

dr. ir. Danilo Babin

Curriculum Vitae

Personal Details

Date of Birth 25th April, 1982
Nationality Belgian, Serbian
Gender Male
Address August Vermeylenlaan 13 bus 201,
3010 Kessel-lo,
Belgium

Education

- 5/2008 - **PhD in Computer Science Engineering**, *Faculty of Engineering and Architecture, TELIN-IPI*,
10/2013 Ghent University, Belgium.
○ Title: Segmentation and Skeletonization Techniques for Cardiovascular Image Analysis
- 9/2001 - **Master in Electrical and Computer Engineering**, *Department of Telecommunications, Faculty of*
3/2007 *Technical Sciences*, University of Novi Sad, Serbia.
○ Grade point average: 8.74 (out of 10.00)

Work Experience

- 10/2013 - **PostDoc Researcher**, *Faculty of Engineering and Architecture, imec-TELIN-IPI*,
present imec - Ghent University, Belgium.
○ Coordinating research projects and conducting research
○ Writing project proposals: FWO Research Project, FWO TBM, IWT O&O, IWT Innovation Mandate, H2020, UGent IOF StarTT, iMinds iStart, imec BBudget, VIB Grand Challenge

Teaching & Academic Experience

- 2010 - **Lecturer (Computer Graphics)**, *Faculty of Engineering and Architecture, imec-TELIN-IPI*,
present imec - Ghent University, Belgium.
- 2017 - **Visiting Professor (Docent)**, *Faculty of Economics, Finance and Administration (FEFA)*,
present Metropolitan University, Serbia.
- 2014 - **PhD Thesis Co-promoter**, *Faculty of Engineering and Architecture, imec-TELIN-IPI*,
present imec - Ghent University, Belgium.
○ 1 successful PhD thesis, 2 on-going
- 2009 - **Msc Thesis Supervisor**, *Faculty of Engineering and Architecture, imec-TELIN-IPI*,
present imec - Ghent University, Belgium.
○ supervised 13 master thesis students
- 2014 - **PhD jury member**, *Faculty of Engineering and Architecture, imec-TELIN-IPI*,
present imec - Ghent University, Belgium.
○ 4 time PhD committee member
- 2012 - **Reviewer**, *Faculty of Engineering and Architecture, imec-TELIN-IPI*,
present imec - Ghent University, Belgium.

- Journals: NeuroImage, Nature Scientific Reports, IEEE Transactions on Medical Imaging, International Journal of Computer Assisted Radiology and Surgery, Computers in Biology and Medicine journal, Journal of Microscopy, IEEE Transactions on Circuits and Systems for Video Technology, British Journal of Radiology, BioMedical Engineering OnLine, IEEE Access, The Open Medical Imaging Journal
- Conferences: EUSIPCO, IWSSIP, ACIVS, ISBI, MECBME
- Books: Wiley

Training & Courses

- 2/2019 **Siemens Syngo Via Development**, *Siemens, Erlangen, Germany.*
 - Basic and Advanced MeVisLab and Siemens Syngo Via development training
- 4/2016 **Starter's seminar - TechTransfer UGent**, *VOKA box, Het Pand Ghent, Belgium.*
 - Course on basics of company financials (P&L statement, statement of financial position, cash flow statement, capital structure), financing of business (venture capitalists, business angels, banks), venture capital, term sheets, government service and support mechanisms
- 12/2015 **TechTransfer Skills - TechTransfer UGent**, *TechTransfer Office, Ghent University, Belgium.*
 - Course on intellectual property rights (copyright, patents and patent databases), licenses and research contracts, start-ups (customer approach) and valorization in funded projects (VLAIO, FWO (SBO), EU, IOF)
- 4/2013 **iBootCamp - iMinds**, *Tech Hub Incubator, Google Campus, London, UK and Sophia House, UK.*
 - Shaping commercial skills
- 12/2007 **Cisco Certified Networking Associate - CCNA**, *Faculty of Technical Sciences, Novi Sad, Serbia.*
 - Cisco Career Certifications Qualification, Cisco Systems Inc: San Jose, CA, US

Skills

Computing	C, C++, VTK, Qt, MeVisLab, ITK, Python, OpenGL, OpenCV, Matlab, TI TMS320C6713 DSK, Pascal, Basic, Delphi, Assembler 8086, MS Office, L ^A T _E X
Siemens	Siemens Syngo Via Frontier plugin development
Networks	Cisco Certified Networking Associate (CCNA)
Languages	English (fluent), Dutch (good), Serbian (mother tongue), Hungarian (fluent), German (basic)

