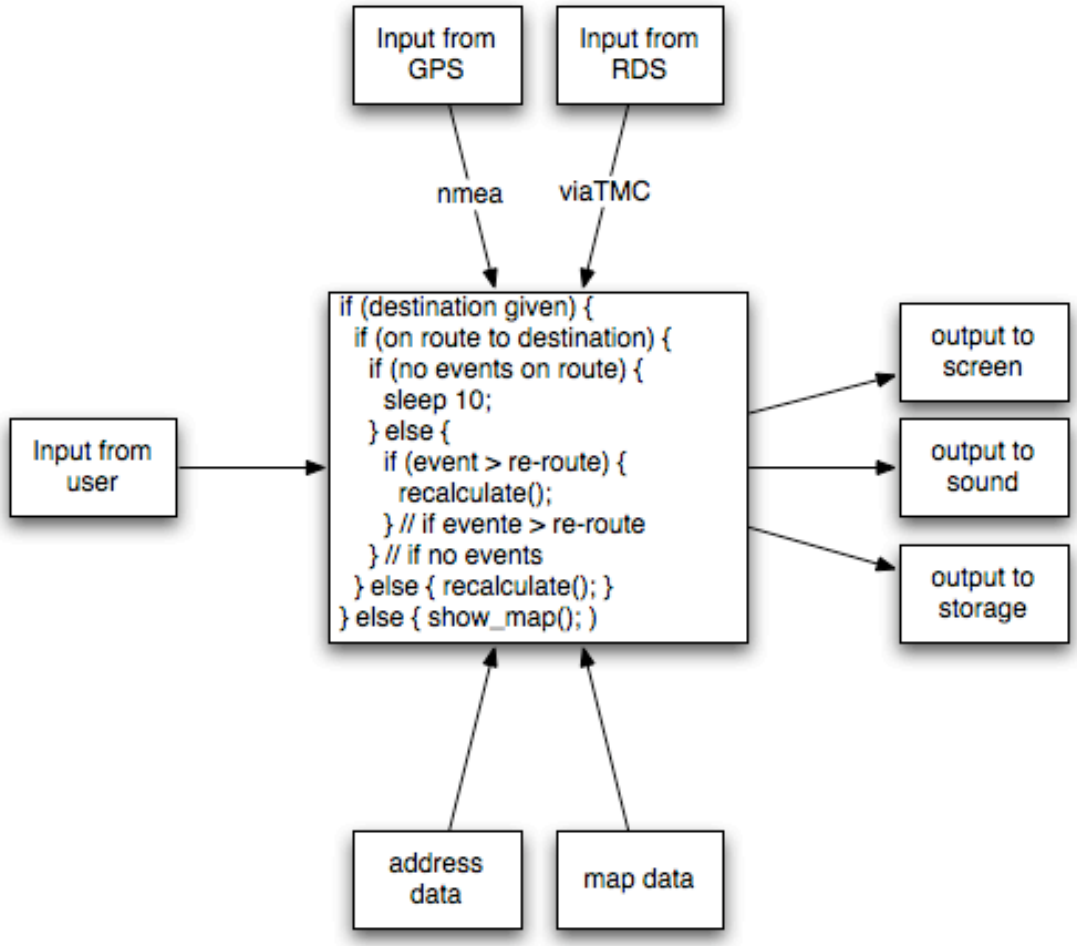
The design of the CNS is based on three main layers: the hardware layer, which consists of all different hardware parts and the interconnection from these parts to the main processor. The second layer is the interface layer, which implements all the hardware-specific software parts. This layer also gives room to the map and address databases. The final layer is the main software loop.

Structure model (hardware component diagram):



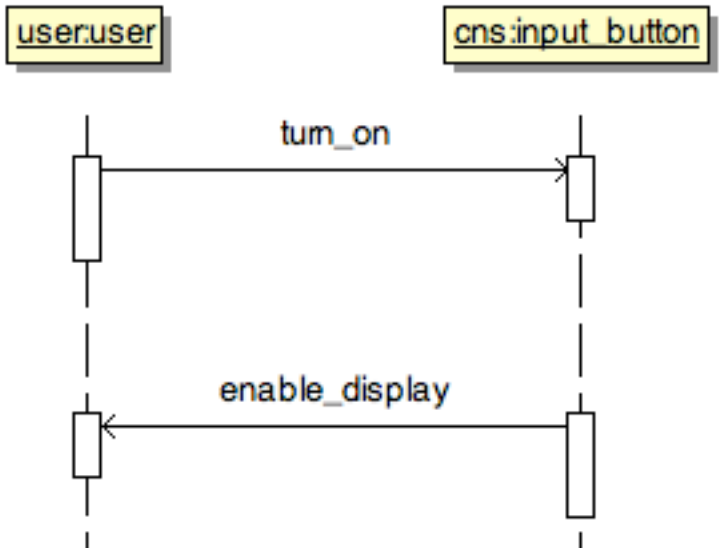
GPS:	collects nmea data. (http://en.wikipedia.org/wiki/NMEA)
RDS:	collects tmc data. (http://en.wikipedia.org/wiki/Radio_Data_System and http://en.wikipedia.org/wiki/Traffic_Message_Channel)
Fixed storage:	provides storage for executable, static databases
Removable storage:	provides storage for history and incremental databases
Display:	part of user interface
Audio:	part of user interface
Inputscreen:	part of user interface
Input button:	part of user interface
Processing:	cpu for execution and component interfacing

