UNIVERSITY OF TECHNOLOGY SYDNEY

Faculty of Engineering and Information Technology

Human Body 3D Scanner (Virtual me)

Esteban Andrade

12824583

Supervisor: Dr Teresa Vidal Calleja

October 13, 2020

Contents

Engineering Reseach Problem

1.1   Reseach Question

"Human Body 3D Scanner: The development of software for 3D data reconstruction of a Human body scanner with multiple sensors "

1.2   Project Contextualization

The project is based on creating a Human Body 3D scanner. It will have two specific streams that include the development of the mechatronic design of a 3D scanner for a human and the software development for 3D data reconstruction. This proposal is based on developing the software for 3D data modelling and reconstruction of the Scanned data.

Similarly, with the 3D reconstructed model of the human has the aim to be utilised to test different fashion clothing items. This has the intent to adjust the sizing of the clothes fittings based on the Scanned data. The clothing models will adjust automatically depending on the dimensions of the data of the scanned model.

1.3   Problem Definition

Being able to obtain data from multiple sensors and model objects has is very crucial for many industries. Nevertheless, there is a lack of precise and accurate options in the market that could create 3D models of Humans with respective sensor data. Similarly there are no current industry application that maximise the potential use of the Human body 3D models. Therefore, this project is aimed at creating a solution and develop the software for 3D data reconstruction of the scanned human. This model will be utilised to try different fashion items and adapt the size fittings accordingly.

The project will have different stages that range from testing different sensors for data acquision,

testing different data stitching frameworks to the deployment of the software in the 3D scanner mechatronic device.

1.4   Background

The human society has the world comprenhension of the surrouding world through visual perception. This principle allows to differenciate distintive kinds of shapes, objects,colours, textures and the spatial pose of the surroudings. Based on this information, it is possible to analyse the number of objects in a determined location, object type, object size, object pose in different coordinate frames. Thus, it impacts how as a society we interactuate with objects ot scenes. As a result it is essential to imitate this perception in order to acquire real world data in different formats that include:

- RGB images

- Depth images

- 3D point clouds

- Multispectral images

- Laser readings

All these acquire data can be obtained from a wide variety of comercial or industrial sensors. With this data it will be possible to use computer processing techniques in order to model the object or scene (Murcia, Monroy & Mora 2018).

()

Bibliography

Daanen, H. A. & Psikuta, A. (2018), '3d body scanning', *Automation in Garment Manufacturing* pp. 237–252.

Fang, Z., Zhao, S., Wen, S. & Zhang, Y. (2018), 'A real-time 3d perception and reconstruction system based on a 2d laser scanner', *Journal of Sensors* **2018**, 1–14.

Gao, W. & Tedrake, R. (2019), 'Surfelwarp: Efficient non-volumetric single view dynamic reconstruction', *CoRR* **abs/1904.13073**.
URL: *http://arxiv.org/abs/1904.13073*

Gonzalez-Rodriguez, A. (2020), 'Growing pains of ill-sized clothing for both consumers and brands'.
URL: *https://fashionunited.uk/news/business/the-growing-pain-of-ill-sized-clothes-for-both-consumers-and-brands/2020010146825*

Magnenat-Thalmann, N., Seo, H. & Cordier, F. (2004), 'Automatic modeling of virtual humans and body clothing', *Journal of Computer Science and Technology* **19**(5), 575–584.

Murcia, H., Monroy, M. F. & Mora, L. F. (2018), *3D Scene Reconstruction Based on a 2D Moving LiDAR*.

Newcombe, R. A., Fox, D. & Seitz, S. M. (2015), 'Dynamicfusion: Reconstruction and tracking of non-rigid scenes in real-time', *2015 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)* .

Slavcheva, M., Baust, M. & Ilic, S. (2018), 'Sobolevfusion: 3d reconstruction of scenes undergoing free non-rigid motion', *2018 IEEE/CVF Conference on Computer Vision and Pattern Recognition* .

Spahiu, T., Shehi, E. & Piperi, E. (2014), *Extracting body dimensions from 3D body scanning.*

Sturm, J., Bylow, E., Kahl, F. & Cremers, D. (2013), 'Copyme3d: Scanning and printing persons in 3d', *Lecture Notes in Computer Science* pp. 405–414.

Treleaven, P. & Wells, J. (2007), '3d body scanning and healthcare applications', *Computer* **40**(7), 28–34.