Funded Projects

- 2019-2020 **DermScan 2 - Skin Cancer Diagnostic Tool Development**, *Vlaio O&O*, partners: Barco (Kortrijk), UGent, and hospitals in Ghent and Leuven, supported by Vlaio.
- 2019 **Hyperspectral Imaging for Tissue Hypo-Oxygenation Detection**, *imec B project*, partner: imec, supported by imec.
- 2017-2018 **DermScan - Skin Cancer Diagnostic Tool Development**, *IWT O&O*, partners: Barco (Kortrijk), UGent, and hospitals in Ghent and Leuven, supported by IWT.
- 2012-2016 **NeoGuard - Neonatal EEG Analysis Software Development**, *IWT TBM*, partners: KU Leuven and hospitals in Leuven, Brussels, Antwerp and Rotterdam, supported by IWT.
- 2014 **Angiogram Segment Tracking (Coronary arteries)**, *consulting*, partner: Verhaert (Kruibeke).
- 2014-2016 **Wavelocity - Cardiovascular Image Analysis Toolkit**, *IWT Innovation Mandate*, partner: IcoMetrix (Leuven), supported by IWT.
- 2009-2010 **Imaging for the Respiratory SysTem (FIRST)**, *IWT O&O*, partners: Materialise (Leuven) and FluidDA (Antwerp), supported by IWT.

Research Topics

- since 2018 **Functional ultrasound (fUS) image processing for brain region activation detection**, collaboration with NERF (VIB - KU Leuven - imec).
Brain region activation experiments (performed on mice and rats) are recorded as intensified blood flow in fUS images. The goal is to provide registration of fUS images to existing brain atlases for brain region classification and segmentation and centerline extraction for improved activation detection.
- since 2018 **Tissue hypo-oxygenation from hyperspectral images**.
Tissue oxygenation is severely disturbed during pathological conditions such as cancer, diabetes, coronary heart disease, stroke, etc. The goal is to evaluate the feasibility of hyperspectral imaging of arterial blood vessels for hypo-oxygenation of tissue by correlating the results to known scenarios of low and normal oxygenation levels in muscle tissue.
- since 2018 **Heart chamber segmentation from CTA images**, *collaboration with Osijek University (Croatia) and University of Novi Sad (Serbia)*.
The preservation and improvement of heart health is the primary motivation behind this cardiovascular research track. Our solution is a convolutional neural network approach for the whole heart segmentation based on the 3D U-Net architecture and incorporates principle component analysis as an additional data augmentation technique.
- since 2017 **Multispectral image analysis for skin cancer diagnosis**, *collaboration with Barco (Kortrijk) and hospitals in Ghent and Leuven and supported by IWT*.
Early detection of skin lesions as well as detection and quantitative characterization of changes in skin lesions has proven essential in diagnosis and treatment of skin cancer. The solution incorporates both standard ABCD and non-conventional feature quantification on multispectral images to perform the analysis.
- since 2014 **Left Atrial Appendage segmentation from CTA images**, *collaboration with Osijek University (Croatia) and University of Novi Sad (Serbia)*.
Atrial fibrillation often causes creation of blood clot in left atrial appendage (LAA) of the heart, which, in turn, is a common cause of stroke. For this reason we create segmentation and skeletonization methods to support the LAA occluder placement procedure.
- since 2014 **Segmentation, skeletonization, tracking and value mapping of coronary arteries**, *collaboration with Ghent University Hospital, Brussels University Hospital and Leuven University Hospital*.
Coronary artery disease (CAD) constitutes 16% of all deaths worldwide, which makes it the most common cause of death globally. To support the diagnosis and treatment of CAD, we designed image segmentation and skeletonization methods along with FFR and pressure wave analysis methods.
- since 2009 **Anatomical and functional analysis of abdominal aorta**, collaboration with Ghent University Hospital and IcoMetrix (Leuven), supported by IWT.
Aortic stiffness is an important diagnostic and prognostic factor that can be well estimated through blood flow and pulse wave velocity measurement. During my IWT mandate I developed WaVelocity, an application and toolbox for thorough anatomical and functional (MRI and CT) aortic analysis (licensed to Imageens, Paris in 2017).
- since 2009 **Lung airway segmentation and analysis from CT images**, *collaboration with Materialise (Leuven) and FluidDa (Antwerp), supported by IWT*.
Reduction of radiation in CT imaging of lungs allows for less invasive examination, but produces noise and lower contrast of small lung air ways. The solution implements a robust approach for closing air tube regions at lowest level to avoid segmentation leaks.
- since 2008 **Brain blood vessel segmentation and skeletonization from 3DRA images**, collaboration with Ghent University Hospital.
Navigating a catheter for embolization of cerebral blood aneurysms and AVMs requires thorough knowledge of blood vessel structure. We design highly accurate and efficient segmentation and skeletonization methods to extract vessel anatomy and calculate optimal navigation paths.
- since 2008 **Image segmentation and skeletonization for blood vessel delineation of Arteriovenous Malformation**, collaboration with Ghent University Hospital.
Embolization of Arteriovenous Malformations (AVM) requires deep insight into the inner structure of the AVM structure, namely classification into feeding arteries, draining veins and the nidus. Our solution uses a multi scale image segmentation and skeletonization approach to discriminate between the AVM structures.

