Google Glass for Personalized Augmentations of Data Visualizations

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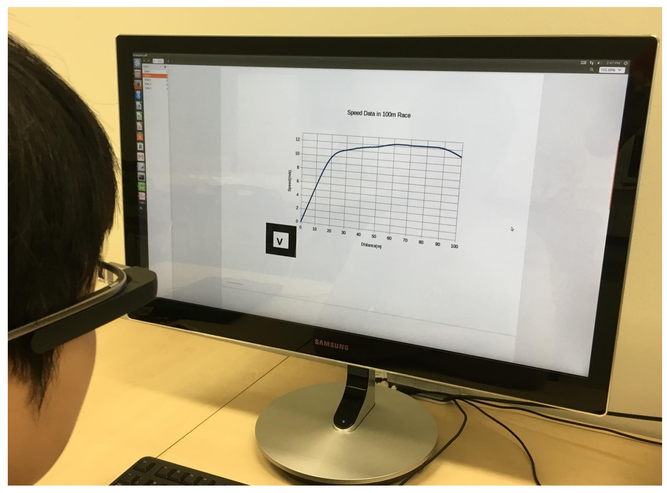
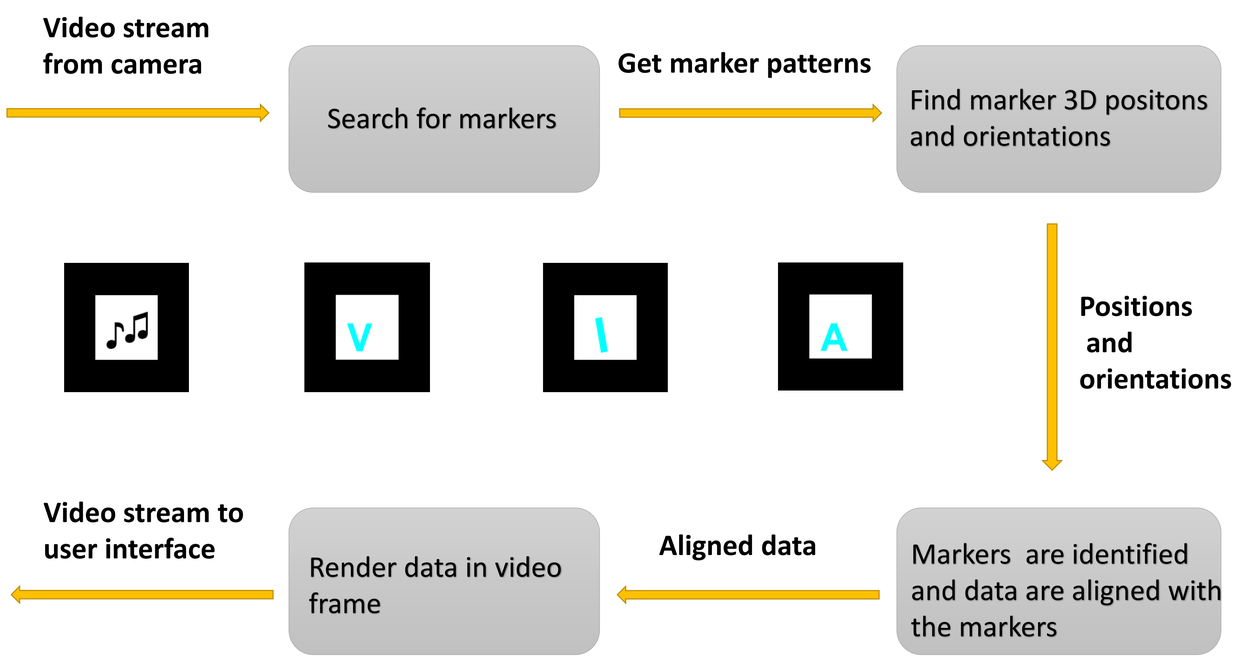
Introduction

There are occasions when data displays have certain information items which should only be visible to a subset of the display's viewers. This could be classified information, private information, or simply information only of interest to specific viewers. We explore the use of Google Glass as a means to augment the display's visual content with these types of private data, superimposing them seamlessly. The display itself could be a desktop display or a large display wall. We constructed a prototype for the former and discuss three case studies.



