

# SANDESH G. BHAT

[DrSGBhat.github.io](https://DrSGBhat.github.io)

updated: October 8, 2025

Eau Claire, WI

Experienced researcher with a proven track record in driving innovative projects and leading multidisciplinary teams in biomechanics and robotics. Adept at translating complex concepts into practical solutions, contributing to advancements that shape the forefront of human motion analysis and biomechanics.

## 1. PRESENT ACADEMIC RANK AND POSITION

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**Assistant Professor for Assistive Systems and Robotics Engineering**

Aug 2025 - Present

*Physics and Astronomy Department, University of Wisconsin-Eau Claire*

*Eau Claire, WI*

- Tenure track position.
- Responsibilities include: teaching, course development, research, and research training.

## 2. EDUCATION

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**Arizona State University, Tempe, AZ**

2021

Doctor of Philosophy

GPA: 4/4

Systems Engineering

**Arizona State University, Tempe, AZ**

2017

Master of Science

GPA: 3.44/4

Mechanical Engineering

**University of Mumbai, Mumbai, India**

2016

Bachelor of Engineering

CGPA: 7.71/10

Mechanical Engineering

## 3. HONORS/AWARDS

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**Outstanding Poster**

2025

*Department of Physiology and Biomedical Engineering, Mayo Clinic*

*Rochester, MN, U.S.A.*

- Received the award for outstanding poster on "The role of neuromuscular control and electromyographic properties in maximum voluntary contraction of the muscle after brachial plexus injury".

**Editor's Choice**

2025

*The Journal of Hand Surgery*

- Article "Spinal Accessory Nerve Versus Intercostal Nerves in Gracilis Free-Functioning Muscle Transfer for Elbow Flexion in Adult Brachial Plexus Patients" was selected as editor's choice in the Volume 50, Issue 7 published July 2025.

**Finalist, Jennifer Jowsey Research Fellow Award**

2024

*Department of Orthopedic Surgery, Mayo Clinic*

*Rochester, MN, U.S.A.*

- Ranked top 3 for my research article "Enhanced Function Using a Powered Upper Extremity Exoskeleton in Patients with Brachial Plexus Injuries" within the Department of Orthopedic Surgery.

**Kelly Research Fellowship**

2023-24

*Department of Orthopedic Surgery, Mayo Clinic*

*Rochester, MN, U.S.A.*

- Received a merit-based endowed fellowship (\$60000) for the project "Real World Data Based Surgical and Rehabilitation Outcome Measures".

**Finalist, Jennifer Jowsey Research Fellow Award**

2023

*Department of Orthopedic Surgery, Mayo Clinic*

*Rochester, MN, U.S.A.*

- Ranked top 3 for my research article "Voluntary Control of Gracilis Free Functioning Muscle Transfer for Elbow Flexion: Spinal Accessory vs. Intercostal Nerve" within the Department of Orthopedic Surgery.

**Julian M. Bruner Award**

2023

*American Society for Surgery of the Hand**Toronto, Canada*

- Received the award for outstanding poster on "Voluntary neuromuscular control of the Gracilis free functioning muscle transfer for elbow flexion: Spinal Accessory Nerve vs. Intercostal Nerve"

**Outstanding Abstract and Poster**

2023

*Department of Physiology and Biomedical Engineering, Mayo Clinic**Rochester, MN, U.S.A.*

- Received the award for outstanding abstract and poster on "Design and development of a powered elbow exoskeleton for neuromuscular injuries".

**Clinical Bio-mechanics Award**

2022

*North American Congress on Bio-mechanics**Ottawa, Canada*

- Received the award for outstanding new biomechanics research targeting a contemporary clinical problem on "Characterization of elbow flexion recovery following surgery for traumatic brachial plexus injury".

**4. PREVIOUS PROFESSIONAL POSITIONS****Assistant Professor of Biomedical Engineering**

2024 - 2025

*Department of Physiology and Biomedical Engineering, Mayo Clinic**Rochester, MN*

- Appointed to the rank of Assistant Professor in recognition of my research, teaching, and scholarly contributions.