Invited Talks

- 12/2019 **NERF Retreat**, OPEK, Leuven, Belgium.

- Talk title: 'Functional Ultrasound Image Processing for Analysis and Quantification of Brain Blood Vessel Networks'
- 6/2018 **NERF Seminar**, *imec Tower room 3D, Leuven, Belgium.*
- Talk title: 'Medical Image Processing: From Acquisition to Interpretation'
- 11/2014 **VII Congress of Cardiovascular Surgeons of Serbia**, *Master Centar, Novi Sad, Serbia.*
- Talk title: 'Aortic Pulse Wave Velocity measurements using Cardiac MR images'

Success Stories

- 12/2017 **Licensed WaVelocity - Cardiovascular Image Analysis Toolkit.**
- Exclusive world-wide license sold to Imageens, Paris, France
- 1/2014 **Granted IWT Innovation (Spin-Off Type) Mandate**, personal mandate, duration: 2 years.
- Project title: 'WaVelocity - Cardiovascular Image Analysis Toolkit'
- 4/2013 **Selected for iBootCamp - iMinds training**, *Tech Hub Incubator, Google Campus, London, UK.*
- Shaping commercial skills
- 5/2007 **3rd Place at Electrijada contest**, *47th International Meeting of Students of Electrical Engineering, Čanj, Montenegro.*
- 6/2001 **Won the 'Generation's Best Pupil Award'**, *Gymnasium Senta, Senta, Serbia.*

International Mobility

- 7-8/2005 **Student Practice**, *Telecommunications Department, Public Power Corporation, Athens, Greece.*
- Project: Development of a 300 baud modem

Hobbies

Waterpolo, swimming, skiing, playing piano.



Danilo Babin

Post-doc at imec-IPI, Faculty of Engineering and Architecture, Ghent University

Image Analysis
Medical Image Segmentation
Skeletonization
Visualization

	All	Since 2015
Citations	161	122
h-index	7	6
i10-index	5	5

TITLE	CITED BY	YEAR
Segmentation of Phase-Contrast MR Images for Aortic Pulse Wave Velocity Measurements D Babin, D Devos, L Platiša, L Jovanov, M Habijan, H Leventić, W Philips International Conference on Advanced Concepts for Intelligent Vision Systems ...		2020
Estimation of the Left Ventricle Volume Using Semantic Segmentation M Habijan, H Leventić, I Galić, D Babin 2019 International Symposium ELMAR, 39-44		2019
Whole Heart Segmentation from CT images Using 3D U-Net architecture M Habijan, H Leventić, I Galić, D Babin 2019 International Conference on Systems, Signals and Image Processing ...		2019
Virtual Clamping Tool for RAPN P De Backer, S Vandenbulcke, M Lejoly, S Vanderschelden, C Van Praet, ... 19th Annual Congress of the Belgian Association of Urology, 1-1		2019
Development of a planning tool for robot-assisted partial nephrectomy surgery based on 3D reconstructions of kidneys S Vandenbulcke, P De Backer, D Babin, P Segers, K Decaestecker, ... 18th National Day on Biomedical Engineering: Artificial Intelligence in Medicine		2019
Left atrial appendage segmentation from 3D CCTA images for occluder placement procedure H Leventić, D Babin, L Velicki, D Devos, I Galić, V Zlokolica, K Romić, ... Computers in biology and medicine 104, 163-174	5	2019
Skeletonization method for vessel delineation of arteriovenous malformation D Babin, A Pižurica, L Velicki, V Matić, I Galić, H Leventić, V Zlokolica, ... Computers in biology and medicine 93, 93-105	7	2018
Left atrial appendage segmentation software with detection of occluder placement location H Leventić, D Babin, L Velicki, D Devos, I Galić, A Pizurica CSI Focus LAA 2018		2018
Left Atrial Appendage Segmentation in 3D CCTA Images H Leventić, I Galić, D Babin, A Pizurica International Conference on Smart Systems and Technologies, 15-16		2018
Proximal aortic stiffening in Turner patients may be present before dilation can be detected: a segmental functional MRI study DGH Devos, K De Groote, D Babin, L Demulier, Y Taeymans, ... Journal of Cardiovascular Magnetic Resonance 19 (1), 27	17	2017

