Mobile All-in-One Display Cluster Calibration

Bachelor Thesis

Objective:
With an impressive 24 Full-HD displays and 8 dedicated render nodes, our Deskothek display cluster provides an impressive environment for data visualization, virtual reality (VR) or distributed rendering applications. The displays can be moved and repositioned to form a giant surface for presentations and teaching, a semi-circle for a CAVE-like VR experience, and many other constellations. Hence, content must be organized spatially; each display must ensure that it shows precisely those parts of the game, simulation or slide that the viewer expects to see there!

Your task will be to create an all-in-one calibration app for common mobile devices (preferably running Android), that is capable of identifying the relative location and orientation of all displays in 3D. First, a network communication layer should trigger a calibration pattern to be shown on each display. Second, the position of each display should be reconstructed from a series of images or a video, recorded with the same mobile device. The output should be a list of 3D coordinates, listing the location of the corner points for each display in the room. By doing so, you will provide developers with a solution for quick and reliable calibration of the cluster, ensuring that applications can produce coherent visuals within a few minutes after the cluster has been moved around!

Qualifications:
- Well accustomed with programming (C++, Java or C#, Matlab)
- Knowledge of basic network communication options (sockets)
- Experience with mobile devices (Android)
- Interested in visual computing and mobile development

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