

CADANS Seminar

Advanced digital technologies for the improvement and customization of wearable products

June 2nd 2015



Organizers
Product Development
iMinds-Vision Lab
Kinesiology

CADANS is a TETRA project of IWT in cooperation with Flanders Inshape

 University
of Antwerp

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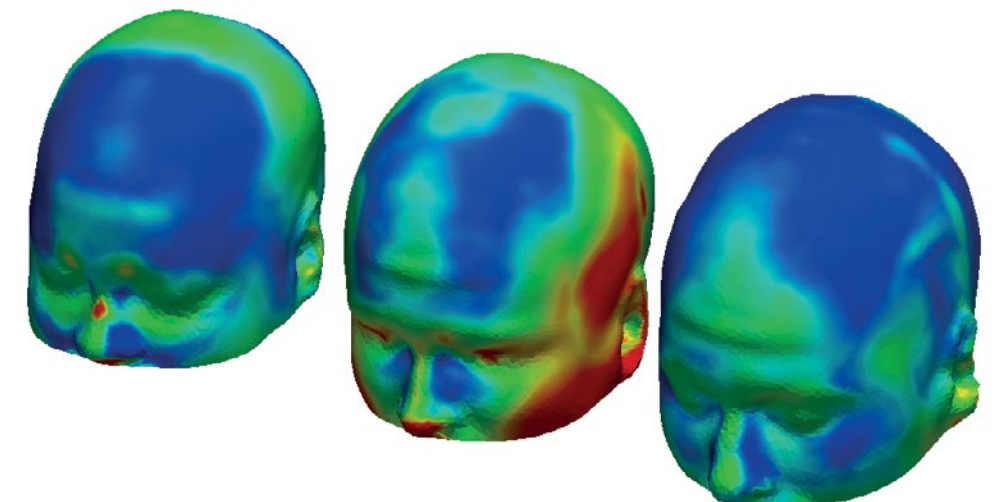
Advanced digital technologies for the improvement and customization of wearable products

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Topic

The design of products that closely interact with the human body, such as furniture, clothing, orthotics, and protective gear, requires a thorough understanding of the variation in human anatomy. Anthropometry – measurement of man – is an important tool in the design process to ensure safe, comfortable, and functional products. Emerging technologies to digitally capture human body data, e.g. via 3D scanning, offer far richer data compared to the traditional tape measure and open up opportunities in adding unique value through comfort improvement or personalisation. The application of these new technologies is, however, still perceived as challenging. This seminar provides an in-depth look in state-of-the-art 3D anthropometry in industry and academics with real-world cases. All SMEs, large companies, and academic researchers are cordially invited to join us in making this an inspiring one-day seminar.

*The morning session focuses on **industrial applications** and the afternoon session focuses on **recent advancements in related scientific research**.*



Registration

Registration fee: € 75 per attendee

Online registration :
<http://cadans.uantwerpen.be/?q=cadans-seminar-2015>

Subscription before: May 31th 2015

Organizers

Product Development
iMinds-Vision Lab
Kinesiology

Location

University of Antwerp
Division of product development
Ambtmanstraat 1, 2000 Antwerp

Schedule

08:30

Registration & coffee @ central hall

09:00

Welcome & introduction

Toon Huysmans – Post-doc researcher at iMinds Vision Lab
& copromotor CADANS project University of Antwerp

09:15

Keynote Exploitation of 3D based resources

Alfredo Ballester – IBV-Biomechanics institute of Valencia (ES)

IBV is a technological centre that studies the behaviour of the human body and its interaction with products, environments and services. The speaker presents a completed representative national database of true 3D body shapes (ES; including man, women and children) and state-of-the-art data for Europe (Eurofit project). Further a tool to apply these data is presented (Hypercliq service within EUROFIT). Applications for proper fit and functioning are discussed (Iturri), as well as application in orthopaedics (Össur knee bracing). Closing topic is the advancements on human motion and shape generator (EASY project).

10:15

Coffee break

10:35

Bivolino's patented biometric sizing technology

Gaby Ratajczak - Bivolino (BE)

Bivolino.com (BE) is an EU cross-border operating (b2c) e-shop for made to measure shirts for men & women. Bivolino.com controls the entire digital supply-chain with integrated manufacturing plants. The patented biometric sizing technology is presented, that makes it possible to obtain a good fit without the use of the measurement tape. Bivolino collaborates with major EU department stores like De Bijenkorf, 3Suisses, Tchibo, El Corte Ingles, Neckermann, Amazon, High&Mighty and Debenhams. Finally it is presented how through BivolinoServices (a collaborative platform for e-custom fit apparel), its 3D visualization and biometric sizing technology is licensed to e-tailers: WE-fashion, Marks and Spencer, Baur (Otto-group)

11:05

Customization and fitting and how it affects the production process

Tom Peeters - Marketing Specialist-RS Print (BE)

By combining expertise in 3D Printing and design automation with RScan's leading dynamic measurement footscan solutions, RSPrint will create the world's first dynamic 3D printed insoles, customized to support the every move of an individual. In that context, the speaker will address the following questions:

- What is the added value of additive manufacturing for mass production?
- What is the role of expert knowledge and 'classic' expert knowledge in a 3D-printing environment?
- What are threats & opportunities for existing industries and threats & opportunities for additive manufacturing?

