

Toon Van den Zegel

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Web: <http://tvdz.be>

Nationality: Belgian

Profile

Computer Vision Engineer specialized in time-of-flight depth cameras with Machine Learning, Game Physics and Computer Graphics expertise.

Employment History

Computer Vision Engineer

Sony Depthsensing Solutions, Brussels, Belgium

August 2012 – Present

- Sony Aibo (<https://aibo.sony.jp/en/>)
 - o Designed and implemented algorithms to improve time-of-flight depth camera image quality for small obstacle detection. Developed the library for small obstacle detection for the Sony robotic pet, Aibo.
- Hand tracking in Virtual Reality with time-of-flight depth cameras. (<https://www.youtube.com/watch?v=R53IEQq02wg>)
 - o Contributed to the hand detection, interaction and tracking algorithms.
- Close Interaction Library (DepthSense CILib) (<https://www.sony-depthsensing.com/DepthSense/DepthSenseMiddleware>)
 - o Hand tracking and gesture recognition library with close range depth cameras, licensed to Intel and embedded in the first version of their Perceptual Computing SDK. Since renamed to Intel RealSense SDK. CILib is now a product on its own.
 - o Fine-tuned and improved the close interaction library algorithms to reach customer acceptance criteria.
 - o Designed and implemented gesture detection, hand tracking and pose estimation with random forests classifiers and regressors.
- Human Tracking Library (DepthSense HTLib) (<https://www.sony-depthsensing.com/DepthSense/DepthSenseMiddleware>)
 - o Full human body skeleton tracking with long range depth cameras, embedded into Sony Playstation 4 SDK and powering, among other titles, Ubisoft Just Dance 2014 and 2015 on PS4.
 - o Responsible for improving the skeleton expectation-maximization framework.
- 3D Reconstruction for an eyewear company:
 - o A main contributor for the development of a 3D reconstruction application. Techniques such as dense visual odometry, sparse icp, color marker detection, marching cubes and truncated signed distance fields were used.
- Design of algorithms to improve time-of-flight depth camera image quality.
- Developed several 3D Computer Vision prototypes such as surface interaction.

Software Developer

ArKaos S.A., Brussels, Belgium

March 2010 – August 2012

- MediaMaster & GrandVJ
 - o Professional real-time video mixing software: C++, Direct3D 9 (Windows), OpenGL (Mac OSX), wxWidgets
 - o Designed and developed the cross-platform graphics engine for MediaMaster, Video Mapper and Grand VJ: C++, Direct3D 9 Ex (Windows), OpenGL (Windows & Mac OSX), Qt.
 - o Used for concerts, festivals, clubs, tv shows, ... such as The Voice Belgium, Big Brother Australia 2015, Australia's Got Talent 2011, DJ Tiesto - The Kaleidoscope World Tour, ...
More showcases at <https://www.arkaos.net/> or <https://www.facebook.com/arkaos>.
- Costumer Support

Portfolio

- Implementation of "Barron, Jonathan T., et al. "Fast bilateral-space stereo for synthetic defocus." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2015." (<http://tvdz.be/2017/03/fast-bilateral-space-stereo/>)
- Implementation of "Böhme, Martin, et al. "Shading constraint improves accuracy of time-of-flight measurements." *Computer vision and image understanding* 114.12 (2010): 1329-1335." (<http://tvdz.be/2015/06/improving-tof-with-shading/>)

More projects: <http://tvdz.be> or <https://github.com/tvandenzegel>

Education

Master of Artificial Intelligence (Cum Laude)

2008 – 2009

University of Leuven, Belgium

Master in Industrial Sciences: Electronics – ICT (Magna Cum Laude)

2003 – 2008

Thomas More, Belgium

Theses

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|----------------------|---|------|
| Master Thesis | Master of Artificial Intelligence | 2009 |
| | Phoneme Recognition with Kernel-Based Classifiers: Towards an Automatic Speech Recognition System. | |
| Master Thesis | Master in Industrial Sciences – ICT | 2008 |
| | Development of an industrial image analysis program in Visual C++ 2005 for 2D SSRM measurements.
<i>Received NV Philips Innovative Applications 2008 award</i> | |

Technical Skills

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|--------------------------------|---|
| Machine Learning: | Deep Neural Networks, Random Forests Classification and Regression, Gradient Boosting, SVM, Kernel Logistic Classifiers |
| Image Processing: | Anisotropic Diffusion, Domain Transform, Bilateral Grid/Permutohedral Lattice, Non-Local Means, Guided Filter, Depth Upsampling Techniques (Fast Bilateral Solver, JBU, NAFDU, ...), Shape from Shading |
| Simulation: | Rigid Body Dynamics, Inverse Kinematics, Verlet Integration, Sequential Impulse Solver |
| Graphics Programming: | OpenGL Core, Direct3D 11, Deferred Rendering, Real-Time Local Reflections |
| Computational Geometry: | Sparse ICP, Articulated ICP, Implicit Surfaces, Marching Cubes, Shape Manipulation |
| Code Optimization: | SIMD, DirectCompute, OpenCL, Parallelization, Thread-safe programming, Real-time performance, |
| Time-of-Flight: | Low-level Time-of-Flight (multipath, scattering, ...), Calibration, Color Depth Registration |
| Tools & Libraries: | C++, Qt, wxWidgets, Jenkins, Jira, Agile/Scrum, 3ds Max, OpenCV, Eigen |