**Senior Research Fellow (post-doctoral)**

2023 - 2025

*Motion Analysis Laboratory, Mayo Clinic**Rochester, MN*

- Sustained active involvement in pioneering research within the dynamic intersection of biomechanics and robotics.
- Acquired valuable grant writing experience through collaboration with Dr. Kenton Kaufman and Dr. Alexander Shin.
- Actively participated in the submission of research proposals to prestigious institutions including NIH, NSF, DoD, and various foundations, demonstrating a strong command of the grant application process.

**Research Fellow (post-doctoral)**

2021 - 2023

*Motion Analysis Laboratory, Mayo Clinic**Rochester, MN*

- Acquired valuable research exposure under the guidance of Dr. Kenton Kaufman in the Motion Analysis Laboratory.
- Developed proficiency in the execution of clinical trials.
- Assisted in data collection, analysis, and interpretation, fostering a deeper understanding of biomechanics and motion analysis techniques.

**Graduate Services Assistant**

2019 - 2021

*Arizona State University**Mesa, AZ*

- Performed research activities to accomplish my Ph.D.

**Graduate Teaching Assistant**

2019

*Arizona State University**Mesa, AZ*

- Provided valuable support to instructors and students in the Mechanics and Strength of Materials courses (EGR 217 and EGR 343).
- Assisted in leading lectures, facilitating discussions, and conducting hands-on lab sessions.
- Graded assignments and exams, providing constructive feedback to enhance student understanding.

**Graduate Teaching Assistant-Instructor of Record**

2018 - 2019

*Arizona State University**Mesa, AZ*

- Taught the Computational Modeling of Engineering Systems course (course code: EGR 219).
- Guided undergraduate students through the complexities of Matlab, C, and other computational programming languages.

- Developed engaging lectures, assignments, and projects to foster a comprehensive understanding of the subject matter.
- Supported student learning by providing one-on-one assistance and constructive critique on coding practices.

### **Graduate Research Assistant**

2017 - 2018

*Arizona State University*

*Mesa, AZ*

- Collaborated closely with Dr. Sangram Redkar and Dr. Thomas Sugar in the field of robotics and dynamical systems as a dedicated Ph.D. student.
- Successfully conceptualized, designed, and executed a Passive Prosthetic Ankle project funded by a Small Business Innovation Research Grant.
- Performing well and contributing to the development of projects on the Universal Robots 5 and Baxter platforms.
- Demonstrated leadership by mentoring and guiding undergraduate students in their work involving Universal Robots 5 and Baxter platforms.
- Actively participated in proposal development alongside Dr. Redkar, participating in the creation of multiple proposals aimed at advancing research in the field.

### **Engineering Intern**

2017 - 2018

*NextGen Aeronautics*

*Torrance, CA*

- Tested a new markerless motion capture system and compared it with popular motion capture systems.
- Gained operational experience with a variety of motion capture systems.

## **5. SERVICE**

### **A. COMMUNITY MEMBERSHIPS AND SERVICES**

#### **Access Fund**

Member

2025 - Present

#### **Minnesota Climbers Association**

Volunteer

2025 - Present

#### **"Full Tilt" Climbing Competition, Roca Climbing and Fitness**

Volunteer Route Setter and Belayer

2023 - 2025

#### **Oraculi, Rochester, MN**

Mentor

2021 - 2025

#### **Alliance of Chicanos, Hispanics, and Latin Americans (ACHLA), Rochester, MN**

Volunteer Mechanic

2023

#### **Food for the Hungry, Inc., Tempe, AZ**

Student Volunteer as part of the Devils in Disguise initiative

2017

### **B. PEER REVIEW**

#### **Ad hoc Reviewer**

Journal of Biomechanics

2025

PLOS ONE

2024 - 2025

Annual Meeting of American Society of Biomechanics

2024 - 2025

Archives of Rehabilitation Research and Clinical Translation

2024 - 2025

Journal of NeuroEngineering and Rehabilitation

2025

BMC Medical Informatics and Decision Making

2025

IEEE Transactions on Neural Systems and Rehabilitation Engineering

2024

International Conference on Robotics and Automation

2020

IEEE Robotics and Automation Letters

2020

International Conference on Intelligent Robots and Systems

2020

## **6. PROFESSIONAL MEMBERSHIPS AND SOCIETIES**

**American Society for Biomechanics (ASB)**

Member

2023 - Present

**Orthopedic Research Society (ORS)**

Member

2023 - 2024

**The American Society of Mechanical Engineers (ASME)**

Member

2018 - 2021

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**7. EDUCATIONAL INTERESTS AND ACCOMPLISHMENTS**

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**A. TEACHING****General Physics (PHYS 211)**

