

# curriculum vitae



## Arjo Loeve

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## Focus 'Fighting complexity with simplicity.'

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As a researcher experienced in BioMechanical Engineering I currently work on:

- Well-cleanable medical instruments,
- 'Engineering for Forensics', aimed at forensic tools and workflow,
- 'Forensic Engineering', aimed at creating forensic knowledge and case works.

I believe the quintessence of creating successful solutions in medical engineering and forensics is to dissect each problem to its core in order to find the fundamental problems and to solve these problems with the solution that is as simple as possible, but not simpler.

## Funded Projects Currently Running

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- 2023 – now** *Forensics-on-a-Chip: body fluids identification & analysis at the crime scene*  
**Funded by TU Delft faculty 3mE Cohesion** || Developing a novel microfluidic platform for on-scene identification and analysis of multiple forensically relevant analytes in body fluid traces.
- 2022 – now** *FBI<sup>3</sup> – Forensic Biomechanics for Infant Injury Investigations*  
**Funded by TU Delft dept. BMechE** || Modelling the kinematics of inflicted head injury in infants by shaking trauma and developing a test doll to assess forensically relevant scenarios.
- 2021 – now** *FreeRef – Contactless size reference for evidence photography*  
**Funded by Politie and Ministerie van Justitie en Veiligheid** || Developing a virtual size reference system for quick and contamination-free photography of pieces of evidence.
- 2020 – now** *ICARUS – Biomechanical models of people falling from heights*  
**Funded by Netherlands Forensic Institute** || Modelling the kinematics of people dropping from heights. Aimed at providing scenario likelihood ratios in forensic cases.
- 2018 – now** *“Van opsporing tot bewijsvoering: plaats delictonderzoek voor de hele strafketen” – CSI-PEEQ – Crime Scene Investigation Parameters for Efficiency, Efficacy and Quality*  
**Funded by Politie en Wetenschap** || Developing workflow models of and optimized work processes for crime scene investigation.
- 2016 – now** *HiPerNav “High Performance Soft-tissue Navigation”*  
**Funded by European Union Horizon 2020 - Marie Skłodowska-Curie grant** || Workflow and visualization optimization for soft-tissue navigation in liver surgery.
- 2016 – now** *MOOC “Forensic Engineering – learning from failure”*  
**Funded by TUDelft Online Learning & Delft Security Institute** || Building and running an edX.org massive open online course about forensic engineering.

## Education

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- 2007 – 2012** *Technische Universiteit Delft*  
**PhD** || 'Shaft-Guidance for Flexible Endoscopes'. Next to the core research, many education, research and consultancy activities on several topics.
- 2000 – 2006** *Technische Universiteit Delft*  
**MSc** || 'Design of an Easy-to-Make Shape-Memory Colonoscope'. Master Mechanical Engineering, variant BioMedical Engineering. (18 OKT 2006)  
**BSc** 'Evaluation of a Joystick Steered Colonoscope'. (21 OKT 2004)

1994 – 2000 *Reformatorsche Scholengemeenschap Gomarus Gorinchem*  
**VWO** || Additional activities: organized social events, trained teachers in video capturing and editing using self-built switchboxes, built school accounting software.

## Training

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2022 DEC *Sentix HSE Services – R. Heerlien*  
Laser safety training level laser worker – according to NPR-CLC/TR 50448:2005

2022 OKT – 2022 NOV *Hertz Training for Scientists – Annemart Berentse*  
Leadership Programme for Assistant and Associate Professors

2018 JAN *Technische Universiteit Delft/4TU – BKO*  
University Teaching Qualification

2017 OKT – 2017 NOV *Technische Universiteit Delft – BKO*  
Students Supervision Techniques

2017 SEP *Technische Universiteit Delft – Online Learning Center*  
Writing a Script

2017 FEB – 2017 MAY *Technische Universiteit Delft – BKO*  
Developing Tests and Assignments

2014 SEP *Philips B.V.*  
Clinical Ultrasound Imaging

2011 FEB *NEN-Advies Medische Hulpmiddelen*  
Product Design According to NEN-EN-ISO 13485

2010 DEC – 2011 FEB *Aletta Wubben – Personal and Organisation Development*  
Workshop Stress Coping

2009 JUN – 2010 JAN *Nessun Dorma – Eva Berends*  
Intervision Techniques

2009 SEP – 2009 OKT *Technische Universiteit Delft – BKO*  
Personal Supervision of Students

2008 JUN *Fontys Conservatorium Tilburg – Inge Mulder*  
Vocal Techniques & Speech Training

2008 MAY – 2008 JUN *Technische Universiteit Delft – BKO*  
Active & Collaborative Learning

2008 JUN *European Association of Endoscopic Surgery*  
Post Graduate Course II – NOTES and Emerging Technologies

## Work Experience

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2021 APR – now *Technische Universiteit Delft*  
**Assistant Professor** || Faculty of Mechanical, Maritime & Materials Engineering, department of BioMechanical Engineering. Projects and tasks:

- Coordinator of the Master Biomedical Engineering.
- ‘*Engineering for Forensics*’ research line in cooperation with the Netherlands Forensic Institute, Forensic Medicine dept. of University of Oslo (Norway), University of Amsterdam, Hogeschool van Amsterdam, and Dutch Police, Army, Ministry of Justice and Safety and Public Prosecutor. Advancing tools and methods for forensics.
- *Lecturer & Block Coordinator* for Bachelor Clinical Technology and Bachelor and Master Mechanical Engineering. Lecturing Matlab, Medical Instrument Design & Safety, Research Methodology. Responsible for BSc final projects. Supervising about thirty graduation students yearly.
- *Master Coördinator* of the Biomedical Engineering programme.
- *Developer & lecturer* of Massive Open Online Course “Engineering for Forensics - Learning from Failures” on [www.edX.org](http://www.edX.org).

