

**EDUCATION**

Ph.D Mechanical Engineering, University of South Florida

GPA: 3.15

Expected Graduation: December 2017

M.S Mechanical Engineering, University of South Florida

GPA: 3.1

Graduation: May 2014

Thesis: Design and Development of an Asymmetric Transfemoral Prosthesis

B.E Mechanical Engineering, Anna University

GPA: 3.0

Graduation: May 2012

Capstone: Design, fabrication and structural analysis of an UAV

Other Project: Design of free piston hydraulic pump for mobile robotic systems

**COMPUTER & TECHNICAL SKILLS**

- Computer Programming : C/C++, C#, .Net, Visual Basic (.Net), MatLab, SQL, Linux, ROS, and Java (Basics)
- Design Software: SolidWorks, AutoCAD, and Ansys
- Machining : 3D Printing, Laser Cutting, Milling, Band Saw, Lathe, Grinding tool, Welding, and CNC machines
- Languages : English (Proficient), Tamil (Native Speaker), Telugu (Native Speaker), Hindi (Beginner), & Spanish (Beginner)
- University of South Florida Graduate Certificate in Robotics

**PROFESSIONAL APPOINTMENTS**

Research Assistant @ Foundation for Orthopaedic Research and Education (January 2014 – March 2014)

- Performed maintenance on a shoulder prosthesis cadaver testing rig

Graduate Assistant @ Centre for Urban Transportation and Research (May 2013 – August 2014)

- Conducted Field Research on the Behavioural Habits of Motorcyclists in Florida
- Lead to a group of 5 in coordinating and collecting data

Engineering Intern @ Sumo Software Corporation (August 2013 – December 2013)

- Research and Development of possible new avenues of expanding the company's Portfolio
- Designed a product software prototype that uses Microsoft Kinect to analyse range of motion of patients pre and post orthopaedic surgery

Quality Manager Intern @ CIH Equipment Company (May 2013 – August 2013)

- Prepared documentation for ISO 17025, NIST and ILAC guidelines in order for Industrial hygiene laboratory accreditation
- Maintained Calibration Labs that dealt with Flow, Pressure, Acoustics, Light, Dust, Particle counter and Environmental chamber

**CURRENT PROJECTS**

Asymmetric Human Gait Pattern Classification Metrics

- Developing a clinical metric to quantitatively classify multiple forms of gait impairments
- The metric is developed using a novel approach to gait symmetry and through the use of machine learning
- Metric is effective at classifying Normal and impaired gait
- Metric can also be used to study the effects of different passive alterations to limbs

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## Perception Study for Human Gait with Multiple Asymmetric Gait Patterns

- Assess the perception of gait among naïve individuals and physical therapists
- They will assess videos of motion capture data played back using realistic CGI models created on the Unity Game engine
- Their assessments will be quantified in a metric to be used in the optimization of design of prosthetic and orthotic devices

## Passive Biomimetic Prosthetic Mechanisms

- Developed a Novel Prosthetic Knee Design based on Anatomical design and dimensions
- The Prosthetic Knee has a simple gear mesh design to provide the necessary motion during gait
- The Prosthetic Knee is designed to be scaled Anatomically to accommodate users of all sizes
- It is designed to be cheap and efficient to manufacture
- The initial prototypes are 3D printed using Nylon, ABS, and Metal (Stainless steel infiltrated with Bronze)

## Passive Orthotic Exoskeletons to aid in Stroke Rehabilitation Research

- Novel Knee orthosis with variable stiffness and damping to simulate stroke like gait on able bodied subjects
- Developed to quantify a clinical measure known as the Ashworth scale for knee spasticity in stroke victims
- Initial test have revealed that the system shows significant changes in a wearer's gait
- Further experimentation is required to optimize it to a stroke like gait

## Evaluation of Different Knee Heights in Transfemoral Prosthetic Users

- Testing the changes in gait dynamics when the knee height of the prosthesis is not the same as the normal
- Both prosthetic users and Able bodied subjects will be tested
- The able bodied subjects will wear a prosthetic simulator
- The prosthetic user is high functioning and will test five different locations of knee height

## ACADEMIC APPOINTMENTS

Clinical Research Assistant @ University of South Florida (January 2016 – Present)

- Assist Physical Therapist in Clinical Evaluation of the Gait Enhancing Mobile Shoe for Stroke Victims
- Assist Physical Therapist in Data Collection and Technical Support for Gait and Balance study for subjects with Friedreich Ataxia
- Assist Physical Therapist in Data Collection and Motion Capture of Prosthetic Subjects

Teaching Assistant @ University of South Florida (August 2014 – Present)

Research Assistant @ University of South Florida (January 2013 – Present)

