

Mobile 3D Functions

Web3D Standards Meeting

August 8, 2012

Myeong Won Lee

The University of Suwon

Mobile 3D Topics

- Polygon reduction for Mobile 3D
 - Progressive mesh generation based on display resolution
- GPS synchronization in an X3D real scene for a mobile display
 - A GPS located 3D scene
 - A GPS sensor for a mobile display
- Mobile AR
 - A GPS sensor and a GPS synchronized 3D world
 - A camera sensor
 - A sound sensor
 - 3D graphics

Polygon reduction for Mobile 3D

- Mobile 3D Functions (2011.8.11)
 - A progressive mesh supporting functions for Mobile 3D



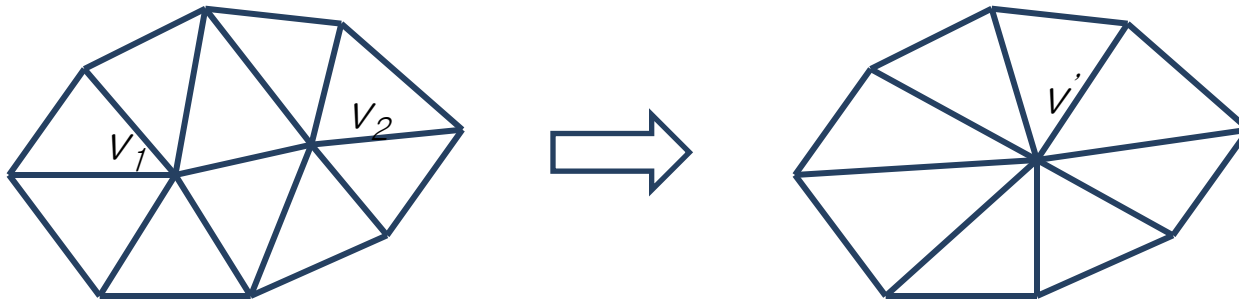
Polygon: 101432 → 17567



Polygon: 70000 → 50000 → 30000

Progressive Meshes

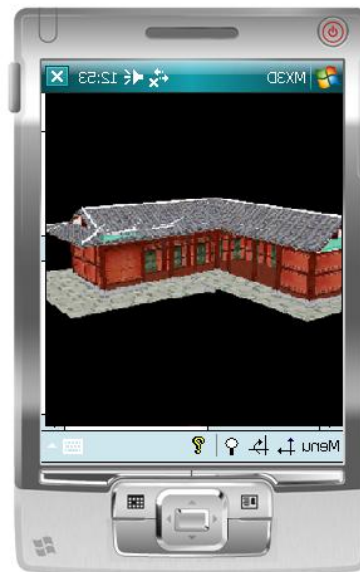
- Hugues Hoppe, SIGGRAPH 96
- Smooth geomorphing of level of detail approximations, progressive transmission, mesh compression, selective refinement
- Algorithm
 - Reduce the number of polygons and vertices
 - Transform and transfer the original data to a base mesh and refinements
 - Recover the original data from the base mesh and refinements