Structure model (software class diagram):

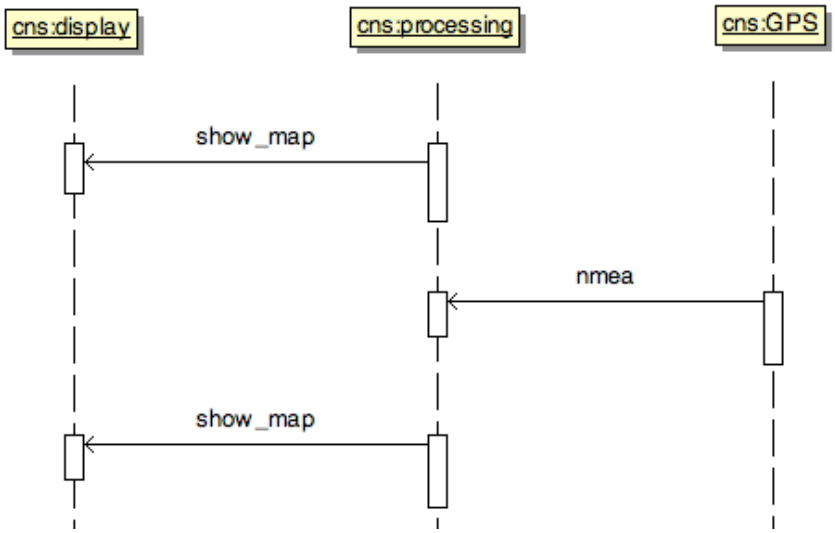


Sequence diagrams

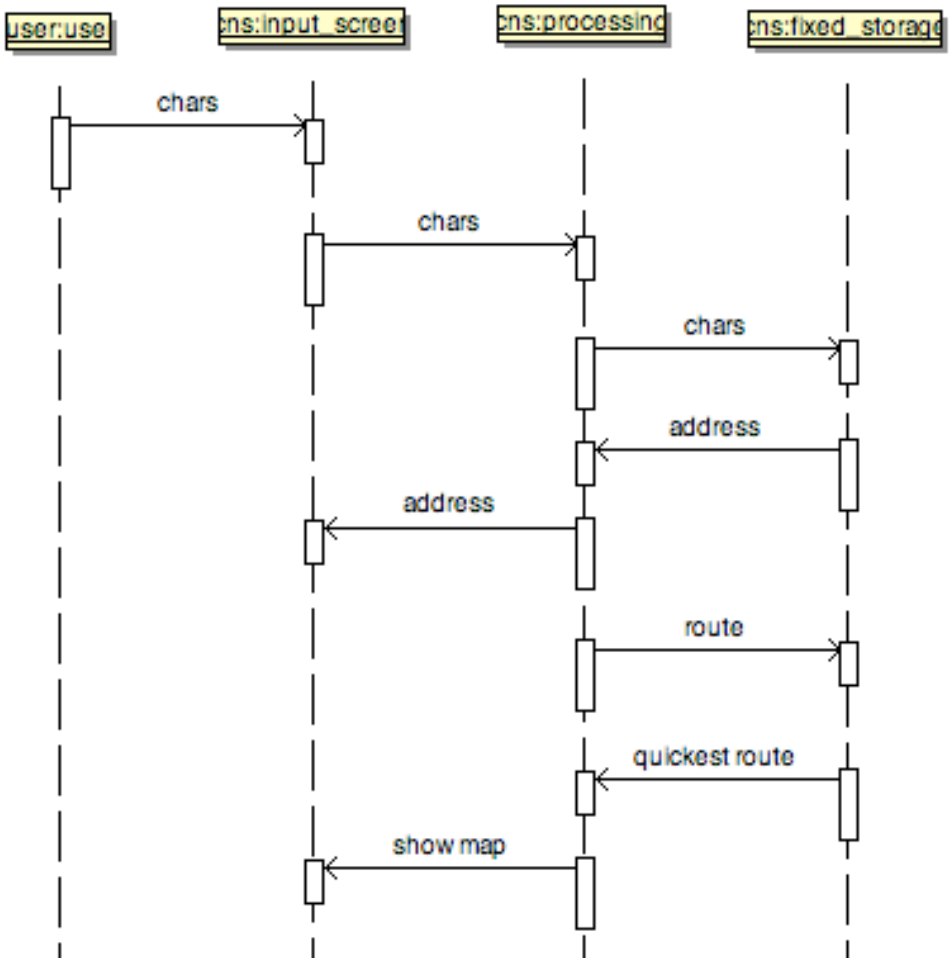
1. user turns on system.



2. system finds it's own location.



3. user give in driving goal



4. system calculates shortest route
5. system check for traffic jams
6. user ignores system
7. user takes memory card with history

Deployment diagram

t.b.d

Technical risks

- Modern car windows shield GPS connection, which might affect accurate positioning'
- TMC is country dependent and might change over time, requiring to change hardware or software
- User interface might be to difficult which not persuade users of actually using the product.
- No suitable processor will have enough cpu processing power
- Communication between hardware component and radio communication component might not be generic enough, might end up being dependent on one specific hardware component

Economic feasibility

	1x	1000x	10000x
Subtotal hardware	$100	$35	$31
Software developement	$84	$23	$19
Hardware assembly	$20	$4	$2
Packaging & shipping	$18	$7	$4
Support / PR	$7	$3	$2

Numbers to be checked.