Jeremy Kooyman

Medical Device Design Consultant

Education

2011– 2013 **MASc. Biomedical Engineering**, *University of British Columbia*, Vancouver, Canada.
Thesis Supervisor: Dr. Antony Hodgson, NSERC Design Engineering Chair

2007–2011 **BSc. Mechanical Engineering**, *Schulich School of Engineering*, Calgary, Canada.
With Distinction
Thesis Supervisor: Dr.-Ing. Robert J Martinuzzi

Professional Experience

2014–current **Mechanical Design Engineer**, *Cambridge Design Partnership*, Cambridge, UK.
CDP is a leading technology design partner with a strong medical devices client base

- Extensive project leadership experience pertaining to the creation of DHF documentation for EMA and FDA submissions of Drug/Device kits and Combination Products.
- Mechanical design experience for Class II Medical Devices, including math modelling and Solidworks design.
- Human Factors for Medical Devices training/experience including formative and summative study design, and medical device validation.

2013-2014 **Private Contractor**, *Kooyman Engineering Services Limited*, Vancouver/Calgary, Canada.
Provided mechanical/biomedical engineering design services to Western Canada.

- Designed and validated performance tests for a novel unicompartmental knee arthroplasty robot, while utilizing project management experience to advance mechanical design team towards milestones and maintain relationships with industry partners interested in commercialization of the device.
- Developed an IMU-based pelvis orientation tracker for a computer-assisted hip arthroscopy system.
- Created a novel rock climbing performance analysis device, enabling athletes to access and track key performance metrics during training cycles.
- Used injury biomechanics and ASTM standards to develop next-generation rock climbing fall protection flooring.

2013-2014 **Design Engineer**, *Arbutus Medical Engineering*, Vancouver, Canada.
Arbutus Medical Engineering is a Grand Challenges funded startup from the University of British Columbia's e@UBC incubator, designing a sterile cover to enable the use of conventional hardware drills during orthopaedic surgery in the developing world, preventing the stoppage of procedures due to sterility or drill availability problems.

- Designed and validated textile components of drill cover.
- Prototyped and manufactured textile components of the drill cover currently undergoing field testing in Uganda.

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2011, 2014 **Competitive Climbing Coach**, *Calgary Climbing Centre*, Calgary, Canada.
Worked with a group of 20+ adolescents to provide them with the tools needed to develop as both competitive climbers and young adults.
- Leveraged biomechanics and functional anatomy training to reduce youth injury rates.
- Established and maintained effective interpersonal relationships with coaches and athletes alike to enhance the impact of instruction.
- Utilized technical communication to disseminate complex training methodology while maintaining athlete motivation.

Scientific/Clinical Research Experience

Research Interests

- Medical Device Design/Regulation
- Computer-Assisted Surgery
- Human-Computer Interaction
- Orthopaedics
- Biomechanics
- Global Health

2011-2013 **Graduate Research Student**, *Neuromotor Control Laboratory*, Vancouver, Canada.
Received instruction and performed research in the areas of computer-assisted surgery, human computer interaction and human anatomy. Studied a phenomenon known as bracing, where humans will establish a secondary parallel load path during tool use to improve task performance, and how it could be applied to orthopaedic surgery.
- Applied principles of affordance, affective communication, haptics, and task analysis to design a custom user input device for Radiologists analysing volumetric DICOM files.
- Created a hip arthroscopy simulator through a combination of surgical observation, biomechanical testing/characterization of tissues and materials, and validation with orthopaedic surgeons.
- Utilized rapid prototyping skills (3DP, silicone and urethane casting, CNC, traditional wood/plastic/metal formation) to iterate on design concepts for user testing of a minimally invasive orthopaedic surgical tool brace.
- Designed and assessed accuracy of prototypes and experimental samples with Solidworks and Rapidform XOR/XOV, including laser scanning digitization.
- Formal education in medical device regulations including and ISO 13485, IEC 60601, and the regulatory paths to market. Personal interest in IEC 62366.
- Detailed dissection-based human anatomy knowledge.

2011-2012 **Engineers in Scrubs Trainee**, *University of British Columbia*, Vancouver, Canada.
Participated in the inaugural year of the Engineers in Scrubs training program, which sought to foster innovation in medical technology by training biomedical engineers in clinical environments.
- Attended a series of workshops and tours covering topics such as hospital organization and personnel roles, and the major departments and facilities at Vancouver General Hospital.
- Paired with several clinicians for dozens of hours of OR shadowing to determine their day to day priorities and operating constraints.
- Collaborated with engineering graduate students and clinicians on an 8-month course in medical innovation, aimed at applying technology to clinical needs. Delivered a solution to address an identified process problem in Vancouver General Hospital's Medical Device Reprocessing Department.