Progressive Meshes



Ant.x3d
Polygon: 2624
Vertex: 1374



Bong-Su-Dang.x3d
Polygon: 1080
Vertex: 1414



Face.x3d
Polygon: 9651
Vertex: 5000

Progressive Meshes on Windows Mobile



Polygon: 2624
Vertex: 1374



Polygon: 1250
Vertex: 687



Polygon: 574
Vertex: 343

Progressive Meshes on Android



원본 Vertex 1374

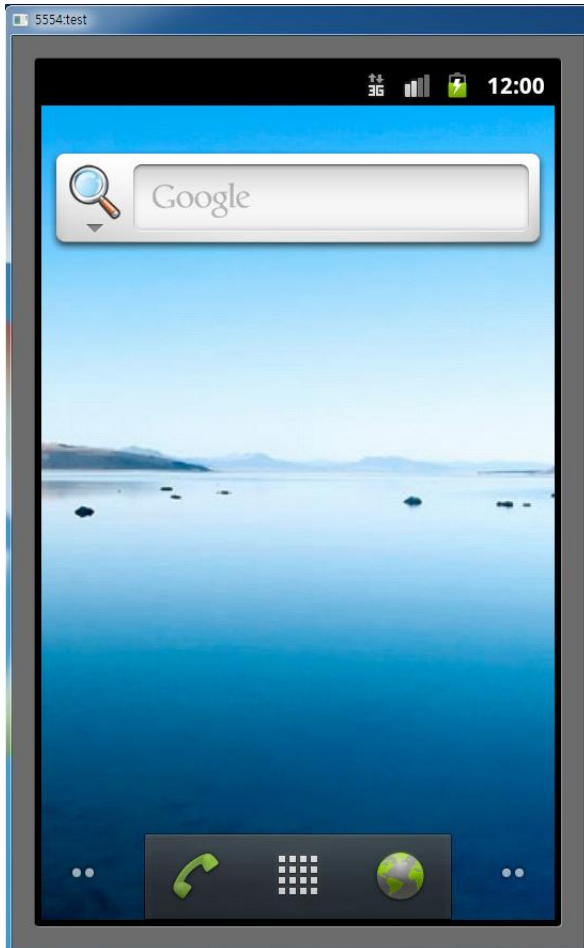


Vertex 687

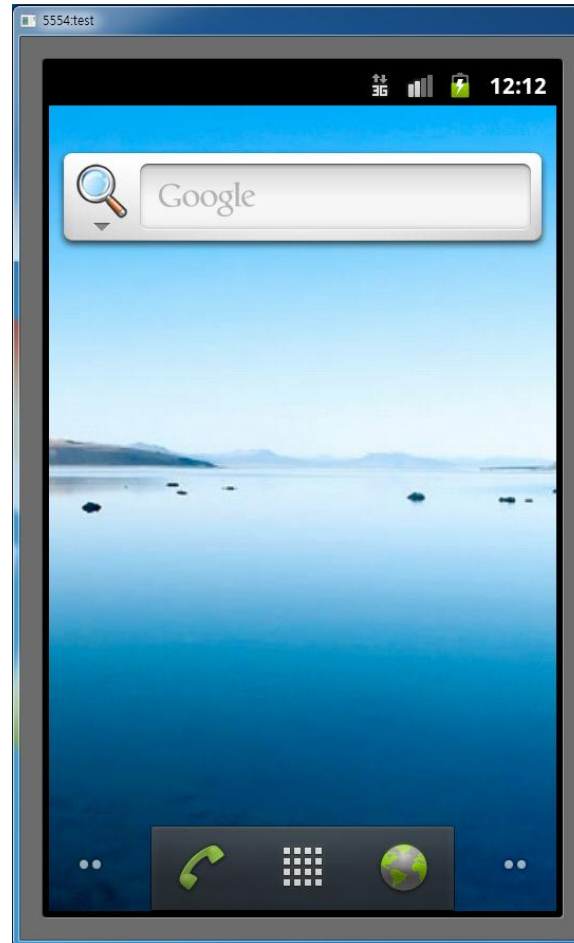


Vertex 343

Progressive Meshes on Android



Vertex 1374



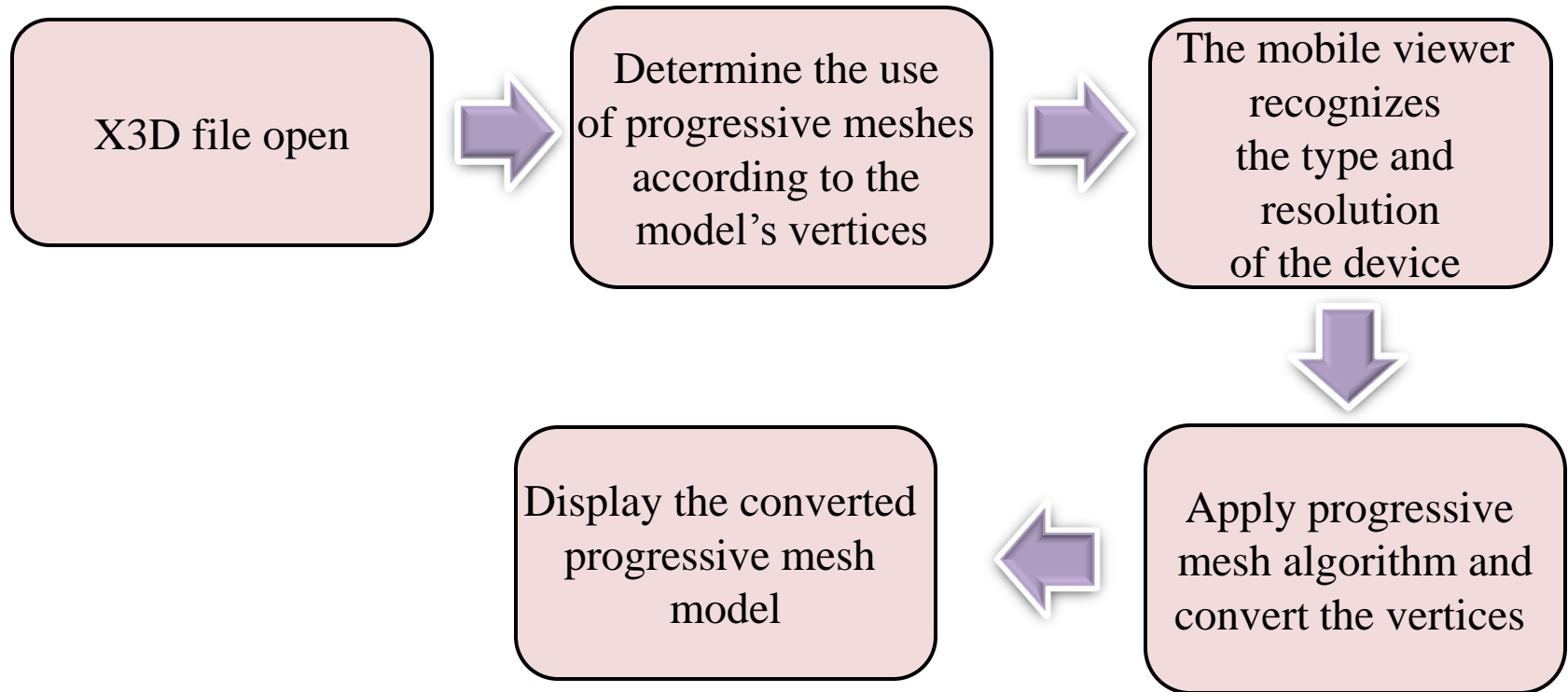
Vertex 687



Vertex 343

Progressive Mesh Mobile X3D Viewer

- Implementation procedure



Differences between original and progressive viewers

Original viewer

Open X3D file
Load Model
Display



Progressive mesh viewer

Open X3D file
Get device resolution
Check Pmesh property
Run_Pmesh
Load Model
Display

Attributes for progressive mesh are necessary so an X3D viewer can determine if progressive mesh should be implemented prior to rendering all polygons of a 3D scene

Definition of Progressive Mesh Property (1)

- PROFILE statement
 - PROFILE <name>
 - PROFILE <progressive> <max polygon no> <min polygon no>
 - <progressive>: a flag to use progressive algorithm for a device.
 - <max polygon no>: specifies maximum number of polygons. If not specified, the polygon number is determined automatically by the browser.
 - <min polygon no>: specifies minimum number of polygons. If not specified, the polygon number is determined automatically by the browser.

Definition of Progressive Mesh Property (2)

- META statement
 - META <key> <data>
 - META <progressive> <max polygon no> <min polygon no>
 - <progressive>: a flag to use progressive algorithm for a device
 - <max polygon no>: specifies maximum number of polygons. If not specified, the polygon number is determined automatically by the browser.
 - <min polygon no>: specifies minimum number of polygons. If not specified, the polygon number is determined automatically by the browser.