- 2016 MAY – 2021 APR** *Technische Universiteit Delft & international partners*  
**Senior Lecturer & Researcher** || Faculty of Mechanical, Maritime & Materials Engineering, department of BioMechanical Engineering. Projects and tasks:
- ‘Engineering for Forensics’: advancing forensic tools and methods.
  - *Lecturer & Block Coordinator* for Bachelor Clinical Technology and Bachelor and Master Mechanical Engineering.
  - ‘HiPerNav – High Performance Soft-tissue Navigation|| Workflow and visualization optimization for soft-tissue navigation in liver surgery.’, Funded by European Union Horizon 2020 - Marie Skłodowska-Curie grant – WP leader.
  - “POxiM – Pulse oximeter that can easily be made in the Netherlands from local components to fight shortages in COVID-19 crisis”, Funded by ZonMW.
  - *Online course developer & lecturer* for Massive Open Online Course “Engineering for Forensics - Learning from Failures” on [www.edX.org](http://www.edX.org).
- 2012 AUG – 2016 MAY** *Technische Universiteit Delft & international partners*  
**PostDoc** || Faculty of Mechanical, Maritime & Materials Engineering, department of BioMechanical Engineering. Projects and tasks:
- ‘Engineering for Forensics’: advancing forensic tools and methods.
  - *Lecturer & Block Coordinator* for Bachelor Clinical Technology and Bachelor and Master Mechanical Engineering.
  - ‘FUSIMO – Patient Specific Modeling and Simulation of Focused Ultrasound in Moving Organs’ European FP7 International Project – WP leader.
  - ‘Multi-Photodiode Array – Measuring Blood Pressure Wave Speeds with Compact Optical Sensors’ project with Erasmus Medical Centre, Rotterdam
- 2013 JUL – 2014 SEP** *Academisch Medisch Centrum, Amsterdam*  
**Scientific Researcher** || Department of Orthopaedic Surgery. ‘Vibrant Vision – Non-Invasive Detection of Cartilage Damage’
- 2011 FEB – 2012 AUG** *Technische Universiteit Delft*  
**PostDoc** || Faculty of Electrical Engineering, Mathematics & Computer Science, department of Electrical Instrumentation.  
 ‘Design of a Dental Drill with Integrated Laser Optics’
- 2007 FEB – 2012 FEB** *Technische Universiteit Delft & Pentax Tokyo, Japan*  
**PhD candidate** || Faculty of Mechanical, Maritime & Materials Engineering, department of BioMechanical Engineering, paid by Pentax Tokyo, Japan.  
 ‘Design of an Easy-to-Make Shape-Memory Colonoscope’
- 2011 DEC – now** *Arjo Loeve Fotografie & Design, Hardinxveld-Giessendam*  
**Photographer and owner** || ([www.arjoloeve.nl](http://www.arjoloeve.nl)) Wedding, portrait, art, events, and product photography.

## Internships & Side Jobs

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- 2003 – 2007** *Imko B.V., Hardinxveld-Giessendam*  
**Software Developer** || Design and realisation of software packages for in-line printing of labels in packaging lines, HACCP cleaning management, OEEE monitoring.
- 2004 OCT – 2005 MAR** *Academisch Medisch Centrum, Amsterdam*  
**INTERNSHIP Researcher** || Analysis of colonoscope insertion problems & pain.
- 2002 JUN – 2002 JUL** *Imko B.V., Hardinxveld-Giessendam*  
**INTERNSHIP Software Developer** || Design and realisation of software package for machine and production line maintenance and management.
- 2001** *Compaq, Gorinchem*  
**Rework Mechanic** || Assembling, adapting, and installing computer systems.
- 2000** *Imko B.V., Hardinxveld-Giessendam*  
**Interim Storehouse Manager** || Stock control and team supervision.
- 1996 – 2000** *De Vroed & Bouter, Hardinxveld-Giessendam*  
**Production & Sales** || Glass cutting, crafts work frame making, shop manager.

## Boards & Commissions

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- 2023** *Bataafs Genootschap der Proefondervindelijke Wijsbegeerte*  
Jury member (of three) for the best 2023 PhD thesis award.
- 2022 – 2023** *Nederlandse Forensische Onderzoeksagenda (NFOA)*  
Workshop lead for “Physics & Engineering” and participant in “Mobile Techniques”. Co-writing the Dutch forensic research agenda for 2023-2033.
- 2021 – now** *Hall-F reorganisation*  
Member. Organizing and supervising the reallocation and creation of labs and offices for 3mE departments and research groups.
- 2021 – now** *Professional Field Board of the Saxion Hogeschool Forensisch Onderzoek Bachelor*  
Member.
- 2021 – 2022** *Professional Field Board of the TU Delft Clinical Technology Bachelor and Technical Medicine Master*  
Member.
- 2020 – 2021** *Bacterial Outbreak Related to ERCP Scopes*  
Independent expert advisor for a Dutch hospital, an ERCP scope manufacturer and the Dutch Health Care Inspectorate (IGJ).
- 2020** *HiPerNav Winterschool Delft – User interaction & Workflow*  
Organizer and lecturer.
- 2019** *Visitatiecommissie – Hogeschool Rotterdam, Bachelor Mens & Techniek*  
Member of auditing team.
- 2017 – now** *Professional Behaviour Board of the Clinical Technology Bachelor and Technical Medicine Master*  
Co-founder and member.
- 2016 – now** *Coordinator Co van Ledden Hulsebosch Center for forensic science and medicine*  
Coordinator on behalf of TU Delft.
- 2015 – 2016** *Bacterial Outbreak Related to ERCP Scopes*  
Independent expert advisor for University Medical Centre Utrecht, Olympus B.V., and the Dutch Health Care Inspectorate (IGZ).
- 2014** *Sterilisation Issues with Orthopaedic Instruments*  
Independent expert advisor in a board managing and investigating sterilisation issues occurring in a sterilisation company and a Rotterdam hospital.
- 2014 – 2016** *int. Society for Medical Innovation & Technology Joint Conference with Design of Medical Devices – European Edition 2016*  
Member of the organization committee. Delft, the Netherlands.
- 2013 – 2014** *Design of Medical Devices Conference – European Edition 2014*  
Member of the organization committee. Delft, the Netherlands.
- 2012 – 2013** *Bacterial Outbreak Related to ERCP Scopes*  
Independent expert advisor for Erasmus Medical Centre Rotterdam, Olympus B.V., Dutch Health Care Inspectorate (IGZ) and Dutch National Institute for Public Health and Environment (RIVM).
- 2012 – 2013** *Design of Medical Devices Conference – European Edition 2013*  
Member of the organization committee. Delft, the Netherlands.
- 2011 – now** *Evacuation Team*  
Member. TU Delft, faculty of Mechanical, Maritime & Materials Engineering.
- 2005 – 2006** *NRC Academische Jaarprijs – Battle of the Universities*  
One of the four members of the TU Delft team BITE (Bio-Inspired Technology).
- 2003 – 2007** *Youth Choir ‘Op Weg’*  
Bass, PR materials designer for concerts and CD’s, monthly magazine editor.
- 2001 – 2002** *Kids Summer Festival ‘Speel-In’*  
Member of the organization committee and playground supervisor.

## (Co-)supervised PhD Students

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- 2022 – now** *ir. Kim Hutchinson*  
Biomechanics of inflicted head injury by shaking trauma in infants. TU Delft.
- 2017 – 2019** *dr. ir. Gert Kraaij*  
**Percutaneous interface tissue removal for hip refixation** || The first step in instrument design. TU Delft.
- 2018 – 2019** *Chun-Feng Lai, M.Sc.*  
**HiPerNav – workflow sensors** || Developing sensors for the automatic detection of workflow of minimally invasive liver treatments in the operation room. TU Delft.
- 2017 – 2023** *Maryam Gholinejad, M.Sc.*  
**HiPerNav – workflow & UI** || Optimizing workflow and user interaction of minimally invasive liver treatments using new planning and navigation platforms. TU Delft.
- 2011 – 2019** *dr. ing. Marit van Velzen*  
**The Speed of Waves** || Measuring the velocity of blood pressure pulse waves traveling through peripheral blood vessels. Half-time. Erasmus MC.

