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Parichit Kumar

PhD Candidate, University of Waterloo

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More than 5 years of research and technical experience within the field of engineering, with a specialization in Mechanical and Mechatronics Engineering. Developed expertise in the field of magnetism, magnetic levitation, additive manufacturing, control systems, sensor implementation and design engineering. I am highly motivated and thrive within team environments with an ability to collaborate with experts from a wide variety of fields. Exceedingly adept at problem-solving and debugging complex engineering problems.

EDUCATION

Doctorate of Philosophy - Mechanical and Mechatronics Engineering , <i>University of Waterloo, Canada</i>	Dec 2019-Present
Masters of Engineering- Mechanical and Mechatronics Engineering , <i>University of Waterloo, Canada</i>	Sep 2017 - Dec 2019
Graduate Diploma - Design Engineering , <i>University of Waterloo, Canada</i>	Sep 2017 - Dec 2019
Bachelors of Technology - Mechanical Engineering , <i>National Institute of Technology Karnataka, India</i>	May 2013 - May 2017

TECHNICAL EXPERIENCE

PhD Candidate **Dec 2019 - Present**
University of Waterloo *Waterloo, Canada*

- **Research Topic: Development and Implementation of Magnetic Levitation system for Additive Manufacturing (3D Printing)**
- Conducted extensive background research to highlight the initial viability of the application of magnetic levitation systems within additive manufacturing environments.
- Use of tools like ANSYS Maxwell, ANSYS Wrokbench, Solidworks, MATLAB among others to design, optimize and develop a novel magnetic levitation system for additive manufacturing applications
- Selection of hardware components to facilitate implementation of the system while offering maximum operational flexibility.
- Experimental implementation of hardware. This included calibration, testing and debugging of the hardware.
- Verification of simulation data with experimental testing
- Maintaining compatibility of the magnetic levitation system with additive manufacturing operations. This entails ensuring stable levitation while accounting for additive manufacturing environment, powder deposition among other factors

Systems Engineer **Apr 2018 - Sep 2018**
Living Architecture Systems Group *Toronto, Canada*

- Worked with experts from fields like architecture, design, psychology and engineering to develop artificial infrastructure capable of mimicking living entities
- The 'living architecture' worked on the principle of using an array of sensors communicating at the sub-system level, system level and super-system level to generate a wide variety of behaviors to mimic living systems
- Use of tools like C, C++, MATLAB, Python among others to develop the system responses using several communication protocols like OSC, TCP, UDP and Serial communication
- Use of sensors like IR sensors, GRID Eye, proximity sensors, mic sound sensors and actuators like DC motors, LED arrays, speakers amongst several others to develop the system

Masters of Engineering Student **Sep 2017 - Dec 2018**
University of Waterloo *Waterloo, Canada*

- Obtained a specialization within the field of Design Engineering
- Collaborated with several external partners for detailed projects, therefore getting a deep insight within problem solving & debugging with strict deadlines
- Collaborated with Living Architecture Systems Group for the development of a motion and direction sensitive living architecture response using a GridEye sensor and an array of IR sensors
- Collaboration with Orthopedic Bracing Solutions Inc. for the development of a shoulder brace to facilitate significant reduction in number of repeated shoulder dislocations
- The collaborations facilitated detailed learning in a wide variety of fields like design, bio-mechanics, sensor fusion and control systems

Summer Research Intern **May 2016 - Jul 2016**
Tata Motors LLC *Pune, India*

- The installation and subsequent implementation of preventive maintenance using SAP PM (Preventive Maintenance) Module.
- The work was carried out in teams of four under the supervision of the lead plant engineer.
- The work included the study of plant equipment, analysis of electronic and structural integrity of the equipment and subsequent prescription of maintenance operations. This work resulted in automated scheduled maintenance operation for all active machinery.
- Responsibilities ranged from analysis of maintenance operations to determining the work power needed and subsequent implementation of the system.