- Conduct research on Biomechanics of Lower Limb Impairments: Prosthetic, Orthotics, Stroke, and Friedreich Ataxia
- Generate Quantification Metrics for Gait Classification using novel techniques and Machine Learning
- Quantify Perception of Gait to improve Rehabilitation Technology
- Assist in Grant writing and Research Protocols for IRB

## PATENTS

- **T. Ramakrishnan** & K.B. Reed, "Position/Weight Activated Knee Locking Mechanism". Provisional Patent filed on April 17<sup>th</sup> 2015 & Patent application submitted April 18<sup>th</sup> 2016.
- C.K.Lahiff, S.H. Kim, **T. Ramakrishnan** & K.B. Reed, "Knee Orthosis with Variable Stiffness and Damping". Provisional Patent filed on November 20<sup>th</sup> 2015 & Patent application submitted September 20<sup>th</sup> 2016.
- **T. Ramakrishnan** & K. B. Reed, "Biomimetic Transfemoral Knee with Gear Mesh Locking Mechanism". Invention Disclosure filed on July 18<sup>th</sup>

**AWARDS**

- Co-wrote supplemental grant funding with PI Dr. Kyle Reed related to National Science Foundation award #1602020. Supplement was for **\$10,000** awarded on 6/18/2016 to fund my graduate work
- Co-wrote grant funding for the American Orthotic & Prosthetic Association: “Transfemoral interfaces with vacuum assisted suspension comparison of biomechanics using the CAREn: Ischial containment versus brimless,” PI: J. Kahle, co-PI: K. B. Reed and others. **\$15,000**; 8/1/2015 – 7/31/2016

**PUBLICATIONS**

- **T. Ramakrishnan** & K.B.Reed, “Anatomically Scalable Transfemoral Knee Design”, IAJC/ISAM International Conference, November 2016
- **T. Ramakrishnan** & K.B. Reed, “Biomimetic Transfemoral Knee with Gear Mesh Locking Mechanism”, International Journal of Engineering Research and Innovation (IJERI) (Pending)
- **T. Ramakrishnan** & K.B. Reed, “Analysis of Multiple Physical Asymmetries Using Consolidated Metrics”, Journal of Human Movement Science (Pending)
- S. Carey, K. B. Reed, A. Martori, **T. Ramakrishnan**, & R. Dubey,” Evaluating the Gait of Lower Limb Prosthesis Users” The International Symposium on Wearable Robotics, October 2016, accepted.
- J. Kahle, K.B. Reed, **T. Ramakrishnan**, T. Klenow, & J. Highsmith,” The Effect of Transfemoral Prosthetic Interface Design on Gait Biomechanics Using a CAREN System: IRC Compared to Brimless” 99th AOPA National Assembly, September 2016, accepted.
- **T. Ramakrishnan**, J. Kahle, J. Highsmith, T. Klenow, & K. B. Reed,” Combined Gait Asymmetry Metric based on Biomechanics: Comparison of IRC, Brimless, & Able-body” 99th AOPA National Assembly, September 2016, accepted.
- S. Kim, I. Handzic, D. Huizenga, R. Edgeworth, M. Lazinski, **T. Ramakrishnan**, & K.B. Reed,” Initial Results of the Gait Enhancing Mobile Shoe on Individuals with Stroke” 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, August 2016.
- **T. Ramakrishnan**, H. Muratagic, & K. B. Reed, “Combined Gait Asymmetry Metric” 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, August 2016
- C. Lahiff, **T. Ramakrishnan**, S. Kim, & K. B. Reed,” Knee Orthosis with Variable Stiffness and Damping that Simulates Hemiparetic Gait” 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, August 2016,
- **T. Ramakrishnan**, C. Lahiff, A. K. Marroquin, and K. B. Reed, "Position and Weight Activated Passive Prosthetic Knee Mechanism", Proc. of the ASME 2015 International Mechanical Engineering Congress and Exposition (IMECE2015) November 13-19, 2015, Houston, USA.
- **T. Ramakrishnan**. "Asymmetric Unilateral Transfemoral Prosthetic Simulator," Master's Thesis, University of South Florida, 2014.

**SYNERGISTIC ACTIVITIES**

- Presented research at Roboticon 2016 to students in elementary through high school
- Given demonstrations to numerous groups from the community including technical presentation of the Computer Assisted Rehabilitation Environment (CAREN) system, high school students (from Steinbrenner and Plant), Girl Scouts, home school groups, and participate in the annual USF Engineering EXPO
- Member of Institute of Electrical & Electronics Engineers and Engineering in Medicine and Biology Society
- Mentored 4 undergraduate researchers in the Rehabilitation Engineering & Electromechanical Design Lab over 4 years