## Awards

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- 2023** *Open Education Award 2023*  
Received for MOOC 'Forensic Engineering – Learning from Failures', Delft University of Technology.
- 2019** *VariScopic – Teacher of the Year 2018-2019*  
Clinical Technology Bachelor, Delft University of Technology.
- 2019** *Institution of Civil Engineers – Publishing Award Telfort Premium Prize*  
Received for 'Improving reliability in forensic engineering: the Delft approach', Forensic Engineering 171(3): 99–106.
- 2011** *BME Conference – Best Oral Presentation*  
Received for 'TraceWard – Contamination prevention for vaginal sampling in rape victims'. Egmond aan Zee, the Netherlands.
- 2009** *EAES Conference – Best Technology Presentation*  
Received for 'The Vacu-SL Mechanism – Vacuumized particles for rigidity control in flexible endoscopes'. Prague, Czechia.

## Scientific Publications

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- 2023** *'Contactless size reference in forensic photography – Design and verification of the novel FreeRef-1 system'*  
L. Schiks, M. Cook, L.R. Lipman, A.P. van Dijke, K. Hutchinson, P. van den Hoven, A.J. Loeve, Sensors, 23(3790), 19p.
- 2022** *'Generic surgical process model for minimally invasive liver treatment methods'*  
M. Gholinejad, E. Pelanis, D. Aghayan, Å.A. Fretland, B. Edwin, T. Terkivatan, O.J. Elle, A.J. Loeve, J. Dankelman, Scientific Reports, 12(1), 14p.
- 2022** *'A hybrid registration method using the mandibular bone surface for electromagnetic navigation in mandibular surgery'*  
A.F. de Geer, M.J.A. van Alphen, S. van der Mierden, C.L. Zuur, A.J. Loeve, R.L.P. van Veen, M.B. Karakullukcu, International Journal of Computer Assisted Radiology and Surgery, 17(2022), 11p.
- 2022** *'Registration methods for surgical navigation of the mandible: a systematic review'*  
A.F. de Geer, S.G. Brouwer de Koning, M.J.A. van Alphen, S. van der Mierden, C.L. Zuur, F.W.B. van Leeuwen, A.J. Loeve, R.L.P. van Veen, M.B. Karakullukcu, International Journal of Oral & Maxillofacial Surgery, (2022), 12p.
- 2021** *'Onderzoek Olympus TJF-Q180V Scoop "in een Nederlands ziekenhuis" n.a.v. gevonden contaminatie na reiniging en desinfectie'*  
A.J. Loeve, Rapport voor de Inspectie Gezondheidszorg.

- 2021 ***'Violent Infant Surrogate Shaking: Continuous High-Magnitude Centripetal Force and Abrupt Shift in Tangential Acceleration May Explain High Risk of Subdural Hemorrhage'***  
A. Stray-Pedersen, F. Strisland, T. Ole Rognum, L.A.H. Schiks, A.J. Loeve. Neurotrauma Reports, 2(1), 8p.
- 2020 ***'Lethal smothering with a pillow – How 181 music festival visitors tried to kill a dummy'***  
D. Prinsen, A. van Dijke, T. Horeman-Franse, N.J. van de Berg, A.J. Loeve. Forensic Science International, 316(2020), 9p.
- 2020 ***'Thresholds for the assessment of inflicted head injury by shaking trauma in infants: a systematic review'***  
L.A.H. Schiks, J. Dankelman, A.J. Loeve. Forensic Science International, 306(2020), 12p.
- 2019 ***'Measuring pulse wave velocity with a novel, simple sensor on the fingertip: a feasibility study in healthy volunteers'***  
M.H.N. van Velzen, S.P. Niehof, E.G. Mik, A.J. Loeve. Biomedical Physics & Engineering Express, 5(6), 10p.
- 2019 ***'Independent root cause analysis of contributing factors, including dismantling of two duodenoscopes, to an outbreak of multidrug-resistant Klebsiella pneumonia'***  
A.W. Rauwers, A. Troelstra, A.C. Fluit, C. Wissink, A.J. Loeve, F.P. Vleggaar, M.J. Bruno, M.C. Vos, L.G.M. Bode, J.F. Monkelbaan. Gastrointestinal Endoscopy, 90(5), 12p.
- 2019 ***'Minimizing aerosol bone dust during autopsies'***  
J.M.E. Pluim, A.J. Loeve, R.R. Gerretsen. Forensic Science, Medicine, and Pathology, 15(3), pp. 404-407.
- 2019 ***'The influence of contact force on forensic trace collection efficiency when sampling textiles with adhesive tape'***  
S. Damsteeg-van Berkel, F. Beemster, J. Dankelman, A.J. Loeve. Forensic Science International, 298, pp. 278-283.
- 2019 ***'Water jet applicator for interface tissue removal in minimally invasive hip refixation: Testing the principle and design of prototype'***  
G. Kraaij, A.J. Loeve, J. Dankelman, R.G.H.H. Nelissen, E.R. Valstar. Journal of Medical Devices, 13(2), 11 p.
- 2019 ***'Surgical process modelling strategies: Which method to choose for determining workflow?'***  
M. Gholinejad, A.J. Loeve, J. Dankelman. Minimally Invasive Therapy & Allied Technologies, 28(2), pp. 91-105.
- 2019 ***'Modeling of inflicted head injury by shaking trauma in children: what can we learn? Part II: A systematic review of mathematical and physical models'***  
J.P. van Zandwijk, M.E.M. Vester, R.A.C. Bilo, R.R. van Rijn, A.J. Loeve. Forensic Science, Medicine, and Pathology 15(3), pp. 408-422.
- 2019 ***'Modeling of inflicted head injury by shaking trauma in children: what can we learn? Part I: A systematic review of animal models'***  
M.E.M. Vester, R.A.C. Bilo, A.J. Loeve, R.R. van Rijn, J.P. van Zandwijk. Forensic Science, Medicine, and Pathology 15(3), pp. 423-436.
- 2018 ***'Improving reliability in forensic engineering: the Delft approach'***  
K. Terwel, M. Schuurman, A.J. Loeve, Proceedings of the Institution of Civil Engineers – Forensic Engineering 171(3), pp. 99-106.
- 2018 ***'Comparison between pulse wave velocities measured using Complior and measured using Biopac'***  
M.H.N. van Velzen, R.J. Stolker, A.J. Loeve, S.P. Niehof, E.G. Mik, Journal of Clinical Monitoring and Computing, 33(2), pp. 241-247.
- 2018 ***'Aerosol Production during Autopsies: The Risk of Sawing in Bone'***  
J.M.E. Pluim, L. Jimenez-Bou, R.R. Gerretsen, A.J. Loeve, Forensic Science International 289, pp. 260-267.
- 2017 ***'Design and functional testing of a novel blood pressure pulse wave velocity sensor'***  
M.H.N. van Velzen, A.J. Loeve, E.G. Mik, S.P. Niehof, ASME Journal of Medical Devices 12(1), 7 p.
- 2017 ***'Onderzoek Olympus TJF-Q180V Scopen UMC Utrecht n.a.v. gevonden contaminatie na reiniging en desinfectie'***  
A.J. Loeve, Rapport voor de Inspectie Gezondheidszorg