Fall 2025

*12 student contact hours: Instructor (In person lecture and lab)**University of Wisconsin-Eau Claire, WI*

- Taught 4 lecture hours and 6 lab hours every week.
- Instructed undergraduate students in the core concepts of mechanics, heat, wave motion, and sound.

**Musculoskeletal Research Conference**

Mar 2025

*Featured Presenter, Department of Orthopedic Surgery**Mayo Clinic, Rochester, MN*

- Presented my research on the neuromuscular control, outcome measures, and assistive devices for the brachial plexus injury population.

**Upper extremity neuromuscular control in the aging population**

Sept 2024

*Guest Lecturer, The Katies for Aging Research and Equity (KARE) program**St. Catherine University, MN*

- Explored the application of biomechanics and the study of neuromuscular control in the elderly.

**Musculoskeletal Research Conference**

Jan 2024

*Featured Online Presenter, Department of Orthopedic Surgery**Mayo Clinic, Rochester, MN*

- Presented the applicability of at-home accelerometry as a diagnostic measure of limb use post surgery

**Biomedical Applications of Engineering Principles**

Dec 2023

*Guest Lecturer, Graduate School of Biomedical Engineering and Physiology**Mayo Clinic, Rochester, MN*

- Explored the basics of mechatronics engineering with possible applications to biomedical engineering

**Engineering Mechanics Fundamentals (EGR 217)****Mechanics of Solid Materials (EGR 343)**

Fall 2019

*3 credits: In person teaching assistant**Arizona State University, Mesa, AZ*

- Provided support to instructors and students
- Assisted in leading lectures, facilitating discussions, and conducting hands-on lab sessions
- Graded assignments and exams, providing constructive feedback to enhance student understanding

**Computational Modeling of Engineering Systems (EGR 219)**

Fall 2018 - Spring 2019

*3 credits: Lecturer (In person and hybrid)**Arizona State University, Mesa, AZ*

- Guided undergraduate students through the complexities of Matlab, C, and other computational programming languages
- Developed engaging lectures, assignments, and projects to foster a comprehensive understanding of the subject matter
- Supported student learning by providing one-on-one assistance and constructive critique on coding practices

**B. MENTORSHIP**

<b>Individual and Position</b>	<b>Timeframe</b>	<b>Outcomes</b>
Ninow, Hadley ( <i>Summer Undergraduate Research Fellowship, Mayo Clinic, MN</i> )	05/2024 - 08/2024	Conducted a scoping review on the patient reported outcomes currently used in clinical trials for elbow orthoses, focusing on their reliability and validity. Publication in Prosthetic and Orthotic International: <i>Patient-Reported Outcome Measures used in Clinical Trials of an Elbow Orthosis: A Scoping Review</i> .
Nuckles, Devin ( <i>Summer Undergraduate Research Fellowship, Mayo Clinic, MN</i> )	05/2025 - 08/2025	Performed an estimation of metabolic energy consumption and fatigue during sustained elbow flexion after a free functioning muscle transfer for patients with a brachial plexus injury. Ms. Nuckles presented a poster and an article was submitted to a well reputed journal.

## 8. INSTITUTIONAL/DEPARTMENTAL ADMINISTRATIVE RESPONSIBILITIES

### A. COMMITTEE MEMBERSHIPS

**Graduate Faculty, University of Wisconsin-Eau Claire**  
Member 2025 - Present

### B. STUDENT ADVOCACY

**Graduate and Professional Student Association, Arizona State University**  
Director of Outreach 2020 - 2021  
Engineering Assembly member 2019 - 2020

**Mechanical Engineering Students Association, University of Mumbai**  
Student President 2015 - 2016  
Treasurer 2014 - 2015

## 9. PRESENTATIONS EXTRAMURAL

### A. ORAL PRESENTATION

#### National/ International

IEEE TNSRE invited article session [DOI](#) May 2025  
International Consortium for Rehabilitation Robotics at RehabWeek 2025  
Chicago, IL

