3D full body scanning systems evaluation

September 15, 2015

Full body scanning for apparel sizing

NIFT is interested in purchasing a depth sensor based 3D scanner system for full body scanning, for experimenting and studying its use for anthropometry for apparel design, that is full body-measurements. As appropriate Indian anthropometric reference population data is not readily available for apparel sizing, the utility of depth sensor based scanning systems will be evaluated through an internally funded NIFT project that will attempt to evaluate the efficacy of acquiring empirical size data, from automated scanning and post-processing, and compare the overheads against manual processes, in terms of throughput, accuracy and other relevant criteria.

This effort is being undertaken with the knowledge that such systems perform non-contact measurements, to some specified approximation, and will scan clothes as surfaces, and that clothing will occlude actual body surfaces. It remains to be seen how useful such scans and any post-processing may be for apparel sizing, by a prototypical end-user, a technically savvy postgraduate student of fashion technology at NIFT.

For the purpose of evaluating available 3D body scanning systems, including self-contained subsystems, NIFT is interested in comparing the differences between the available off-the-shelf and custom designed scanners and post-scan processing software, for use by trained fashion designers, from amongst non-exhaustive differentiating criteria including,

1. ease of installation and configuration, including level of integration out-of-the-box,
2. learning curve, and complexity in use, for a fashion designer, in acquiring and processing 3D full body scans
3. ease of extracting relevant apparel sizing data from the scans, against specified tolerances and the implication of the errors on sizing for apparel
4. ease of use for designing clothes following manual drafting, draping and technical drawings based on the scans and derived measurements
   (a) ease of use of proposed or implied workflow
   (b) ease of manipulating 3D data

(c) ease of moving from 3D measurement data to relevant 2D measurements, for sizing sloper patterns or block patterns, or more complex and sophisticated 2D patterns, including software support

(d) 2D and 3D visualisation and manipulation capability

(e) level of integration with compatible, proprietary, and open Computer Aided Manufacturing (CAM) systems, including CNC cutting systems, in addition to manual processes for cutting and sizing, for one-off experimental designs

5. environment control requirements, of any booth, and restrictions imposed by the type of sensor

6. open-systems compatibility, including ability to import and export data in open formats, and post-process using third-party software used in current workflows by designers, if any

7. learning curves associated with any necessary software

8. ability to use multiple depth sensors, and software and hardware upgrades to support simultaneous capture

9. impact of any required motion of sensors, on reliability, repeatability, time to capture and comparison against simultaneous capture

10. impact of and ability to use a turntable, to move the subject, and comparrison against simultaneous capture, including tolerances in measured data

11. technical comparison of depth sensor capability against the Kinect v2, and implications on accuracy of capture

12. minimum and recommended workstation specifications,

(a) minimum and recommended processor and class, matching motherboard, RAM

(b) Operating System and required software configuration and licenses

(c) hardware keys or mechanism for license management for a technical educational fashion institute

(d) number of simultaneous sensors supported

(e) USB specifications, any proprietary cards and interfaces, network card

(f) minimum drive speed, utilisation and capacities, HDD or SSD

(g) professional monitor

(h) recommended haptic device

(i) printer, wide format, cutter-plotter, CAM interface

13. upgrade path for software and hardware, and level of integration and modular self-containment

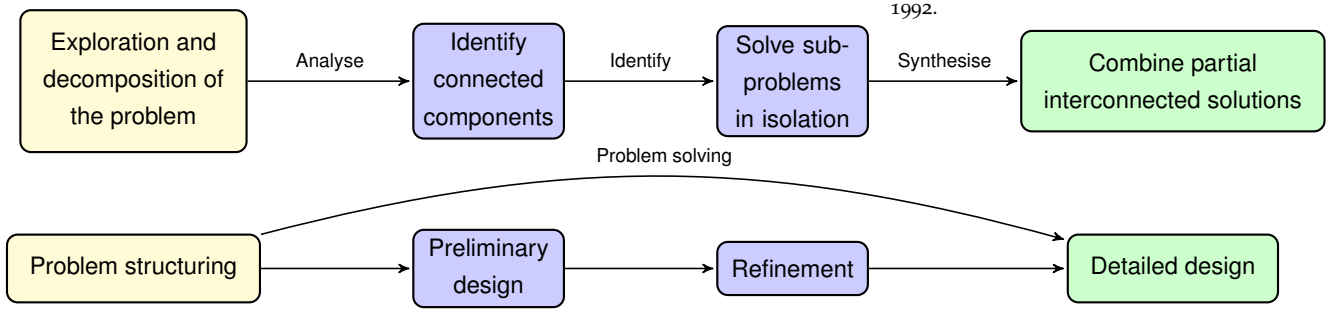
Evaluation of system design

NIFT intends to use the following high-level framework, the first flowchart, for evaluating the system design. Vendors are requested to demonstrate how individual modular self-contained sub-systems, address critical stages of the fashion design workflow for a fashion designer, and when connected, allow the fashion design educated end-user to design clothing.

Vendors are also requested to demonstrate their ability to customise offerings, against fashion designer specified workflow requirements, along the lines of the second flowchart.

Design problem spaces[1]

[1] Vinod Goel and Peter Pirolli. The Structure of Design Problem Spaces. Cognitive Science 16, pages 395–429, 1992.



Evaluation of proposed workflow

NIFT is proposing to use the following reference design-thinking workflow to evaluate the user experience of fashion designers using any proposed vendor system.

1. **Inspiration** Catalysing creativity[2]
2. **Rework**. Make tools, materials, textiles, draft
3. **Ideas**
4. **Art** Influence, draw on experience and culture, dissent
5. **Planning and execution** Putting it together

[2] Inspired by Jay Calderin. Fashion Design Essentials. Rockport Publishers, 2011.