- 2017 ***'Increasing accuracy of pulse transit time measurements by automated elimination of distorted photoplethysmography waves'***  
M.H.N. van Velzen, A.J. Loeve, S.P. Niehof, E.G. Mik, Medical & Biological Engineering & Computing 55(11), 12 p.
- 2016 ***'Workflow and Intervention Times of MR-guided Focused Ultrasound—predicting the impact of new techniques'***  
A.J. Loeve, J. Al-Issawi, F. Fernandez-Gutierrez, T. Langø, J. Strehlow, S. Haase, M. Matzko, A. Napoli, A. Melzer, J. Dankelman, Journal of Biomedical Informatics 60, pp. 38-48.
- 2015 ***'Effect of heat-induced pain stimuli on pulse transit time and pulse wave amplitude in healthy volunteers'***  
M.H.N. van Velzen, A.J. Loeve, M.C. Kortekaas, S.P. Niehof, E.G. Mik, R.J. Stolker, Physiological Measurement 37(1), pp. 52-66.
- 2015 ***'An integrated model-based software for FUS in moving abdominal organs'***  
M. Schwenke, J. Strehlow, S. Haase, J. Jenne, C. Tanner, T. Langø, A.J. Loeve, I. Karakitsios, X. Xiao, Y. Levy, G. Sat, M. Bezzi, S. Braunewell, M. Guenther, A. Melzer, T. Preusser, International Journal of Hyperthermia 31(3), pp. 240-250.
- 2015 ***'Reply to Saliou et al.'***  
C.J. Verfaillie, M.J. Bruno, A.F. voor in 't Holt, J.G. Buijs, J.W. Poley, A.J. Loeve, J.A. Severin, L.F. Abel, B.J. Smit, I. de Goeij, M.C. Vos, Endoscopy 47(11), pp. 1059-1059.
- 2015 ***'Withdrawal of a novel-design duodenoscope ends outbreak of a VIM-2-producing Pseudomonas aeruginosa'***  
C.J. Verfaillie, M.J. Bruno, A.F. voor in 't Holt, J.G. Buijs, J.W. Poley, A.J. Loeve, J.A. Severin, L.F. Abel, B.J. Smit, I. de Goeij, M.C. Vos, Endoscopy 47(6), pp. 493-502.
- 2014 ***'A novel ultrasound technique for detection of osteochondral defects in the ankle joint: A parametric and feasibility study'***  
N. Sarkalkan, A.J. Loeve, K. van Dongen, G.J.M. Tuijthof, A. Zadpoor, Sensors 15(1), pp. 148-165.
- 2014 ***'Onderzoek Olympus TJF-Q180V Scoop n.a.v. gevonden contaminatie na reiniging en desinfectie'***  
A.J. Loeve, Rapport voor de Inspectie Gezondheidszorg.
- 2014 ***'Static friction of stainless steel wire rope-rubber contacts'***  
A.J. Loeve, T. Krijger, W. Mugge, P. Breedveld, D. Dodou, J. Dankelman. Wear 319: 11p.
- 2013 ***'Mechanical analysis of insertion problems and pain during colonoscopy: Why highly skill-dependent colonoscopy routines are necessary in the first place... and how they may be avoided'***  
A.J. Loeve, P. Fockens, P. Breedveld. Canadian Journal of Gastroenterology 27(5), 10p.
- 2013 ***'In vitro validation of vaginal sampling in rape victims: the problem of Locard's principle'***  
A.J. Loeve, R.A.C. Bilo, E. Emirdag, M. Sharify, F.W. Jansen, and J. Dankelman. Forensic Science, Medicine, and Pathology 9: pp. 154-162.
- 2012 ***'Shaft-Guidance for Flexible Endoscopes'***  
A. J. Loeve, Dissertation, ISBN 978-94-6191-329-6, 260 p.
- 2012 ***'Cutaneous manifestations of child abuse and their differential diagnostics'***  
R.A.C. Bilo et al., Book chapter, ISBN 978-3-642-29286-6, 264 p.
- 2012 ***'Endoscope shaft-rigidity control mechanism: FORGUIDE'***  
A.J. Loeve, D.H. Plettenburg, P. Breedveld, J. Dankelman. IEEE Transactions on Biomedical Engineering 59 (2): 10.p.
- 2010 ***'Polymer rigidity control for endoscopic shaft-guide 'Plastolock' - A feasibility study.'***  
A.J. Loeve, J.H. Bosma, P. Breedveld, D. Dodou, J. Dankelman. Journal of Med. Devices 4 (4): 6 p.
- 2010 ***'Vacuum packed particles as flexible endoscope guides with controllable rigidity'***  
A.J. Loeve, O.S. van de Ven, J.G. Vogel, P. Breedveld, J. Dankelman. Journal of Granular Matter 12 (6):12 p.
- 2010 ***'Scopes too flexible...and too stiff'***  
A.J. Loeve, P. Breedveld, J. Dankelman. IEEE Pulse 1 (3):16 p.
- 2011 – now ***Reviewer for various journals and conferences***  
Journal of Forensic Research, Sensors & Actuators – A. Physical Registration, IEEE Transactions of Biomedical Engineering, Journal of Mechanics in Medicine and biology, Design of Medical Devices Conference – American & European Editions, Engineering Structures, ASME Journal of Medical

Devices, ASME Design of Medical Devices Conference, IEEE International Conference on Robotics and Automation, IEEE/RSJ International Conference on Intelligent Robots and Systems, Tribology International, Medical Devices – Evidence and Research, Journal of Pediatric Neurology and Neuroscience, Forensic Science International.

## Published Datasets

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- 2023 ***'FreeRef-1 verification, inter-observer and user tests 2023***  
4TU.Centre for Research Data, <https://doi.org/10.4121/22180438.v1>
- 2022 ***'Source data of journal article: Inflicted Head Injury by Shaking Trauma in Infants: potential effect of spatiotemporal variation of the rotation center'***  
4TU.Centre for Research Data, <https://doi.org/10.4121/19388672.v1>.
- 2022 ***'Video annotation software'***  
4TU.Centre for Research Data, <https://doi.org/10.4121/20163926.v1>.
- 2022 ***'The analyzed data of the laparoscopic liver treatment process model'***  
4TU.Centre for Research Data, <https://doi.org/10.4121/20163968.v2>.
- 2020 ***'Forces and modi operandi of 181 music festival (Lowlands 2016) visitors smothering a dummy with a pillow'***  
4TU.Centre for Research Data, <https://doi.org/10.4121/UUID:36CA19B5-18A7-41BE-9387-DC9B3127DE61>