TITLE	CITED BY	YEAR
Semi-automatic Left Atrial Appendage Segmentation from 3D CCTA Images Hrvoje Leventić, Danilo Babin, Lazar Velicki, Irena Galić, Vladimir Zlokolica IEEE 59th International Symposium ELMAR-2017, 39-42	3 *	2017
Semiautomatic Epicardial fat segmentation based on fuzzy c-means clustering and geometric ellipse fitting V Zlokolica, L Krstanović, L Velicki, B Popović, M Janev, R Obradović, ... Journal of healthcare engineering 2017	4	2017
Proximal aortic stiffening in Turner patients is more pronounced in the presence of a bicuspid valve. A segmental functional Mri study DG Devos, K De Groote, D Babin, L Demulier, Y Taeymans, ... European Heart Journal–Cardiovascular Imaging 17 (suppl_1), i1-i80		2016
Validation of 'WaVelocity' image analysis toolbox for cardiac magnetic resonance pulse wave velocity measurements D Babin, D DEVOS, P Segers Annual Meeting and Exhibition of the International Society for Magnetic ...		2016
4D CT Cardiac image enhancement for Subjective Medical Quality Perception of the Left Ventricle Hrvoje Leventić, Časlav Livada, Irena Galić, Vladimir Zlokolica, Lazar ... Medical Image Perception Society (MIPS) Conference XVI, 60		2015
MR pulse wave velocity increases with age faster in the thoracic aorta than in the abdominal aorta DGH Devos, E Rietzschel, C Heyse, P Vandemaele, L Van Bortel, ... Journal of Magnetic Resonance Imaging 41 (3), 765-772	18	2015
Epicardial fat registration by local adaptive morphology-thresholding based 2D segmentation V Zlokolica, L Velicki, M Janev, D Mitrinovic, D Babin, N Ralevic, ... Proceedings ELMAR-2014, 1-4	3	2014
Pixel profiling for extraction of arteriovenous malformation in 3-D CTA images D Babin, M Spyrtantis, A Pižurica, W Philips, L Velicki, V Zlokolica Proceedings ELMAR-2014, 1-4	5	2014
Skeleton calculation for automatic extraction of arteriovenous malformation in 3-D CTA images D Babin, M Spyrtantis, A Pižurica, W Philips 2014 IEEE 11th International Symposium on Biomedical Imaging (ISBI), 425-428	2	2014
Robust segmentation methods with an application to aortic pulse wave velocity calculation D Babin, D Devos, A Pižurica, J Westenberg, E Vansteenkiste, W Philips Computerized medical imaging and graphics 38 (3), 179-189	12	2014
Brain blood vessel segmentation using line-shaped profiles D Babin, A Pižurica, J De Vylder, E Vansteenkiste, W Philips Physics in Medicine & Biology 58 (22), 8041	27	2013

TITLE	CITED BY	YEAR
<p>Segmentation and skeletonization techniques for cardiovascular image analysis D Babin Ghent University</p>	1	2013
<p>Generalized pixel profiling and comparative segmentation with application to arteriovenous malformation segmentation D Babin, A Pižurica, R Bellens, J De Bock, Y Shang, B Goossens, ... Medical image analysis 16 (5), 991-1002</p>	21	2012
<p>Centerline calculation for extracting abdominal aorta in 3-D MRI images D Babin, E Vansteenkiste, A Pižurica, W Philips 2012 Annual International Conference of the IEEE Engineering in Medicine and ...</p>	3	2012
<p>A novel dictionary based detection method for cell nuclei J De Vylder, J Aelterman, D Babin, M Vandewoestyne, T Lepez, ... 34th Annual International Conference of the Engineering in Medicine and ...</p>		2012
<p>Segmentation of brain blood vessels using projections in 3-D CT angiography images D Babin, E Vansteenkiste, A Pižurica, W Philips 2011 Annual International Conference of the IEEE Engineering in Medicine and ...</p>	7	2011
<p>Segmentation of abdominal aorta for pulse wave velocity calculation D Babin, A Pizurica, W Philips 12th FEA PhD Symposium</p>		2011
<p>Robust segmentation methods for aortic pulse wave velocity measurement D Babin, A Pizurica, W Philips 2011 Annual symposium of the IEEE EMBS Benelux Chapter</p>	3	2011
<p>Segmentation of airways in lungs using projections in 3-D CT angiography images D Babin, E Vansteenkiste, A Pižurica, W Philips Engineering in Medicine and Biology Society (EMBC), 2010 Annual ...</p>	6	2010
<p>Segmentation and length measurement of the abdominal blood vessels in 3-D MRI images D Babin, E Vansteenkiste, A Pizurica, W Philips 2009 Annual International Conference of the IEEE Engineering in Medicine and ...</p>	8	2009
<p>Length measurement of abdominal blood vessels through segmentation and skeletonization D Babin, A Pizurica, W Philips 10e FirW PhD Symposium</p>		2009
<p>The shortest path calculation between points of interest in 3-d mri images of blood vessels D Babin, J De Bock, A Pizurica, W Philips 11th Annual Workshop on Semiconductor Advances for Future Electronics and ...</p>	9	2008