Basic Principles



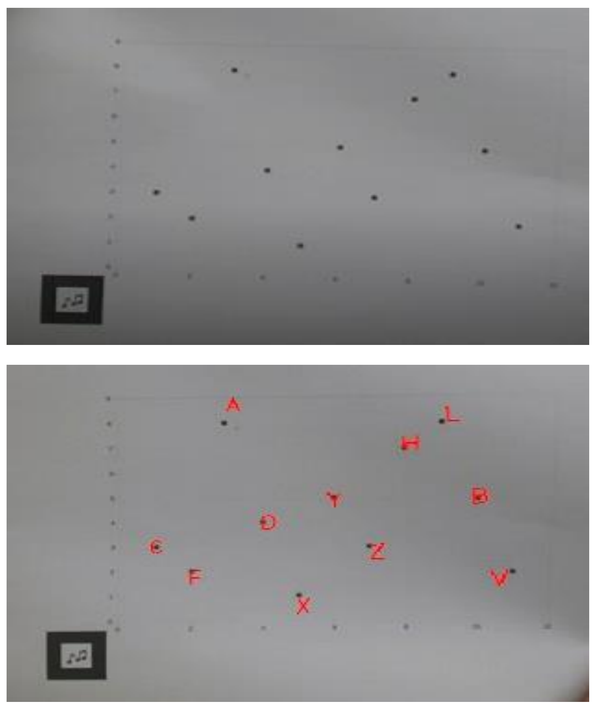
We utilized Nyartoolkit for Java, a wrapper of the ARToolKit. The ARToolKit is a library of functions that can track markers with recognizable patterns and allows virtual imagery to be superimposed over live video of the real world.

The workflow of our system is as follows:

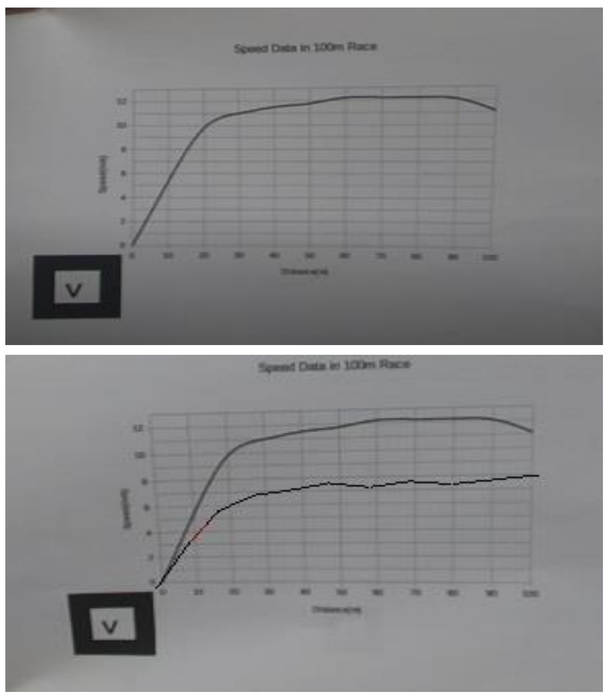
- The processors on the Glass search through each video frame for the specially designed markers.
- The Glass uses the coordinates of the markers to compute the position of the on-Glass camera relative to the markers.
- According to the scale of the recognized markers and the specific design, the private data is aligned with the markers, drawn on top of the video, and output to the user interface.

Usage Scenarios

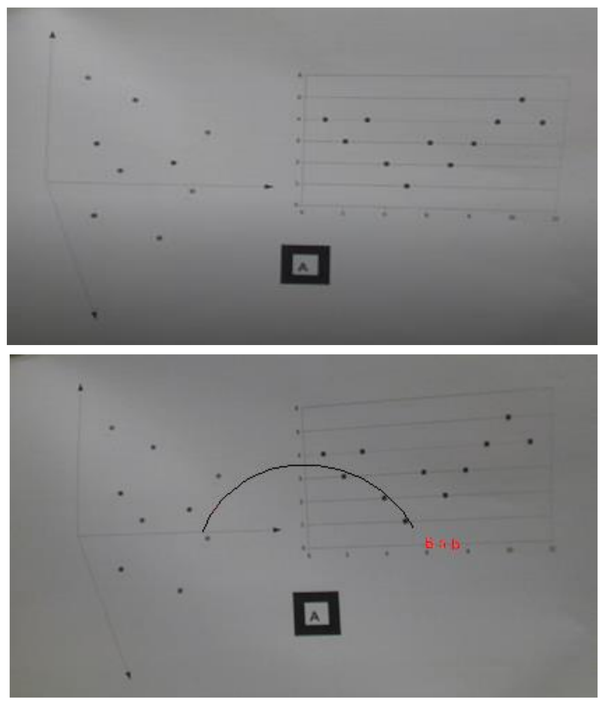
Top row: common display. Bottom Row: display as seen by the user wearing Glass, augmented with private information



A scatterplot printed on paper where each point has hidden attributes and only users with special permission can view them. In the Glass wearer's view, each point's extra information is positioned adjacent to it.



A line plot of a certain person's speed data in a 100 m race. Another participant wearing the Google Glass could then privately compare his or her own running data with the posted one without needing to share these (possibly embarrassing) data with the other viewers.



This is an application example which has two graphs – two scatter plots of different variables where the points in the two graphs refer to the same group of people. A specific user wearing the Glass could then see only his or her own data being marked and connected, but not that of others.

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