2010–2011 **Undergraduate Research Student**, *Biofilms Engineering Research Group*, Calgary, Canada.
Explored the relationship between bacteria and bioremediation as well as hydrodynamics and biofilm formation to address the environmental impact of Alberta's oil sands tailings ponds.
- Evaluated the suitability of BioTiger for the bioremediation of Oil Sands Tailings.
- Collaborated with Fluid Mechanics and Microbiology Researchers.
- Designed physical and simulation models for evaluating relationship between shear and biofilm formation.

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2009 **Undergraduate Research Student**, *Human Performance Laboratory*, Calgary, Canada.

Researched the mechanical properties of lubricating proteins extracted using mucin biochemical methods for the development of osteoarthritis theraputics.

- Created Excel macros for analyzing 20 000+ lines of data from Bose Electroforce machines.
- Developed standard operating protocols for mucin biochemical methods and cartilage biomechanical testing experimentation.

Teaching Experience

2012–2013 **Teaching Assistant**, *University of British Columbia*, Vancouver, Canada.

Responsible for two courses: BMEG 500 (Orientation to the Clinical Environment) and BMEG 501 (Interdisciplinary Team Project in Medical Technology Innovation).

- Negotiated tour arrangements with clinical and industry personnel.
- Provided mentoring to incoming Engineers-in-Scrubs students.
- Facilitated concept generation/ideation sessions for design teams.

Notable Scholarships/Awards

2011–2013 **Faculty of Applied Science Graduate Award**, *University of British Columbia*.

In recognition of academic achievement in the Faculty of Applied Science.

2011 **UBC Mechanical Engineering Department Scholar**, *University of British Columbia*.

The Department Scholar designation was created to recognize the outstanding calibre of graduate students in the Department, and their achievements in their studies and research.

2011–2012 **Alexander Graham Bell Canada Graduate Scholarship**, *Natural Science and Engineering Research Council of Canada*.

The CGS M Program provides financial support to high caliber scholars who are engaged in eligible Masters programs in Canada. Applicants are evaluated on academic excellence (50%), research potential (30%), and personal characteristics/interpersonal skills (20%).

2010 **Biomedical Engineering Distinguished Service Award**, *University of Calgary*.

In recognition of outstanding contributions to the undergraduate biomedical engineering community.

2010 **Darren Cooper Memorial Award**, *University of Calgary*.

Established in honor of Darren Cooper, a student in the Faculty of Engineering (now called the Schulich School of Engineering) from 1983-1987, the Memorial Award is given to a Mechanical Engineering student with outstanding academic performance.

2009, 2010, 2011 **NSERC Undergraduate Student Research Award**, *University of Calgary*.

Undergraduate Student Research Awards are meant to stimulate interest in research in the natural sciences and engineering. Students are evaluated on their academic record and research aptitude.

Publications

Jeremy Kooyman, Maria Cecilia Alvarez, and Tannin Schmidt. Cartilage Boundary Lubricating Properties of Native Proteoglycan 4 Purified from Normal Bovine Synovial Fluid. In *Trans Orthop Res Soc.*, page 35:255, 2010.

Maria Cecilia Alvarez, Jeremy Kooyman, and Tannin Schmidt. Synthesis of Proteoglycan 4 (PRG4) Disulfide-Bonded Multimers by Chondrocytes in Cartilage Explants. In *Trans Orthop Res Soc.*, page 35:850, 2010.

Jeremy Kooyman. *Sedimentation of Oil Sands Tailings via Microbial Treatment*. Bachelor of science, University of Calgary, 2011.

Jeremy Kooyman. *Tool bracing for performance improvement in simulated femoral*

head-neck osteochondroplasty. Master of applied science, University of British Columbia, 2013.

JJR Kooyman and AJ Hodgson. Tool bracing for performance improvement in simulated femoral head-neck osteochondroplasty. In *International Society for Computer Assisted Orthopaedic Surgery (CAOS)*, page 7, Orlando, 2013.

Intellectual Property

2014 **Drill Cover and Chuck Mechanism** *Arbutus Medical Engineering - Provisional (Filed)*

Personal Interests

Climbing	Former internationally ranked youth competitive climber. Currently coaching national-level athletes.
Cycling	Downhill, all-mountain, road, commuting.
Ultimate Frisbee	Attended the 2009 Canadian Ultimate Championships. Calgary Ultimate Association League Champions 2010.
Medical Technology	Currently writing a blog focusing on the medical device industry in order to stay current with cutting-edge technology and trends.
Movember	Best Kooyman in the world at growing a moustache. Movember Canada 2012.

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