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Modelling Stonehenge: an interdisciplinary digital approach to 3D interactive storytelling

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Abstract:

This presentation given at the The Theoretical Archaeology Group (TAG), 2010 conference at the University of Bristol, UK and discusses the advantages of an interdisciplinary Heritage, Art and Science approach to create virtual Stonehenge. The research draws together expertise from fields including 3D modelling, animation, digital video and music technology to visualise the changes on the site using digital archive data and 3D technologies specifically focused on creating a digital model of Stonehenge.

Point cloud data sourced from English Heritage National Monuments Record 2009
Categorizing the Stone scan files.

Testing conversion of stone scan files in different 3D software
Inverted image of 3D Point cloud scan data to provide detail
Converted 3D cloud data as a surface in 3D Scanning software.
Surfacing, rebuilding (filling) and merging scan data surfaces to prepare for import into 3D modeling.
3D Scanning software used for converting cloud data.

Rebuilding, filling and merging to generate a 3D surface to be imported into 3D modeling & animation software
STONEHENGE

Stonehenge Survey engraving c.1740  Source: English Heritage National Monument Record Archive 2009
MA 3D Digital Design course, Design Puzzle Project (See *).
Source: www.hud.ac.uk & www.huddersfield3d.co.uk

3D Modeling in Autodesk Maya. Laser cutter to hatch the map on the base and cut the placement holes for the stones

3D Modeling in Autodesk Maya. Laser cutter to hatch the map on base and cut the fittings for stones. Source: www.hud.ac.uk & www.huuddersfield3d.co.uk
Google Map measuring tools used to select area for LiDAR Data
Stonehenge LiDAR data: Source: Geomatics

Stonehenge LiDAR data, processed into a TIN and rendered using Demon software from Archaeoptics. Approximate resolution 1m. 8,000,000 individual triangles form the TIN.
Google Map Satellite data is used to visually evaluate and estimate the scale of the model and the location of each stone.
Untextured 3D CG model of Stonehenge phase 3c created by the Huddersfield 3D team
Initial renderings of 3D CG model of Stonehenge
3D CG model of Stonehenge with character test
http://www.youtube.com/watch?v=yqrQgcemWPV4&feature=fvw
Texturing process of 3D CG model of Stonehenge
Digital photographic images taken during site visit of stones selected & cropped for 3D texture mapping
Animations of Stonehenge phase 3c

http://www.youtube.com/watch?v=VvE8WUw6-VM
http://www.youtube.com/watch?v=uhFn2RT1WQI
http://www.youtube.com/watch?v=bYcTWCj3ECI
The advantages of the collaborative relationship between professionals from 3D Product, Textiles / Fashion and Music technology has enabled new discussion within a Archeological theoretical framework, proposing that an interdisciplinary approach to experimental multimedia archaeology is vital for cultural changes in Heritage visitor attractions in the 21st century.

The accuracy of the project has been achieved by using 3D scan surface data of each individual stone sourced from the English Heritage National Monuments Record Archive. The individual stone data were processed; surfaces merged, textured. In a 3D Animation software the sun system including shadows allowed the team to test solstice equinoxes and seasonal/environmental lighting conditions.

Pre-testing of acoustic actualisations, immersive interactive environments and high-resolution digital video exhibition experiences have been created.
Animations of Stonehenge phase 3c  visit YouTube:
http://www.youtube.com/watch?v=VvE8WUw6-VM
For further information work please see:

- Poster Paper
- 3D Acoustic Stonehenge Animation

Presented in TAG 2010 Conference in University of Bristol, UK.