Enhanced Functionality Using a Powered Upper Extremity Exoskeleton August 2024  
2024 Military Health System Research Symposium  
Kissimmee, FL

Improvement in function for patients with brachial plexus injuries using a powered elbow orthosis August 2024  
American Society of Biomechanics 2024 Annual Meeting  
Madison, WI

Stability analysis for the quantitative assessment of progressive supranuclear palsy affected gait August 2023  
American Society of Biomechanics 2023 Annual Meeting  
Knoxville, TN

Real-world evidence-based measurement of upper extremity activity June 2023  
Gait and Clinical Movement Analysis Society 2023 Annual Meeting  
High Point, NC

Invariant manifolds in human joint angle analysis during walking gait August 2020  
2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference  
Virtual Conference

Reconstruction of ground reaction force data using Lyapunov Floquet theory and invariant manifold theory August 2020  
 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference  
 Virtual Conference

Development of a passive prosthetic ankle with slope adapting capabilities November 2018  
 2018 International Mechanical Engineering Congress and Exposition  
 Pittsburgh, PA

Design and development of an unmanned underwater vehicle (UUV) in the form of a cuttlefish November 2018  
 2018 International Mechanical Engineering Congress and Exposition  
 Pittsburgh, PA

## B. POSTER PRESENTATION

### National/ International

The role of neuromuscular control and electromyographic properties in maximum voluntary contraction of the muscle after brachial plexus injury August 2025  
 American Society of Biomechanics 2025 Annual Meeting  
 Pittsburgh, PA

Empowering movement: A HITL proportional controller for assisted elbow flexion in BPI August 2025  
 2025 Military Health System Research Symposium  
 Kissimmee, FL

Voluntary neuromuscular control of gracilis free functioning muscle transfer for elbow flexion: Spinal Accessory Nerve vs Intercostal Nerve February 2024  
 Orthopedic Research Society 2024 Annual Meeting  
 Long Beach, CA

Design and development of a powered elbow exoskeleton for neuromuscular injuries August 2023  
 2023 Military Health System Research Symposium  
 Kissimmee, FL

Analysis of a periodic force applied to the trunk to assist walking gait March 2019  
 2019 Wearable Robotics Association Conference  
 Scottsdale, AZ

## 10. RESEARCH INTERESTS

Robotic Prosthetics/Orthotics  
 Biomechanical Robot Design  
 Rehabilitation Science  
 Upper Extremity Function Enhancement  
 Translational Biomechanics  
 Application of Nonlinear dynamics to gait and balance

## 11. RESEARCH GRANTS AWARDED

### A. COMPLETED GRANTS

#### Federal

Responsibility	Grant title	Active date
Postdoctoral	Intraoperative Optimization and Validation of Musculoskeletal	09/2024 -
Research Fellow	Reconstruction. Funded by the U.S. Department of Veterans Affairs	07/2025
(IPA)	(RX-002462-01-A1)	
Postdoctoral	Myoelectrically-Controlled Power-Assist Upper-Extremity	09/2020 -
Research Fellow	Exoskeleton. Funded by U.S. Army Medical Research Acquisition	06/2024
	Activity (W81XWH-20-1-0923)	

## 12. SOCIETAL AND POLICY IMPACTS

1. **How long can you stand like a flamingo? The answer may reflect your age, new study says.**  
Taylor Nicoli, CNN  
<https://edition.cnn.com/2024/10/23/health/balance-one-leg-old-age-wellness/index.html>  
Study cited: <https://doi.org/10.1371/journal.pone.0310764>  
Similar news articles appeared in more than 300 news outlets (including the Washington Post, Al Jazeera, MSN Health, WebMD, and Dr. Radio on SiriusXM) internationally.