GPS Functions for Mobile 3D

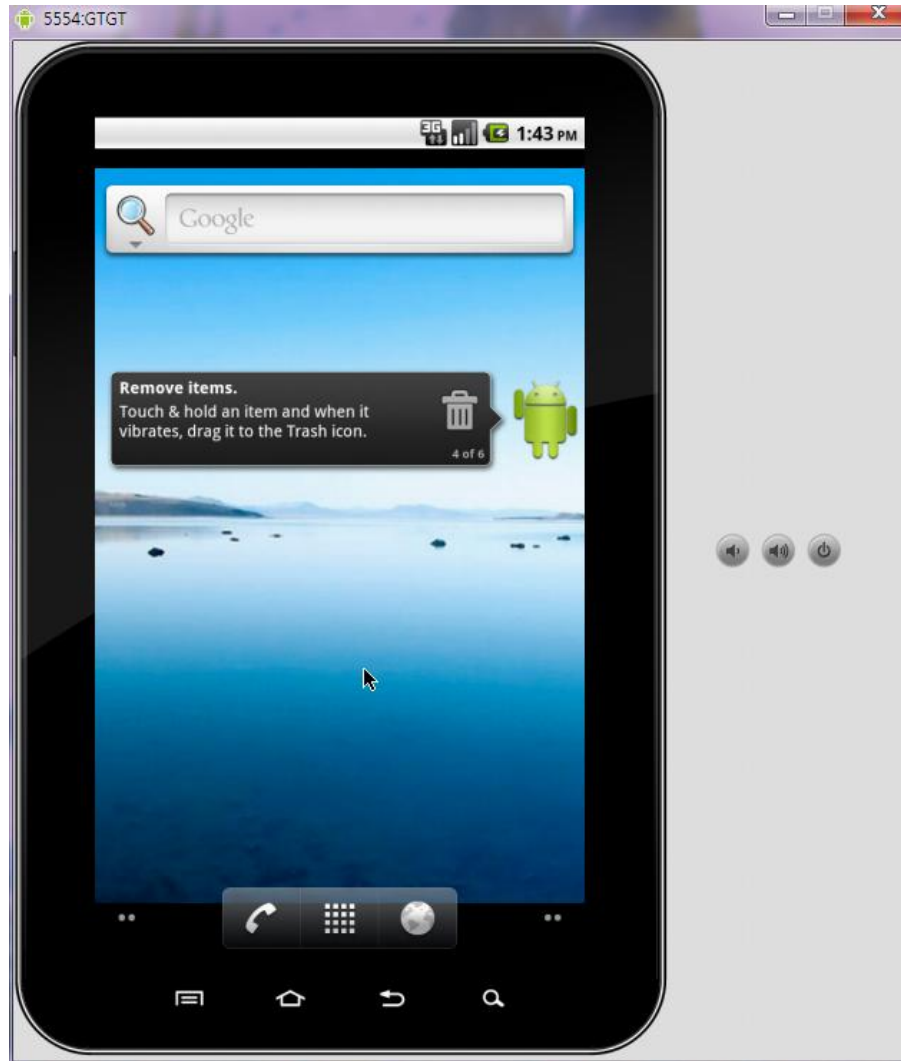
- Represent two kinds of GPS information
 - Spatial GPS synchronization between real and virtual worlds
 - 3D scene
 - Real world
 - Current GPS location of a mobile device
- GPS functions in 3D scenes
 - GPS synchronization for 3D scenes
 - GPS representation for a mobile device with/without an avatar



Mobile 3D AR Functions

- GPS functions
 - GPS synchronization with a 3D scene
 - GPS location of a mobile device
- Camera functions
 - Real camera position of a mobile device
 - Setting or synchronizing a camera window in a 3D scene
 - Displaying a camera image or video in a 3D scene
- Sound functions
 - Synchronizing sound in a 3D scene
 - Voice interaction in a 3D scene
- Graphics functions
 - Modeling, rendering, animation
 - Reading, writing, displaying 3D data
 - Interaction
 - Interface

Mobile X3D Viewer – Android (Video)



Conclusions

- Mobile 3D Data Representation and Exchange
 - Progressive meshes for Mobile 3D
 - Mobile 3D GPS functions
 - Mobile 3D AR functions
- Mobile 3D and X3D
 - GPS node
 - Progressive mesh property node
 - Physical camera node in a 3D scene
 - Physical sound node in a 3D scene (voice recording and synchronization)
- Proposal to be submitted to ISO/IEC JTC 1/SC 24 Mobile Graphics SG
 - Functionalities of Mobile 3D Representation and Exchange