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IEEE Industry Connections (IEEE-IC) 3D Body Processing (3DBP) Initiative– An Introduction

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Abstract

The background, goals, and status for the IEEE 3D body processing (3DBP) initiative are introduced in this white paper. This initiative was launched in the first quarter of 2016 with an initial focus on exploring technology standardization opportunities for hardware and software technologies across the "3D body processing" pipeline; i.e., from scanning of people and creating body model data to simulating, modeling, analytics, and visualization. A Virtual Fit use case and relevant 3DBP attributes are examined as an example of a 3D body processing use case. File formats, metadata, and communication protocols are discussed and initial guidance is proposed for evaluating and selecting among existing formats and protocols. While the white paper utilizes examples from an apparel/retail context, it is important to note that the direction taken by the 3DBP initiative is applicable to use cases in other industries such as health, wellness, fitness and athletics as well as complementary to adjacent technology ecosystems such as IOT, 5G, AI, fog, and cloud computing.

1. Introduction

For the past two decades, 3D scanning and modeling of the human body or body parts have been applied in various applications and industries. Today, we believe that 3D body-model processing hardware and software technologies are at an inflection point; i.e., the potential for mass adoption in industries such as apparel design, manufacturing, and retail are conditioned on not just total cost of ownership but on scalability, interoperability, and quality of experience as well.

Initially, creating a 3D body model mandated the use of relatively expensive and large full-body scanners. Advances made in the past few years in depth sensing technologies have made it possible to create 3D scanners models on PCs, tablets, and smart-phones at 100–250 times lower the cost. As such, a good number of start-ups, as well as established companies, are investing efforts in generating solutions that will allow people to create 3D body models of themselves at a fraction of the previous price and from the comfort of their homes. Scanning booths at points of sale are another option for model creation—an option that is being pursued by many companies.

Two important implications from the above trends are as follows:

- As the number of players increases, each often creating different types of 3D body-model data, so then does the risk of fragmentation and incompatibility across offerings.
- As incompatibility and fragmentation increases, the more challenging it will be for consumer-facing players (such as retailers) to scale solutions that deliver on intended quality of experiences.

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Companies are already working on applications that will take advantage of the availability of 3D body models to provide previously infeasible benefits to customers. Specifically, this is taking place in the online apparel market.

While the online sale of clothing is increasing year after year at a faster rate than the overall increase in market size (17.5% vs 6% [1]), it is still only a fraction of the overall apparel world market (5% in 2015 [1]). One of the main roadblocks to increase online sales is the fact that people find it hard to figure out whether a clothing item they see online will satisfy them, both in terms of correct size and in terms of fit ("how would I look in this garment?").

As a result of the inability to sufficiently predict the fit, online sales businesses experience the following consumer behaviors that impact their bottom line:

- Large percentage of returns (25−50% [2], [3], [4])
- Customers ordering a number of items, in cadenced sizes, with the implicit intent to keep only one of them

For example, a 2015 study by IHL indicates a loss of approximately $62B to retailers from "buying the wrong size"[6]. Additional examples of these consumer behaviors can be found in [5] and [7].

Since the overall apparel market value is estimated at $1.5 trillion a year [1], it is clear that any change that brings even a small increase in online sales or a small decrease in returns will have a large, positive impact for the involved businesses.

The industry is looking at Virtual Fitting (VF) to increase online sales and unlock a set of business models, related to mass customization and made-to-order production. VF means that a person can select a garment in an online shop and get an on-screen, photo-realistic view of how the garment would fit him/her. The VF software must have access to a 3D body model of the online shopper for a high-quality VF experience. It must have access to digitized data of the garment. It can then drape the selected garment over the 3D model to create the VF experience.

Online solutions for size-estimation and size-recommendation software exist today. Some are linked with online sales sites. Some offer a level of fit estimation. While a step in the right direction, these implementations do not yet offer a full VF experience.

Making use of these models by multiple virtual fit experience providers calls for some standardization in the way the models are stored and shared.

Moreover, each of these implementations is a fully proprietary solution. They are based on large databases of clothing size, pattern, and fabric attributes information. They either get access to manufacturer's digitized clothes data or create it themselves. This work in "silos" limits the expansion of this section of the industry. Only a small number of applications make use of 3D body models; when they do, the application flow includes model capturing and generation, making it even more proprietary.

With more people getting access to 3D body-model generation equipment, we foresee an increase in the availability of these models. However, making use of these models by multiple virtual fit experience providers calls for some standardization in the way the models are stored and shared. Such standardization will improve the ability of different software vendors to

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