USING AUGMENTED REALITY IN OUTDOOR ENVIRONMENTS – INDUSTRIAL USE CASES

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MARIN2 PROJECT

• Mobile Mixed Reality Applications for Professional Use
• 2014-2016, funded by TEKES, budget 2 million euros

Industry partners
Defour Oy
Destia Oy
Granlund Oy
Infrakit Oy
Integration House Oy
Meyer Turku Oy
Nextfour Group Oy
Lloyds’ Register EMEA Ltd.

Other partners
Building information Ltd /
BuildingBuildingSMART Finland
Machine Technology Center Turku Oy
Turku Science Park Oy
Augmented Reality in Large Scale Outdoor Environments
TARGET USE CASE

• Visualization tasks
  – To show buildings on construction site or even before the construction has started
  – To notice potential design issues early, already in the planning phase
MAIN CHALLENGES

• Sensor signals are inaccurate
  – Especially GPS & magnetometer of consumer level mobile devices

• Dynamic environments
  – Changing Illumination, moving objects, non-static landscape

• Application users are not IT professionals
Panorama Tracking
PANORAMA TRACKING

• A panorama image is used as a map to store detected features
  – Created in real time during the tracking process

• Tracks rotational movements only
PANORAMA TRACKING

• A sample panorama image (top)
  • The red rectangle shows the estimated camera location

• Current view from the camera (right)
EXAMPLE

Video
TRACKER INITIALIZATION

• Two of new methods are developed for the tracker initialization
  – One method that use two GPS locations, and another method that use GPS and magnetometer
    • GPS accuracy around 5m at best on regular mobile devices
    • GPS still more reliable than magnetometer, which is vulnerable to outside disturbances
SUMMARY OF RESULTS

• Surprisingly drift-free tracking
  – Preferably used on a tripod
• Relatively simple implementation and compact storage requirements
• Few cases when the tracker may fail:
  – Very rapid movements
  – Tracked features from moving objects
FUTURE WORK

• Control of camera automatic parameter adjustment
• Performance optimizations
• Improve content initialization accuracy
• Enhance rotation estimation around z-axis
QUESTIONS?