## Invited

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- 2023 ***Pediatric Forensic Medicine and Clinical Forensic Medicine – Soria Moria 2023***  
Invited lecture 'Interpreting Biomechanics of Inflicted Head Injury by Shaking Trauma in Infants'. Soria Moria, Oslo, Norway.
- 2022 ***European Society of Paediatric Radiology – Course on Imaging Child Abuse***  
Invited lecture 'Biomechanics of Inflicted Head Injury by Shaking Trauma'. Netherlands Forensic Institute, the Hague, the Netherlands.
- 2022 ***European Academy of Forensic Science – Conference 2022***  
Invited keynote lecture 'Infant Head Injury by Shaking Trauma – a biomechanical engineering perspective'. City Conference Center, Stockholm, Sweden.
- 2022 ***Symposium on Bioengineering – SOBE 2022***  
Invited lecture 'How harmful is shaking a baby? – Forensic Biomechanics for Infant Injury Investigations'. FEUP, Porto, Portugal.
- 2022 ***Vereniging Vertrouwensartsen Kindermishandeling en huiselijk geweld – VVAK dag 2022***  
Invited lecture 'Biomechanische gevolgen van schudden'. Utrecht.
- 2022 ***Forensic Photography Symposium***  
Invited lecture 'FreeRef - Contactless size reference for evidence photography'. University of Toronto Mississauga (online), Mississauga, Ontario, Canada.
- 2021 ***Seminars in Pediatric Neuroimaging – SPIN Annual Conference 2021***  
Invited keynote lecture 'Biomechanics of Inflicted Head Injury by Shaking Trauma in Infants'. Sydney (online), Australia.
- 2021 ***International Workshop – Improving Forensic Trace Recovery***  
Invited lecture 'FreeRef – Contactless size reference for evidence photography'. Lorentz Center (online), Leiden, the Netherlands.
- 2020 ***International Workshop – Forensic Engineering – Expert lectures 2020***  
Invited lecture 'Innovating Forensic Tools – Fighting complexity with simplicity'. Rashtriya Raksha University (online), Ahmedabad, India.
- 2019 ***Landelijk Expertise Centrum Kindermishandeling – Congress 2019***  
Invited lecture 'Biomechanische aspecten van schedelhersenletsel bij schudden'. Pathé Utrecht Leidsche Rijn, the Netherlands.



- 2019 **European Congress of Neuropathology – Forensic Course 2019**  
Invited lecture ‘Inflicted Head Injury by Shaking Trauma in Infants’. AMC, Amsterdam, the Netherlands.
- 2019 **Frontiers of Forensic Science – Lectures series 2019**  
Invited lecture ‘Modelling shaken babies’. Universiteit van Amsterdam, Amsterdam, the Netherlands.
- 2018 **Co van Ledden Hulsebosch Center – Annual Symposium 2018**  
Invited lecture ‘Innovating Forensic Tools – Fighting complexity with simplicity’. Universiteit van Amsterdam, Amsterdam, the Netherlands.
- 2017 **Forensisch Medisch Genootschap – Annual Symposium 2017**  
Invited lecture ‘Biomechanics of Inflicted Head Trauma in Infants’. Jaarbeurs, Utrecht, the Netherlands.
- 2017 **Pediatric Forensic Medicine and Clinical Forensic Medicine – Soria Moria 2017**  
Invited lecture ‘Biomechanics of Inflicted Head Trauma in Infants’. Soria Moria, Oslo, Norway.
- 2016 **European Congress of Neuropathology – Forensic Course 2016**  
Invited lecture ‘Biomechanics of Inflicted Head Trauma in Infants’. AMC, Amsterdam, the Netherlands.
- 2015 **Design of Medical Devices Conference – European Edition 2015**  
Invited session organizer ‘Design by Dissection’. ACMIT, Wiener Neustadt, Austria.
- 2014 **Workshop on Biomedical Engineering**  
Invited lecture ‘Design of a bone drill with integrated OCT optics and no coupling losses’. Universidade de Lisboa, Lisbon, Portugal.
- 2008 **European Society for Gynaecological Endoscopy**  
Invited lecture ‘Memorizing Shape’. Passenger Terminal, Amsterdam, the Netherlands.

## Conferences

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- 2022 **European Academy of Forensic Sciences – 9<sup>th</sup> conference**  
**Oral, last author** || ‘Icarus: validation of a biomechanical model of the human body for forensic fall analysis’. City Conference Center, Stockholm, Sweden.
- 2022 **European Academy of Forensic Sciences – 9<sup>th</sup> conference**  
**Poster, last author** || ‘Icarus: validating a biomechanical model for forensic fall analysis’. City Conference Center, Stockholm, Sweden.
- 2022 **BioMedical Engineering (BME)**  
**Poster, last author** || ‘DropAdjust – A precise and accurate manually controlled over-line flow regulator for gravity infusion’. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2021 **Society for Medical Innovation and Technology (SMIT)**  
**Poster, 2<sup>nd</sup> author** || ‘A novel platform for improving surgeries using surgical process modelling specifications’. Radisson Blu Scandinavia Hotel, Oslo, Norway.
- 2019 **American Academy of Forensic Sciences – Annual Scientific Meeting**  
**Poster, last author** || ‘Modeling of inflicted head injury by shaking in children: what can we learn? Part II: Mathematical and physical models’. Baltimore Convention Center, Baltimore, Maryland, U.S.A..
- 2019 **American Academy of Forensic Sciences – Annual Scientific Meeting**  
**Poster, 3<sup>rd</sup> author** || ‘Modeling of inflicted head injury by shaking in children: what can we learn? Part I: Animal models’. Baltimore Convention Center, Baltimore, Maryland, U.S.A..
- 2019 **BioMedical Engineering (BME)**  
**Oral, last author** || ‘The risk of sawing in bone’. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2019 **BioMedical Engineering (BME)**  
**Poster, 2<sup>nd</sup> author** || ‘Surgical process modelling strategies: How to determine workflow?’. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2019 **BioMedical Engineering (BME)**  
**Poster, 6<sup>th</sup> author** || ‘Sprint Splint – A 3D-printed, rapidly customized, patient specific wrist splint’. Zeeduin Hotel Egmond aan Zee, the Netherlands.

