

Clemson University,  
Clemson, SC  
USA  
☎ 352 317 1950  
✉ nkumar-  
curl@gmail.com  
🌐 nitheshk.org  
in nithesh-kumar-  
073958120

# Nithesh Kumar

## PhD Student in Electrical Engineering

*Research in Robotics, Architectural robotics, Robotics Prototyping, Adaptive Environments, and Bio-Sensing Technologies.*

### Summary

I am a PhD candidate in Electrical and Electronics Engineering at Clemson University, specializing in robotics hardware development with a focus on architectural robotics. My dissertation centers on the Robot-Rooms, which explores morphing robotic surfaces and re-configurable environments that envelop and adapt to human needs. This research represents a transformative approach to human-robot interaction, allowing spaces to physically evolve in response to occupants' activities. In addition to my dissertation work, I have led the development of continuum robots and hybrid robotic grippers. I have also worked on bio-sensing technologies, developing rugate filters for colorimetric biosensing. I have successfully designed innovative systems like a self-deploying space bridge and a self-reorienting tent. My research is grounded in rapid prototyping and human-centered design, as evidenced by user studies integrated into the Robot-Rooms project. My experience extends to industry, where I worked as an Electrical Engineer at Fiber Mountain, designing PCBs and test fixtures. I hold a Six Sigma Green Belt certification and am proficient in tools such as OrCAD and Allegro PCB. I am passionate about advancing robotics research and contributing to academic projects focused on adaptive environments, robotics-assisted systems, and human-centered technology.

### Research Interests

- Robotics
- Bio-sensing technologies
- Adaptive environments
- Robot-assisted living spaces
- Structural color sensors
- Continuum robotics
- Hybrid robotic grippers

### Education

**PhD in Electrical and Electronics Engineering**, *Clemson University*, **2020–Present**  
Clemson, SC, *Expected Graduation: 2025*.  
Research focus: Robotic surfaces and bio-sensing devices for adaptive living spaces.

**Bachelor of Science in Electrical and Electronics Engineering**, *University of New Haven*, West Haven, CT, **2013–2017**  
*Graduated May 2017*.

### Research Experience

- Graduate Research Assistant**, *Clemson University*, Clemson, SC. **2020–Present**
- Spearheaded the design and prototyping of adaptive "Robot Rooms," reconfigurable robotic living spaces addressing space constraints through advanced CAD modeling, 3D prototyping, and equitable design.
  - Developed hybrid robotic grippers, increasing object manipulation efficiency by 30%.
  - Designed a self-deploying 'space bridge' and other robotic prototypes.
  - Researched dual-band porous silicon rugate filters for optical bio-sensing.
  - Mentored and supervised an undergraduate student through project semesters, providing guidance on experimental design, data analysis, and prototyping.
  - Published findings in peer-reviewed journals and conferences.

## Professional Experience

**Electrical Engineer**, *Fiber Mountain*, Cheshire, CT.

2017–2020

- Designed PCB test fixtures and FPGA circuits for Fiber Mountain's product line.
- Reduced production errors by redesigning application circuits for the SENSUS product line.
- Managed cross-functional agile teams, reducing time-to-market by 15%.

## Teaching Experience

**Invited Guest Lecturer**, *Clemson University*, Clemson, SC.

2023

Course: ECE 8690 – Advanced Kinematics in Robotics.

**Teaching Assistant**, *Clemson University*, Clemson, SC.

2022–2024

Course: ECE 8680 – Architectural Robotics.

**Teaching Assistant**, *University of New Haven*, West Haven, CT.

2014–2017

- Tutored Pre-Calculus, Analog Circuits, and other Electrical Engineering courses.
- Assisted with grading, mentoring students, and organizing instructional materials.

## Publications

**2024: N. Kumar**, H.M. Chao, B.D.D.S. Tassari, E. Sabinson, I.D. Walker, K.E. Green, "Design of Two Morphing Robot Surfaces and Results from a User Study On What People Want and Expect of Them, Towards a 'Robot-Room'," **Presented at 2024 IEEE International Conference on Robotics and Automation (ICRA)**.

**2024: N. Kumar**, E.M. Dos Santos, T.H. Talukdar, J.D. Ryckman, "Quantitative Dynamic Structural Color: Dual-Band Hyperchromatic Sensing with Mesoporous Metamaterials," *Advanced Optical Materials*, 2401152. **(Featured on the cover of the issue)**.

**2024: P. Malhotra, N. Kumar**, C. Frazelle, I.D. Walker, G. Lv, "Soft Robotics for Fall Mitigation: Preliminary Design and Evaluation of a Wearable System using Continuum Robots," **Presented at 2024 6th International Conference on Reconfigurable Mechanisms and Robots (ReMAR)**.

**2023: N. Kumar**, E.M. Dos Santos, T.H. Talukdar, J.D. Ryckman, "Spatiotemporally Resolved Dual-band Hyperchromatic Structural Color with a Mesoporous Metamaterial," **Abstract Presented at CLEO: Science and Innovations, SF1A.6**.

**2023: I.D. Walker, N. Kumar**, K.E. Green, "Animated Surfaces for Novel Robot-Rooms," **Abstract Presented at Human-Focused Robotics Workshop (HFR2023)**.

## Technical Skills

**PCB Design:** OrCAD, Allegro PCB

**Programming:** MATLAB, ARM Microcontrollers, C

**3D Modeling:** SOLIDWORKS

**Other Tools:** SMT Soldering, Linux, Arena PLM, Jira, Agile Project Management

## Leadership and Service

**Graduate Student Government Delegate, *Clemson University*, Clemson, SC, 2020–2023**

- Represented graduate students in policy discussions in the Graduate Student Senate.
- Served as a member of the GSG Activities Committee, responsible for planning, organizing, and running events for graduate students.

**Project Lead and Mentor, Robot-Rooms Project, *Clemson University*, Clemson, SC, 2021–2023**

- Managed and mentored a team of multidisciplinary undergraduate students, facilitating collaboration across engineering and design disciplines to advance the Robot-Rooms project.
- Oversaw project tasks, guiding students in prototype development, experimental design, and achieving project milestones in a structured timeline.

## Press and Media Coverage

This Clemson News article features my former advisor, Dr. Judson Ryckman, and myself discussing our work on nano-manufactured sensor chips. The research, which aims to make diagnostic tests more accessible through visible color changes, directly contributed to our publication in *Advanced Optical Materials*.

Link to article: [New Research Could Open the Door to Quick, Simple Diagnostic Tests.](#)

## Certifications

Six Sigma Green Belt (CSSGB)