SKILLS

Electrical Simulation	ANSYS Maxwell, Simplorer, PartSim, Falstad Circuit Simulator
Design & Simulation	ANSYS Workbench, Solidworks
Programming	MATLAB, C++, \LaTeX
Machine Shop	Lathes, Drill Press, Milling Machine

LEADERSHIP & TEAMWORK EXPERIENCE

Teaching Assistant

Sep 2019 - Present

Design Engineering Courses, University of Waterloo

Waterloo, Canada

- Served as a Teaching Assistant (TA) 7 different times for 3 different design engineering courses
- The course structure entails the TAs playing the role of the primary supervisor and the first point of contact for all the teams.
- The Professor (serving the role of CEO) is consulted if/when necessary.
- Key responsibilities included receiving weekly updates from teams regarding the progression of the work and contributions to primary objective and providing guidance to keep the teams on track to accomplish said objectives in weekly meetings
- Working as a TA for the course has given me the ability to manage 10-15 teams working on independent projects simultaneously.

Student Committee Member

Sep 2020 - May 2021

Council for Responsible Innovation and Technology (CRIT), University of Waterloo

Waterloo, Canada

- The inherent nature of engineering design and development of a new system is driven by innovation.
- Optimizing the performance of any engineering system responsibly and ethically is crucial to the innovative nature of the field.
- Opportunity to collaborate with experts from a wide variety of fields.
- Key contribution of the work revolved around development of a workshop that is aimed at anyone who is actively involved in the development and deployment of data driven technologies, with a strong emphasis on ethics. The work was conducted in collaboration with Open Roboethics Institute (ORI).

Vice President - Communication

Sep 2020 - May 2021

Mechanical and Mechatronics Graduate Student Association (MMEGA), University of Waterloo

Waterloo, Canada

- Developed skills to facilitate improved community engagement within the department of Mechanical and Mechatronics Graduate Student community
- Served as a key member to expand the reach of the association through posters, website, events on social media etc.
- Special emphasis was placed on maintaining transparency of MMEGA by posting the meeting minutes on the website and developing a platform where students could file in their inquiries/complaints (if any).

PUBLICATIONS

- **P. Kumar**, Malik, S., Toyserkani, E., Khamesee, M. B. (2022). Development of an Electromagnetic Micromanipulator Levitation System for Metal Additive Manufacturing Applications. *Micromachines*, 13(4), 585.
- **P. Kumar**, Malik, S., Toyserkani, E., and Khamesee, B., "Design and Analysis of a Magnetic Levitation Systems for Additive Manufacturing (AM) Applications", in HI-AM (Holistic Innovation In Additive Manufacturing) Conference, Online, 2021, vol. 4, p. 45. 2021
- S. Malik, **Kumar, P.**, Toyserkani, E., and Khamesee, B., "An Analytical Approach in the Design of a Complex Electromagnetic Levitation System for Additive Manufacturing", HI-AM (Holistic Innovation In Additive Manufacturing) Conference, vol. 4. NSERC, p. 45, 71, 2022
- J. Tung, **Kumar, P.**, and Mohammadbagher, E., "Design logs for instructional support: Early observations from implementation in 3rd year project course", in Canadian Design Workshop Schedule, 2020
- **P. Kumar**, Toyserkani, E., and Khamesee, B., "Design, Optimization, and Validation of a Magnetic Levitation System for Additive Manufacturing", HI-AM (Holistic Innovation in Additive Manufacturing), vol. 3. NSERC, p. 25, 41, 2020
- **P. Kumar**, Huang, Y., Toyserkani, E., and Khamesee, M. Behrad, "Development of a Magnetic Levitation System for Additive Manufacturing: Simulation Analyses", *IEEE Transactions on Magnetics*, vol. 56, no. 8, pp. 1-7, 2020
- **P. Kumar**, Toyserkani, E., and Khamesee, B., "Magnetic Levitation for Additive Manufacturing", HI-AM (Holistic Innovation in Additive Manufacturing), vol. 2. p. 21, 43, 2019

AWARDS

- 3rd Place - HI-AM Conference: Placed in 3rd place at the Holistic Innovation for Additive Manufacturing (HI-AM) conference in June 2021 for the poster titled "Design and Analysis of a Magnetic Levitation Systems for Additive Manufacturing Applications".
- UW Graduate Scholarship: These scholarships are awarded by the Faculty of Engineering in recognition of special achievements of graduate students. Awarded in Fall 2019, Spring 2020, Fall 2020, Fall 2021 terms.
- International Doctoral Student Award: Awarded from 2019 - Present.