11:35

CADANS methodology & closing remarks

Jochen Vleugels & Toon Huysmans - CADANS University of Antwerp (BE)

In this project, state-of-the-art processing techniques are employed to structure 3D-scan databases into 3D statistical anthropometric models that provide a concise parameterization of the 3D human body shape with anthropometric parameters. These models are then made available to the product developer: online and as a plugin in standard CAD-software.

The online tool provides an easy way to generate human head shapes best fitting according to given measurements. Then products can be made that fit these models accordingly, multiple models can be made e.g. to analyze the shape differences in varying head sizes.

The CAD plugin provides the similar functionality but integrated in a Solid-Works environment. This means that products can be designed directly on 3D body shapes and that there is a dynamic link between the drawing and the body shape. This allows one to easily adapt the CAD drawing for new body shapes, e.g. obtained from personal measurements. Generation of shapes and sizing systems could become a valuable tool to design better fitting and mass-customized products.

12:00 - 13:00

Network lunch

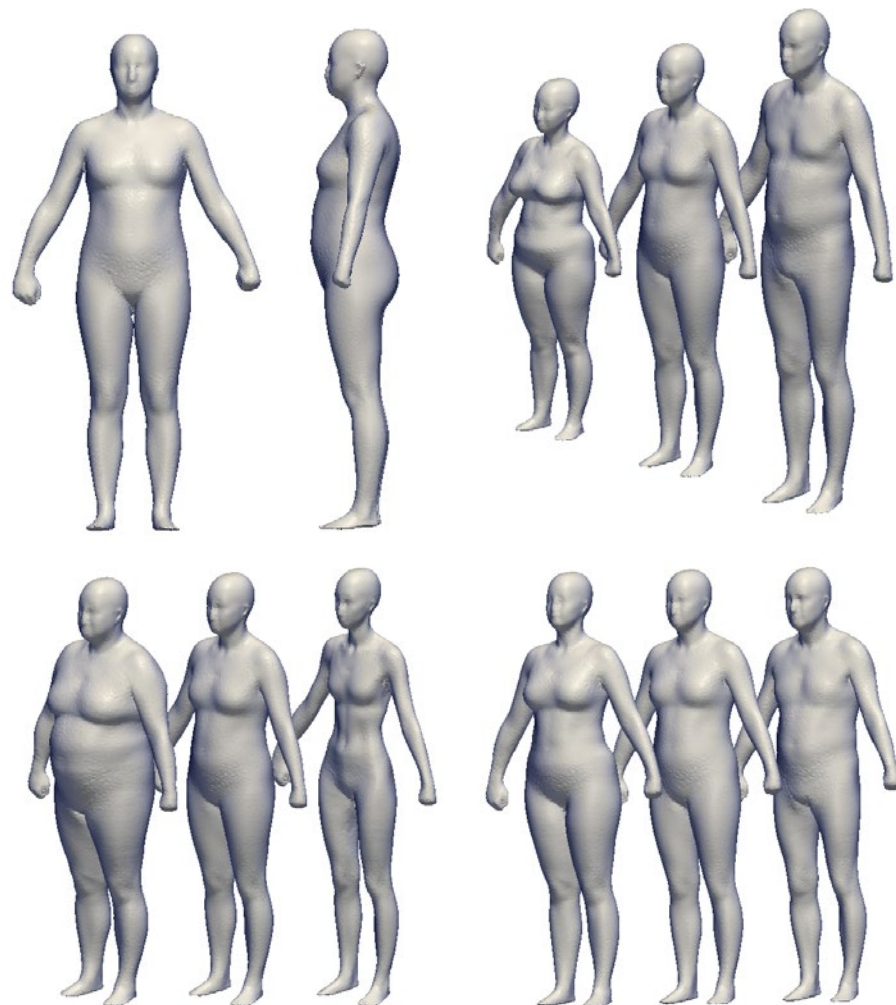
Schedule

between 12:00-16:00
during lunch and
coffee breaks

Demo: Cadans Web-based tool and SolidWorks Plugin

Jochen Vleugels and Rob Linders – University of Antwerp (BE)

In the demonstration of the CADANS plugin we will show what we are capable of as of so far with a simple product example and show our step by step method of helping designers and developers throughout the process.
-What are threats & opportunities for existing industries and threats & opportunities for additive manufacturing?