- 2018 **Co van Ledden Hulsebosc Center – Annual Symposium**  
**Poster, last author** || ‘Thresholds for the assessment of inflicted head injury by shaking trauma in infants’. Universiteit van Amsterdam, Amsterdam, the Netherlands.
- 2016 **Lowlands Science (LL16)**  
**Experiments** || ‘Finger prints on activity level’ One of nine teams selected to experiment during the Lowlands festival. Biddinghuizen, the Netherlands.
- 2015 **BioMedical Engineering (BME)**  
**Oral, 2<sup>nd</sup> author** || ‘Functional testing of a novel pulse wave velocity sensor’. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2015 **BioMedical Engineering (BME)**  
**Poster** || ‘Engineering for Forensics: Spreading of harmful bone dust due to sawing. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2015 **BioMedical Engineering (BME)**  
**Poster, 2<sup>nd</sup> author** || ‘A novel ultrasound technique for detection of osteochondral defects in the ankle joint. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2014 **Design of Medical Devices – Europe Edition (DMDeur)**  
**Oral presentation & interactive demo session** || ‘Chairlift compatible sit-snowboard for paraplegics’. Aula TU Delft, the Netherlands.
- 2013 **Wetenschapsdag Anesthesiologie (NVAw)**  
**Poster, 2<sup>nd</sup> author** || ‘Can pulse transit time be used as an objective indicator of pain?’ FIGI Zeist, the Netherlands.
- 2013 **Society for Medical Innovation and Technology (SMIT)**  
**Oral** || ‘Sub-millimeter-size opto-mechanical couplings for fast rotational OCT-scanning’. Kurhaus Baden-Baden, Germany.
- 2013 **Society for Medical Innovation and Technology (SMIT)**  
**Oral, 2<sup>nd</sup> author** || ‘Can a simple photodiode be used to detect pain?’ Kurhaus Baden-Baden, Germany.
- 2013 **Society for Medical Innovation and Technology (SMIT)**  
**Oral, 6<sup>th</sup> author** || ‘The FUSIMO prototype: Patient-specific prediction of focused ultrasound surgery in moving organs’. Kurhaus Baden-Baden, Germany.
- 2013 **BioMedical Engineering (BME)**  
**Poster** || ‘Sub millimeter-size opto-mechanical couplings for fast rotational OCT- scanning’. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2013 **BioMedical Engineering (BME)**  
**Poster, 3<sup>rd</sup> author** || ‘Effect of heat-induced pain stimuli on pulse transit time’. Zeeduin Hotel Egmond aan Zee, the Netherlands.
- 2013 **Optics in Cardiology (OIC)**  
**Poster** || ‘Opto-mechanical couplings for fast rotational OCT-scanning for sub-millimeter size applications’. Lantaren Venster Rotterdam, the Netherlands.
- 2012 **Society for Medical Innovation and Technology (SMIT)**  
**Poster** || ‘Sub-millimeter-size opto-mechanical couplings for fast rotational OCT-scanning’. AXA Auditori Barcelona, Spain.
- 2011 **BioMedical Engineering (BME)**  
**Oral** || ‘TraceWard – Contamination prevention for vaginal sampling in rape victims’. Zeeduin Hotel Egmond aan Zee, Netherlands.
- 2010 **International Conference on the Survivors of Rape**  
**Oral** || ‘TraceWard – Contamination Prevention for Vaginal Sampling in Rape Victims’. UMC Utrecht, the Netherlands.
- 2010 **Society for Medical Innovation and Technology (SMIT)**  
**Oral** || ‘PlastoLock’ Endoscope Shaft-Guide, rigidity control by safe heating’. St. Olavs Hospital Trondheim, Norway.
- 2010 **ASME Design of Medical Devices (DMD)**  
**Poster** || ‘Polymer rigidity control for endoscopic shaft-guide ‘PlastoLock’’. Radisson University Hotel Minneapolis, MN, U.S.A..

- 2010 **Nederlandse Vereniging voor Endoscopische Chirurgie (NVEC)**  
**Poster** || 'Shaft guidance for flexible endoscopes... and all that should now be rigid and then compliant'. Amersfoort, the Netherlands.
- 2009 **Society for Medical Innovation and Technology (SMIT)**  
**Oral** || 'FORGUIDE: Shaft-guide for flexible endoscopes'. Conference Casino Sinaia, Romania.
- 2009 **European Association for Endoscopic Surgery (EAES)**  
**Oral** || 'The Vacu-SL Mechanism – Vacuumized particles for rigidity control in flexible endoscopes'. Convention Centre Prague, Czechia.
- 2009 **BioMedical Engineering (BME)**  
**Oral** || 'Vacuumized particles for rigidity control in flexible endoscopes'. Zeeduin Hotel Egmond aan Zee, Netherlands.
- 2008 **Society for Medical Innovation and Technology (SMIT)**  
**Oral** || 'Review & analysis on insertion difficulties & pain during colonoscopy'. Altes AKH Vienna, Austria.
- 2008 **European Association of Endoscopic Surgery (EAES)**  
**Oral** || 'Memorizing the shape of flexible instruments'. International Fairs Stockholm, Sweden.
- 2003 **Society for Medical Innovation and Technology (SMIT)**  
**Oral** || 'Evaluation of a joystick-controlled colonoscope'. AMC Amsterdam, the Netherlands.

## Skills

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### Languages

Mother tongue Dutch and native proficiency in English (CEFR Level C2).  
 Basics in French, German and Portuguese.

### Software

Highly experienced in major software packages for typesetting, graphic design, video-editing and 3D CAD (e.g., LaTeX, Adobe, Camtasia, Pro/Engineer, Solidworks), programming and scripting (Matlab, VBA, .NET, Delphi, C++, OpenGL, Arduino, R, Python) and common office software.

### Sports & Creativity

Professional photographer. Leather crafting. Piano, organ and vocals (ensembles and solo). Wind sailing, bouldering and speed skating.

# APPENDIX

## Additional Tenure Track Related Information

## Projects Acquisition & Supervision

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### Summary

BSc. students supervised: >260 (64 groups: TUD ME, TUD KT, HvA Math)  
 MSc. students supervised: 61 (TUD ME, TUD IDE, UvA Forensic Science)  
 PhD. students supervised: 4  
 Other researchers supervised: 13  
 Resources acquired: € 3875k (medical)  
 € 680k (forensic) + 70k 2022 FreeRef = 4615k grand total

2023 – 2024

### ***Forensics-on-a-Chip: body fluids identification & analysis at the crime scene***

**Applicant & principal investigator with Hanieh Bazyar** || € 60k, Faculty 3mE, TU Delft, Cohesion

Partners: ETh/P&E  
 Supervised: Job interviews in progress.  
 Summary: Developing a novel microfluidic platform for on-scene identification and analysis of multiple forensically relevant analytes in body fluid traces.

2023 – 2024

### ***Forensic Escape Room – Expansion of MOOC Forensic Engineering***

**Co-applicant & co-leader** || € 25k, Open Edu. Fund (15k), Education Innovation Projects CIEG (10k)

Partners: TU Delft Faculty CiTg and Faculty AE  
 Supervised: Jennifer Juch.  
 Summary: Developing a virtual forensic escape room to let MOOC participants solve a “real” forensic case in the civil engineering domain: a collapsed bridge.

2022

### ***FreeRef – Contactless size reference for evidence photography – Software architecture***

**Applicant & principal investigator** || € 30k, Nederlands Forensisch Instituut

Partners: Nederlands Forensisch Instituut.  
 Supervised: Mernoud Burger (software architect).  
 Summary: Development of the FreeRef-2 software architecture.

Summary:

***A combined system of a laser projector put on a photo camera objective***

2021 – 2022

### ***FreeRef – Contactless size reference for evidence photography***

**Applicant & principal investigator** || € 91k, NFI & MinJenV Startup Hubs – Burglary Challenge

Partners: Nederlands Forensisch Instituut, Politie NL, Ministerie van Justitie en Veiligheid.

