Pinpointing Physical Objects in mobile AR games

The purpose of this master thesis is to examine possibilities and issues of pinpointing physical object within a mobile augmented-reality (AR) game. A mobile augmented reality game is a game that brings real world objects, relative locations or places, into the game experience. This is often achieved by combining a number of sensory inputs such as GPS positions, gyros, RFid tags and so on with the sensory input of other players or knowledge of the world (such as for example geographical data).

This master thesis is part of a project called Backseat Playground. Backseat playground is a game that is played by kids in the backseat of a car. The game makes use of existing GIS data in order to map the game content onto the physical world. As the player travel through the road-network the game turn churches, bridges and other roadside objects into a fictive world filled with crimes, virtual characters, and hidden clues. By pointing the gaming device towards objects as they pass by, different sounds are generated, turning the device into a sort of directional microphone.

A pinpointing algorithm

In this master thesis the possibility to pin-pointing different physical objects will be handled. The goal is to examine how the system can detect what physical object the player is aiming at by the use of the player's displacement. Current sensors give us the player's position and the direction that the pointing device is aiming. By using two or more position and directions as the player pass an object the object being tracked can be found.

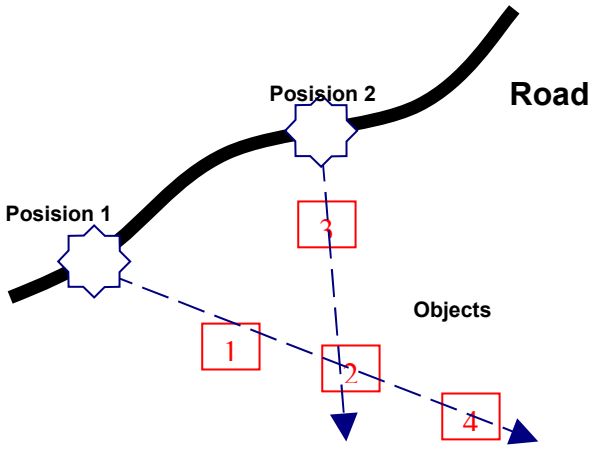

Fig 1. In this scenario it seams like the player is tracking object 2.

The sensors data however contains errors to some degree that has to be accounted for. The directional sensors for instance will drift over time. The GPS position affected by conditions in the ionosphere has an average accuracy of 30 meters. I most situations, these errors, will be roughly the same in both

position 1 and position 2 (see fig 1), as long as the time between the positions is relatively small. If we instead of 2 points use lets say 10 points or more we can filter away the directional error by simultaneously rotating all the directional vectors until they all intersect at one point. The GPS error can be dealt with by combining the GPS data with GIS knowledge of the roads.

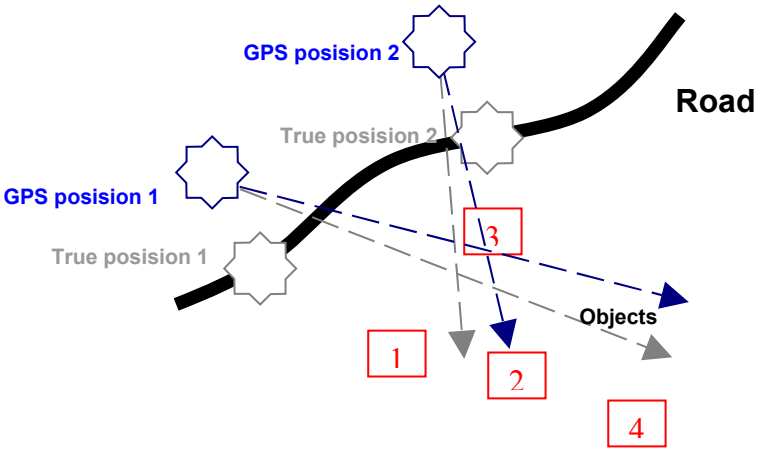

Fig 2. The same scenario as in fig 1 but with errors. Now the user seams to point towards object 3.

Scope

The master thesis consists of developing the pinpointing algorithm for the backseat playground system. The system consists of both a client unit equipped with sensors and a server unit with GIS data. This means that the algorithm has to be developed as two separate units' one running on the server and one running on the client. The pinpointing algorithm should be able to detect when the user is tracking a point. It should also be able to handle and detect normal sensor errors as mentioned above.

Interactive Institute

The master thesis will be carried out on Interactive Institute's mobility studio in Stockholm. This means that you will have the ability to experience working within an internationally successful research group and on one of Swedens most creative workplaces. A place where we in a playful manner, explores mobile applications of tomorrow.

Information regarding the Interactive Institute can be found on www.tii.se. Information regarding the Mobility studio on www.tii.se/mobility. The BSP project is decribed on www.tii.se/mobility/BSP/.