Vijeth Rai

Rehabilitation Engineer

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Goal

To enable mobility in developing nations through accessible assistive devices.

Education

PhD Candidate Electrical Eng.
University of Washington (UW)
2020 Expected | GPA 3.75/4.0

MS Electrical Eng-Controls & Robotics
University of Colorado Boulder
2012 | GPA 3.71/4.0

BE Electronics and Communications
B.M.S College, Bangalore (VTU) 2008

Skills

Deeplearning: PyTorch, TensorFlow

Programming: C, Matlab, Python, C++, Android, Robot Operating System (ROS), OpenCV,

PCB Design/Simulation: Altium Designer, NI MultiSIM Ultiboard, ORCAD, DipTrace, Eagle, Verilog, VHDL, VxWorks, Simulink, LABView, basic 3D printing

Hardware: Motor control, FPGA, NI sbRIO, Microcontrollers, ARM based SOMs

Awards and Roles

Engineers Without Borders
- UW Chapter Ambassador Guatemala Project (2014-15)

Center for Neuro-technology
- Undergrad Research Mentor (2018)
- Travel award recipient

Graduate Professional Student Senate Conference Travel Awardee

Work Experience and Internships

Aug'14 Doctoral Researcher — University of Washington and Veterans Affairs Hospital
Deep learning and vision for prosthetic control

Mar'12 Research Engineer — Rehabilitation Institute of Chicago (RIC)
Center for Bionic Medicine (CBM) directed by Dr Todd Kuiken
Project Lead- Electronics design and support for UL prosthesis control

Sept'13 Research Engineer — Argall Lab - RIC
Adaptive control of assistive robotic JACO arm and wheelchair navigation

July'10 Research Intern — Almende B.V The Netherlands
Investigate bio-inpsired algorithms for self-assembly of modular robots

Aug'08 Research Engineer — Robonik India, Mumbai
Designed and programmed controllers for biomedical diagnostic devices

Research and Projects

Continuous Control of Prosthetic Limbs: Data-driven approach — PhD UW
Designed a unified continuous controller for diverse and non-cyclic activities. Applied neural networks for real-time prosthetic control of Open Source Leg (OSL) using body kinematics. [*Pytorch, FastAI*]

Vision for Prosthetic Mode Detection — PhD UW
Applied egocentric camera for anticipatory terrain mode classification. Novelty of this research was to use unsupervised learning to label training data and leverage transfer learning to improve generalization. [*Pytorch, FastAI*]

Visual Localization for Control of Assistive Devices — PhD UW
Applied SLAM for estimating movement in an environment for prosthetic control.

Myo-electric Control of Bionic Limbs — CBM RIC
Conceptualized and designed controllers, EMG acquisition systems. [*Altium*]
Provided hardware support to prosthetists and researchers for OttoBock Hand, BiOM Ankle,Vanderbilt Leg.

Adaptive Control of MICO 6DOF JACO Arm — Argall Lab - RIC
Implemented algorithms for semi-autonomous control of JACO arm mounted on a smart wheelchair. [*C++, ROS*]
Path planning for wheelchair navigation through doors for people with quadriplegia.

REPLICATORS - Self-Assembly in Modular Robots — Almende B.V, MS Thesis
Simulated bio-inspired algorithms for assembly and metamorphosis of modular robots into complex functional organisms.[*Delta3D,C++,Matlab*]
European Commission FP7 transnational collaborative project.

Selected Publications

Coordinated Movement for Prosthesis Control: Temporal Factors and Attention
IEEE International Conference on Biomedical Robotics & Biomechatronics (BioRob 2020)

Framework for Mode-Free Prosthetic Control for Unstructured Terrains
IEEE International Conference on Rehabilitation Robotics (ICORR 2019)

Mode-free Control of Prosthetic Lower Limbs
IEEE International Symposium on Medical Robotics (ISMR 2018)

Visual Localization System for Environment Awareness in Assistive Devices
IEEE International Engineering in Medicine and Biology Conference (EMBC 2018)

Self-Assembly of Modular Robots from finite number of modules using Graph Grammars
International Conference On Intelligent Robots and Systems (IROS 2011)

Interests & Graduate Courses

Robotics & Control: Robot Manipulation, Embedded Systems,Mechatronics, Multi-Robot Systems Optimal Control, Neural And Physiological Control, Design Of Implantable Medical Devices,Movement Control, Musculo-skeletal Biomechanics

Other: Consciousness, Free-Will, Theory of Mind, Qualia, Time