Supervised: Aaron Ang, Nordin Sahla, Moad Gerrouj, Stijn Pennings, Sherin Grimbergen, Marijn Leeuwenberg, Stephan Neevel, Jaco Verhage, Mohan Rao, Gaurav Daswani, Lars Lipman, Vincent Tedjawirja (BSc students); Lars Lipman, Luuk Schiks, Maura Cook (MSc students); Kim Hutchinson (researcher).

Summary: A combined system of a laser projector put on a photo camera objective and a software tool that recognizes the laser projections to calculate real-world dimensions in evidentiary photographs is being developed (currently TRL6). This eliminates the need for placing physical rules or stickers placed close to pieces of evidence as a size reference. With this tool, crime scene investigations will become faster, with less risk of trace contamination and reduced workload.

2020 – 2023

### ***ICARUS – Biomechanical models of people falling from heights***

**Investigator** || € 15k + € 84k, Nederlands Forensisch Instituut

Partners: Nederlands Forensisch Instituut, TU Delft NeuroMuscular Control Lab.

Supervised: Kim Hutchinson (MSc student), Vera de Vette (Researcher).

Summary: Validating biomechanical rigid-body models using fall experiments. The project aims to find out what models are suitable for use in forensic cases where a victim is found after a fall from a height to establish whether the victim jumped, fell or was pushed.

2020

### ***POXiM – Easy-to-make, easy-to-use SpO2 measurement device for pandemics***

**Applicant & principal investigator** || € 6k, ZonMw Creatieve aanpak oplossingen Coronavirus

Partners: HedoN Electronic Developments B.V., Faber Electronics, P3D, Promolding, Hogeschool van Rotterdam, Jeroen Bosch Ziekenhuis.

Supervised: Daan de Groot and Arthur Admiraal (EWI MSc students); Nick van den Berg, Linda Wauben, Jan-Willem Klok, Daniel Robertson, Thomas Lenssen, Sara Azizian Amiri, Marit van Velzen (MiSiT-lab researchers).

Summary: Design & test report for a pulse-oximeter for pandemic situations that can be built using parts, components and techniques that are readily available in the Netherlands and world-wide. (Currently at TRL 4.)

**2018 – now**

***IHI-ST – Inflicted Head Injury by Shaking Trauma in infants***

**Principal investigator** || In-kind contributions and donations plus € 25k of equipment, Oslo Universitetssykehus HF, one PhD paid by BMechE department.

Partners: Nederlands Forensisch Instituut, Oslo Universitetssykehus HF, TU Delft Biorobotics Lab, Amsterdam Universitair Medisch Centrum.

Supervised: Kim Hutchinson (PhD student), Luuk Schiks, Jip Pluim, Eva Blom (MSc students).

Summary: Together with the research partners several literature reviews and original research articles were published that stirred the field quite a bit. As a consequence, I am frequently asked (nationally and internationally) to lecture about the biomechanics of shaking an infant and about how the existing literature should and should not be interpreted in casework and in court. Recent experiments with a custom-instrument crash-test dummy obtained from our Oslo forensic partners brought exciting new insights and will hopefully soon help to clarify the many questions there are in the forensic field about the relations between shaking and injuries, and to obtain funding for further research by our consortium.

**2018 – 2022**

***“Van opsporing tot bewijsvoering: plaats delictonderzoek voor de hele strafketen” – CSI-PEEQ – Crime Scene Investigation Parameters for Efficiency, Efficacy and Quality***

**Applicant & principal investigator** || € 122k, Politie & Wetenschap

Partners: Nederlands Forensisch Instituut, Hogeschool Rotterdam, Politie NL.

Supervised: Bernard Zwienenberg, Daan Breederveld (BSc students), Daisy Pieterse, Marion van den Einden, Willeke Langenhorst, Marijke Faber, Lize Dirrix (MSc students); Maryam Gholinejad (PhD student).

Summary: Using interviews and online surveys extensive knowledge was gathered about the different goals and priorities that play a role in forensic crime scene investigations for all parties in the criminal justice system (from crime scene investigators to judges). Analysis of mock-up crime scene investigations using an in-house developed path-registration software tool showed how different crime scene investigators work in different ways and achieve different results. Eventually, the CSI-PEEQ project will help identify bottle-necks and develop solutions for improving the efficiency, efficacy and quality of crime scene investigations and for improving the benefit of it for all partners in the criminal justice system.

**2017 – 2022**

***Therminus – Thermodynamic model and quantitative measurement devices for time of death determination***

**Co-applicant & work package leader** || € 197k, Ministerie van Veiligheid en Justitie, Projectenronde 2017 II

Partners: Academisch Medisch Centrum Amsterdam, Universiteit van Amsterdam, Nederlands Forensisch Instituut, Forensic Technical Solutions B.V., Geneeskundige en Gezondheidsdienst, Politie NL (Forensische Opsporing and Expertteam Visualisatie en Reconstructie), TU Delft Industrial Design Engineering.

Supervised: Julius Prins, Vincent van Beusekom, Bastiaan Vos, Auke de Vries, Sven Drommel, Wouter van den Hoed, Yorrit Zabel, Hidde de Zwart, Laura Koopman, Tessa Kos, Anne Meester, Eris van Twist, Diana Jokic, Karen Rijnders, Thijs Elzer, Miriam Cañones Castellano, Maarten Stolk, Caitlin Ramsey, Brian Tantuo, Jaya Rupini Vijayaragavan, Sheila Serra, Gert Galis, Kyriacos Papa, Nabil El Hasnaoui, Denise Peeters, Marina Lobo Blanco, Monika Salandova, Thomas Njio, Nico Noort, Ivo Best, Jason van Schijndel, Fabian Verhage, Wing-Han Tang (BSc students), Thomas Anker, Charlotte Kaanen, Martijn van der Helm (MSc students), BartJan Maat (designer).

Summary: Devices for on-crime-scene measurement of mortal remains weight and of heat flow through clothing and into surfaces on which a cadaver rests are being developed. With these tools, crime scene investigators can quickly input essential information into the Therminus computer model for reliably and precisely estimating time of death. The weighing device is about to be tested for TRL7, the thermal properties device is at TRL4.

2016 – 2022

***HiPerNav “High Performance Soft-tissue Navigation”***

**Co-applicant & work package leader** || € 3846k, European Union Horizon 2020 - Marie Skłodowska-Curie grant

Partners: Oslo Universitetssykehus HF, Universidad de Cordoba, Norges Teknisk-Naturvitenskapelige Universitet, Unviersité Paris 13, CAScination AG, Unversität Bern, Institut National de Recherche en Informatique et en Automatique France, Stiftelsen SINTEF, Inselspital-Stiftung, Siemens Healthcare GmbH, NVIDIA Corporation, Innovasjon Norge, YES!Delft.