### 13. BIBLIOGRAPHY

Please find the updated links to my publications on [Google Scholar](#)

Shared first authorship is marked by \*, Mentored articles and mentees are marked by #

#### A. PEER REVIEWED ARTICLES

1. **Bhat SG\***, Ali F\*, Hogen CA, Rezaei A, Josephs KA, Whitwell JL, Kaufman KR. Dynamic Stability Analysis of Progressive Supranuclear Palsy affected gait using Lyapunov Floquet Theory. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. (in-press)
2. Ninow HT #, Barman A, **Bhat SG**, Wilson G, Kaufman KR. Patient-Reported Outcome Measures used in Clinical Trials of an Elbow Orthosis: A Scoping Review. *Prosthetics and Orthotics International*. 2025 May; 10-1097.
3. **Bhat SG**, Shin AY, Kaufman KR. Real-World Evidence-Based Outcomes to Measure Upper Extremity Activity in The Brachial Plexus Injury Population. *European Journal of Orthopaedic Surgery and Traumatology*. 2025 July; 35(1):290.
4. **Bhat SG**, Bishop AT, Spinner RJ, Kaufman KR, Shin AY. Spinal Accessory Nerve vs Intercostal Nerves in Gracilis Free Functioning Muscle Transfer for Elbow Flexion in Adult Brachial Plexus Patients. *Journal of Hand Surgery*. 2025 July; 50(7):837-845.
5. Kumar R, Hamouda AM, Pennington Z, Astudillo MD, Shafi M, Hallak H, **Bhat SG**, Rezaei A, Jusué-Torres I, Graff-Radford J, Jones DT, Botha H, Cutsforth-Gregory JK, Ali F, Cogswell PM, Kaufman KR, Elder BD. Evaluating longitudinal changes of gait parameters following shunt placement in patients with idiopathic normal pressure hydrocephalus. *Journal of Neurosurgery*. 2025 Jun 13;1(aop):1-8.
6. **Bhat SG\***, Miller EJ\*, Kane PH, Hollander K, Vignola C, Shin AY, Sugar TG, Kaufman KR. Enhanced functionality using a powered upper extremity exoskeleton in patients with brachial plexus injuries. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. 2025 Feb 13 vol. 33, pp. 780-786.
7. Miller EJ, **Bhat SG**, Kane PH, Shin AY, Kaufman KR. Myoelectric performance of the reconstructed elbow flexor in patients with brachial plexus injuries. *Journal of Electromyography and Kinesiology*. 2024 Nov 9:102944.
8. Rezaei A, **Bhat SG**, Cheng CH, Pignolo RJ, Lu L, Kaufman KR. Age-related Changes in Gait, Balance, and Strength Parameters: A Cross-sectional Study. *PLoS ONE*. 2024 Oct; 19(10): e0310764.
9. **Bhat SG**, Kaufman KR. Dynamical systems theory applied to short walking trials. *Journal of Biomechanics*. 2024 Sep 21:112331.
10. Vignola C\*, **Bhat SG\***, Hollander K, Kane P, Miller E, Martin WB, Shin AY, Sugar TG, Kaufman KR. Design and Development of a Powered Myoelectric Elbow Orthosis for Neuromuscular Injuries. *Military Medicine*. 2024 Sep;189(Supplement 3):585-91.
11. **Bhat SG**, Shin AY, Kaufman KR. Upper extremity asymmetry due to nerve injuries or central neurologic conditions: a scoping review. *Journal of Neuroengineering and Rehabilitation*. 2023 Nov 9;20(1):151.
12. **Bhat SG**, Miller EJ, Shin AY, Kaufman KR. Muscle activation for targeted elbow force production following surgical reconstruction in adults with brachial plexus injury. *Journal of Orthopaedic Research*. 2023 Sep;41(9):2032-9.
13. **Bhat SG**, Noonan EJ, Mess G, Miller EJ, Shin AY, Kaufman KR. Characterization of elbow flexion torque after nerve reconstruction of patients with traumatic brachial plexus injury. *Clinical Biomechanics*. 2023 Apr 1;104:105951.
14. **Bhat SG**, Subramanian SC, Redkar S. Order reduction of nonlinear quasi-periodic systems subjected to external excitations. *International Journal of Non-Linear Mechanics*. 2022 Jun 1;142:103994.

