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NBA 6120

DISRUPTIVE TECHNOLOGIES

Mobile Geometric Capture/IP, Privacy & Security Issues

Assignment #1

Assigned: September 15, 2014

Due: September 24, 2014

We are entering a new era where a plethora of novel geometry acquisition devices are rapidly becoming available. No longer does one have to go to a specialized facility to scan a specific object as mobile devices can easily achieve the same purpose. During the past few years, we have seen how Microsoft's Kinect or Leap Motion can use infrared cameras to capture gestures in real time using projected infrared patterns. Cheap laser scanning devices and time-of-flight imagers are also available but may be somewhat limited to static geometries such as buildings, statues or objects. Perhaps more importantly, based on computational photography, photographic methods can accurately capture geometric information and re-build accurate surface descriptions. There are many software offerings using a single camera taking pictures from multiple positions. Open source software can easily re-build complex geometries. We showed this in the laboratory with Autodesk's 123D Catch. Very recently, Dell started to offer an Android tablet with four cameras to provide this capability. Even without taking photographs, one can access images from the Web to recreate a point cloud from multiple images. Last, but of course not least, is the fact that new devices such as the Lytro camera can capture depth information in the form of a light field.

In one sense, all of this is rather scary. One can capture facial images unobtrusively without a person's consent.

Although there are many opportunities which will be made available by this impressive technology it also carries some potential dangers. There are no precise rules or regulations yet which clearly raise ownership issues and the specter of privacy versus security. Does the government have the right to obtain this data? Who owns the data? Can this be used for surveillance when the data was acquired without your permission? Is this a violation of the Fourth Amendment? As of now, many of these questions are not answered.

This homework assignment deals with these sets of problems and is subdivided into three parts.

1. Describe in detail a potential application which uses captured geometric information and could be developed into a start-up opportunity. (2 pages)
2. Describe the technology which you would use to acquire the geometry. In this same section, describe where the information will be stored, either locally or in the Cloud and how your end product will be delivered. This either could be in digital form on the Internet or as a physical product. (2 pages)
3. Describe how you will protect the intellectual property and privacy of the individual, the novelty of the design, or the details of the personal property.
 - A. Do you own the data of yourself, even if it was captured in a public setting? A picture taken by a photographer in a public setting can be used by media or for non-commercial (e.g., advertising purposes). Does this cover the geometry of a design or a face? Can a 3D model be printed and sold without your permission? Who owns the intellectual property?
 - B. An important part of this section is to document the policies which you will adopt with respect to maintaining the privacy of your client(s). How will you respond to Federal government's requests for this information? (Note that, to my knowledge, these issues have not yet been resolved in any existing regulations as contrasted to the recording of telephone conversations or the FISA court). Lastly, please comment on what you believe should be the responsibility of your company or Cloud provider or your Internet distribution channels. Who should be liable if that information is made available?

In addition to the two, single-spaced typewritten pages for each of the three sections, please provide two PowerPoint slides (electronically) to demonstrate your application. Please note that this is much more of a creative project (your application) and a discussion to determine the appropriate legislative solutions than a demonstration of your technical expertise.