Supervised: Maryam Gholinejad, Chun-Feng Lai (PhD students).

Summary: The generic workflow of soft-tissue navigation in liver surgery has been established and modelled using live observations and camera footage analysis in several hospitals across Europe. Software for these purposes was built in-house and machine learning algorithms were developed to automatically detect surgical tools in laparoscopic videos. Using the acquired knowledge, a software platform for planning, navigation and training in navigated liver surgery was developed and tested. Because of the modular and generic approach in this project, the developed software and methods were also used in other medical and forensic applications. These systems are currently at TRL3.

2016 – now

***MOOC “Forensic Engineering – learning from failure”***

**Applicant & principal investigator** || € 35k + € 5k/year, TU Delft Online Learning & Delft Security Institute and edX revenues

Partners: TU Delft Civil Engineering, TU Delft Aerospace Engineering

Supervised: Lize Dirrix, Jeroen Teurlings (student-assistants).

Summary: An edX.org massive open online course about forensic engineering was built and is now brought to thousands of students worldwide each year. The forensic engineering method developed for this course was published and awarded and is since being applied more and more by professional forensic engineers in practice. Furthermore, the “Delft Approach” for forensic engineering has become an embodied part of the HvA programme “Forensic Investigation” and of the MOSHE safety course. Professionals in many different fields (nurses, pilots, lawyers, law-enforcement officers, forensic investigators) have followed and applied this MOOC in their work. Because of the high percentage of participants who choose to receive a formal certificate after completion, this MOOC is financially self-sustaining.

2015 – now

***Various forensic tools development projects and pilots***

**Applicant & principal investigator** || € 31k, Nederlands Forensisch Instituut

Partners: Nederlands Forensisch Instituut, Politie NL, Koninklijke Landmacht, TU Delft Industrial Design Engineering

Supervised: Many BSc students; Brenda van Geel, Selma Damsteeg, Jip Pluim, Lucas Jimenez Bou, Wouter Bonhof, Olaf dassing, Danique Prinsen (MSc students).

Summary: A device for contamination-free intra-vaginal sampling of potential perpetrator DNA, the TraceWard was developed and tested, showing that the current gold-standard methods are likely unreliable. A Forensic Nail Clipper (€ 10k, TRL6) was developed to allow for sinle-handed, contamination free collection of nail evidence from victims and perpetrators. The PEMAD (€ 10k, TRL7) pyrolytic analysis device was developed to replace the current subjective “hot needle test” for pyrolytic analysis with an objective, standardized test. Several budgets of <€ 5k were obtained for equipment, materials or production. Aerosol measurements in autopsy situations helped assess the risks of sawing in

bones. Research on stubbing efficiency showed how the amount of collected micro-traces with tape-lifting stubs related to the kind of textile that is sampled. Several device developments helped improving making and using tape stubs for lifting micro-traces. Our CBRNe Glove Donning Aid helped regain 5 of the 30 minutes of operational time in a hazmat suit, normally lost on changing latex gloves.

**2012 – now**      ***Hired expert for forensic engineering investigations of bacterial outbreaks related to ERCP-scopes in hospitals***  
**Independent expert investigator** || € 22k (4 cases), Dutch hospitals  
 Supervised:      Investigation teams consisting of assistants and involved participants from hospitals and manufacturers related to the case.  
 Summary:          Despite all hospital protocols, manufacturer instructions and government regulations, large bacterial outbreaks in hospitals related to ERCP endoscopes still occur occasionally, sometimes infecting many patients. In each case after extensive forensic investigation a report for the health care inspectorate was drawn up. These reports lead to world-wide improvements in ERCP-scope designs, manufacturer’s cleaning instructions, hospital protocols and hospital employees’ training. Hence contributing to patient-safety world-wide.

## Publication & Citation Metrics

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# Journal publications:	33 (+4 under review)		
# Other reports & book chapters:	5 (+1 in press)		
# First or second author items:	19		
# Last author items:	9 (+3 under review)		
Citation analysis date:	8 August 2021 <b>(to be updated)</b>		
Citation analysis sources:	Web of Science	Scopus	Google Scholar
H-index:	9	9	12
m-index:	0.9	0.9	1.1
# Citations total:	399	430	647
# Citations average per item:	14	14	22
# Citations of most cited paper:	87	97	151

## Education & Organization

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### **Education:**

**2016 – now**      ***MOOC Forensic Engineering – Learning from Failures***  
 See Section “Projects Acquisition & Supervision” for details.

**2015 – now**      ***KT3801 – Clinical Technology BSc Final Projects – 11 ECTS***  
 Course & exam designer, responsible instructor and block coordinator. Assignments acquisition from academic and peripheral medical centers, scheduling, lecturing (measuring techniques, medical device regulation, production techniques and IP-rights), coaching project groups, gathering and supervising assessment teams and jury members, chairing the KTO-HREC committee, organizing and running final symposium, grading and overall supervision and communication. Yearly guiding 80-110 Clinical Technology BSc students, 20-30 assessors and jury members, 40-70 supervisors and a 12 people strong symposium team.

**2014 – 2021**      ***KT1002 – Wiskunde 1,2 – 6 ECTS***  
 Course & exam designer, course coordinator, responsible instructor until 2019, Matlab instructor. Yearly teaching 110 Clinical Technology BSc students (900 until 2016, combined with the mechanical engineering students) with an instructors team of 5 (50 until 2016) to use Matlab for solving math problems and processing research data.

**2014 – now**      ***BM41100 – Medical Instruments B: Quality assurance in design – 3 ECTS***  
 Course & exam designer, responsible instructor. Yearly teaching 25-45 MSc students from various faculties how to design medical devices according to the applicable regulations and field norms.



This intensive course with weekly assessments is supported by guest lecturers from various companies and institutes and an assisting PhD student.

**2008 – now**

***Guest lectures, project group supervision, feedback sessions, help in assignment design***

BM3105 – Minor Biomedical Engineering

KT2950 – Academische Vorming 2: Regelgeving en Veiligheid

WB1130 – Technische Systemen

WB2308/ME41075 – Biomedical Engineering Design

WB3BEP-16 – Bachelor Eindproject

**Organization:**

Streamlined and improved the **programming curriculum** in the entire clinical technology programme by surveying lecturers and doing a detailed curriculum review (2016-2018) together with colleague Marjon Stijntjes. Coaching students in their **professional attitude** and investigating disputes between students and lecturers as a member of the KTTM professional behaviour board, which I also co-founded. Helping to **improve facilities and safety** of our faculty as member of the Hall F reorganization team and the emergency evacuation team. **Strengthening forensic networks** within and outside the TU Delft as one of the TU Delft Forensics captains, as a coordinator of the Co van Ledden Hulsebosch center for forensic science and medicine, and as an advisor of the TU Delft Safety and Security institute. I co-initiated and helped realize the TU Delft - NFI agreement on cooperation, which was signed for faculty 3mE in 2016 and for the entire TU Delft in 2021 through DSyS. See C.V. section Boards & Commissions for details.