Schedule

13:00

Deriving design specifications from shape models

Daniel Lacko - doctoral student University of Antwerp and KULeuven, multi-disciplinary project Product development, physics and Neurophysiology- (BE)

CAD-related conferences and journals are featuring more and more papers about shape models and 3D anthropometry. However, it is still unclear how these models should be used for ergonomic design. Designers need to be able not only to predict or adapt surface representations of the body, but also to extract useful specifications out of the models. In this presentation, it is shown how a shape model of the human scalp can be used to create both a one-size-fits-all brain-computer interface headset and a new sizing system for bicycle helmets. Both methods have been tested through proof-of-concept prototypes. Experiments have shown that both products fit their target population better than their traditionally designed counterparts. After this talk, you will be ready to start implementing 3D anthropometry in your own design process and enjoy the many benefits it offers complementary to traditional design.

13:30

From motion to M2OCEAN: Motion capturing and motor control

Ann Halleman – assistant professor University of Antwerp & project coordinator of M2OCEAN (BE)

In order to get a full image of the progress and control of movements, kinematic data obtained from optometric and/or electromagnetic movement registration have to be combined with force measurements, electromyography and the registration of foot pressure, possibly also with high-speed detail kinematics.. M2OCEAN is a fully equipped state-of-the-art research center enabling competition with the best in the field. In M2OCEAN research is performed in humans, from children to elderly, in physiological, pathological and specific conditions. Major topics of interest are balance and postural control locomotion and sensori-motor control of voluntary movements. During this talk the research infrastructure, possibilities and example projects will be discussed, which could complement the development of statistical shape models.

14:00 Smartfit measurement campaign 2012 – 2013: results and implementation
Joris Cools – research fellow smartfit project HoGent (BE)

With the financial support of the Agency for Innovation through Science and Technology (IWT), over the last two years University College Ghent carried out a measurement campaign for a systematic mapping of Flemish human body measures. The measurements and body shapes of the Belgian population were mapped using high-tech 3D body scanners. The results of this campaign led to defining four new body measurement tables for women in four age categories and six new body measurement tables for men in three age categories.

14:30 Coffee break

15:00 Thermal comfort and fit

Guido De Bruyne – associate professor ergonomics, University of Antwerp (BE)

In this talk a first link between statistical models and physical properties is exploited that might serve as an onset to build enriched statistical models. The presented research is confined to modeling and verification of thermal comfort and might lead to predictions of local thermal discomfort and a design methodology to optimize thermal comfort.

15:30 Human Body Modeling

Femke Danckaers – doctoral fellow iMinds Vision Lab (BE)

The human body appears in many shapes and sizes. For ergonomic products, it is important that they have an accurate fit to ensure an optimal comfort. Traditional product development techniques are based on 1D measurements of the body. By building a 3D statistical shape model of the body, representing mean shape and the variability inside the population, there is a realm of information available to improve the process of new product development. Such a shape model is build by constructing meaningful correspondences between the surfaces and applying principal component analysis (PCA) on the collection of corresponded surfaces, to generate a representative model for the population. The shape model will be implemented in a CAD environment as a virtual mannequin, so it can be used to validate and optimize designs. The virtual mannequin will be fully adjustable, both in pose and in body shape. This will lead to more ergonomic products and a reduction of the design time.

16:00 Closing remarks

Stijn Verwulgen – professor University of Antwerp (BE)



**For more information,
feel free to contact**

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IWT TETRA Project CADANS 2014-2016

A CAD Platform for 3D Statistic-Anthropometric Design

Design of Wearable Products

The human body is a complex shape with many variations of which a thorough understanding is needed in order to design wearable products like protective gear, head-sets, sports clothing, and orthotics, that are both functional and ergonomic. Current design approaches, relying only on 1D anthropometry and unrealistic, linearly scaled ISO-mannequins, require many prototyping and testing iterations. With the uprising of 3D scanning technology, however, an enormous amount of 3D data becomes available for the product developer. Unfortunately, it is not yet clear how this wealth of information can be leveraged for improving their products. CADANS will solve this.

CADANS Technology & Innovation

In this project, state-of-the-art processing techniques are employed to structure 3D-scan databases into 3D statistical anthropometric models that provide a concise parameterization of the 3D human body shape with anthropometric parameters. These models are then made available to the product developer in standard CAD-software where they can be used for:

- quantitative and qualitative exploration of 3D shape and size variation within a target population;
- devising product and target-group specific sizing systems, e.g. one-size-fits-all or N-sizes-fit-all;
- dynamic linking of CAD designs to 3D shape models for easy mass-customization of the product.

What is IWT TETRA?

A TETRA-project is focused at translating scientific knowledge to the everyday practice of Flemish enterprises and thereby increasing innovation potential to ensure that they can develop new products, services or processes faster. The project is executed by a consortium of academic research groups and funded by IWT (92.5%). Companies that can benefit from the project results are invited to join the user committee and to actively support the project (7.5%). As a user committee member you are granted exclusive access to all results during the project and you have the opportunity to steer the project, provide use-cases to optimize your products or workflow, participate in project meetings, etc. For more information contact us.