15. Subramanian SC, **Bhat SG**, Redkar S. Applications of symbolically computed Lyapunov-Floquet transformation. *International Journal of Nonlinear Dynamics and Control*. 2022;2(2):97-115.
16. **Bhat SG**, Subramanian SC, Sugar TS, Redkar S. Application of Floquet theory to human gait kinematics and dynamics. *Journal of Mechanisms and Robotics*. 2021 Dec 1;13(6):061003.
17. **Bhat SG**, Sugar TG, Redkar S. Invariant manifolds in human joint angle analysis during walking gait. *In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference 2020 Aug 17* (Vol. 83914, p. V002T02A031). American Society of Mechanical Engineers.
18. **Bhat SG**, Sugar TG, Redkar S. Reconstruction of ground reaction force data using Lyapunov Floquet theory and invariant manifold theory. *In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference 2020 Aug 17* (Vol. 83990, p. V010T10A047). American Society of Mechanical Engineers.
19. Le T, **Bhat SG**, Subramanian SC, Waswa PM, Redkar S. Design and analysis of an auto-parametrically excited platform for active vibration control. *In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference 2019 Aug 18* (Vol. 59261, p. V006T09A046). American Society of Mechanical Engineers.
20. **Bhat SG**, Cherangara S, Olson J, Redkar S, Sugar TG. Analysis of a periodic force applied to the trunk to assist walking gait. *In 2019 Wearable Robotics Association Conference (WearRAcon) 2019 Mar 25* (pp. 68-73). IEEE.
21. **Bhat SG**, Redkar S, Sugar TG. Development of a passive prosthetic ankle with slope adapting capabilities. *In ASME International Mechanical Engineering Congress and Exposition 2018 Nov 9* (Vol. 52026, p. V003T04A018). American Society of Mechanical Engineers.
22. Cherangara Subramanian S, Le T, Olson J, **Bhat SG**, Redkar S. Design and Development of an Unmanned Underwater Vehicle (UUV) in the Form of a Cuttlefish. *In ASME International Mechanical Engineering Congress and Exposition 2018 Nov 9* (Vol. 52040, p. V04BT06A020). American Society of Mechanical Engineers.
23. **Bhat SG**, Redkar S. Volitional control of an active prosthetic ankle: a survey. *International Robotics and Automation Journal*. 2018 Nov 27;4:380-8.

## B. ABSTRACTS

1. Rezaei A, **Bhat SG**, Cheng CH, Pignolo RJ, Lu L, Kaufman KR. Single-Leg Stance is the Best Predictor of Aging. *2025 Congress of the International Society of Biomechanics*, July 2025, Stockholm, Sweden; P3:015
2. **Bhat SG**, Shin AY, Kaufman KR. Voluntary neuromuscular control of gracilis free functioning muscle transfer for elbow flexion: spinal accessory nerve vs intercostal nerve. *In Orthopedic Research Society 2024 Annual Meeting*, February 2024, Long Beach, CA; Paper No. 1166
3. **Bhat SG**, Shin AY, Kaufman KR. Voluntary neuromuscular control of gracilis free functioning muscle transfer for elbow flexion: spinal accessory nerve vs intercostal nerve. *In Scientific ePoster Abstract Book, American Society for Surgery of the Hand*, October 2023, Toronto, Canada; p 42, ePoster 20
4. **Bhat SG**, Ali F, Hogen CA, Josephs KA, Whitwell J, Kaufman KR. Stability analysis for quantitative assessment of progressive supranuclear palsy affected gait. *In Orals Part 1, American Society of Biomechanics*, August 2023, Knoxville, TN; p 5.
5. Noonan EJ, **Bhat SG**, Mess G, Miller EJ, Kane P, Shin AY, Kaufman KR. Characterization of elbow flexion recovery following surgery for traumatic brachial plexus injury. *In North American Congress on Biomechanics*, August 2022, Ottawa, Canada; Winner of Clinical Biomechanics Award.
6. **Bhat SG**, Shin AY, Kaufman KR. Real-world evidence of upper extremity asymmetry. *In North American Congress on Biomechanics*, August 2022, Ottawa, Canada; Poster P1-189

## C. THESIS

1. **Bhat SG**. Dynamical Systems Theory and its Application to Human Gait Analysis. Doctoral dissertation, *Arizona State University*; 2021.
2. **Bhat SG**. Design and Development of a Passive Prosthetic Ankle. Master's Thesis, *Arizona State University*; 2017.