

# Sambad Regmi

## Curriculum Vitae

📄 Personal Web Page

### Research Interests

- Theory Data analysis; Experiment design; Human biomechanics; Kinematics and dynamics of robots and robotic manipulators; Manipulator design; Rehabilitation robotics; Robotics, mechatronics, and controls (alphabetical order)
- Application Control applications such as impedance control; Data acquisition system; Motors, motor drives, sensors, and controller systems; real-time systems; Rehabilitation robotics; Robotics and mechatronics (alphabetical order)

#### Summary

My research interests mainly lie within the field of:

- Mechatronics, Robotics, and Control
- Human-Human and Human-Robot Interaction
- Robotic Manipulators
- Rehabilitation Robotics
- Kinematics and Dynamics of the System

### Education

- May 2022 **Ph.D, Mechanical Engineering**, *Missouri University of Science and Technology*, Rolla, MO, (GPA: 3.933).  
Dissertation Title: “Development of an Interactive Robot for Overground Physical Human-Robot Interaction”  
Advisor: Dr. Yun Seong Song
- Jun 2016 **B.E, Mechanical Engineering**, *Visvesvaraya Technological University*, Bangalore, India, (85%).

### Professional Experience

- May 2022 – **Senior Mechatronics Engineer**, *ASML*, Wilton - CT.
- Present
  - Working with system architects in a multi-discipline project team to develop concepts, perform engineering analysis, and build and test prototypes
- Aug 2017 – **Graduate Research Assistant**, *Missouri University of Sci. and Tech.*, Rolla, MO.
- Apr 2022
  - Designed and developed robotic manipulator for physical human robot interaction experiments; Selected required hardware and software for the robot; and, currently trying to implement various force, position, and velocity control strategies on the robot
  - Developed a “dynamics” simulator of a robotic manipulator using Lagrangian method; estimated the friction/damping of rotational joints, and verified its accuracy using the effective inertia estimate; developed a method to estimate the output impedance of a manipulator using the robotic simulator
  - Designed a data acquisition and analysis technique for the overground physical human-robot interaction experiment
  - Designed and conducted the the human-robot interaction experiment, including acquiring an IRB approval, recruiting and interacting with the participants, preparing and maintaining the experiment setup, collecting and analyzing the data, and reporting results
  - Published journal article about our research progress and update; Presented our research progress as posters and conference presentations

- Sep 2021 – **Engineering Intern, (Mechatronics)**, ASML, Wilton - CT.
- Dec 2021 ○ Worked on sub-systems involving robotics, mechatronics, and precision mechanics, which involved understanding the functional requirements and deriving specifications
- Jun 2016 – **Quality Assurance and Maintenance Engineer**, Nepal Health Research Council, Nepal.
- Jun 2017 ○ Involved in solving various issues related to the equipment for ECG and Spirometry tests that were used in the project “Prevalence of Chronic Diseases in Nepal”
- Coordinated with health workers and patients for smooth and effortless use of the devices

## Publications

- [1] **Regmi, S.**, Song, Y. S., “Design methodology for robotic manipulator for overground physical human-robot interaction”, *ASME Journal of Mechanisms and Robotics*, **12**(4), p. 041002, 2020.
- [2] **Regmi, S.**, Song, Y. S., “Estimation of Endpoint Impedance of a 2D Parallel Manipulator using Numerical Simulation Experiment”, *ASME International Mechanical Engineering Congress and Exposition*, **Vol. 84522**, American Society of Mechanical Engineers, 2020.
- [3] **Regmi, S.**, Burns, D., and Song, Y. S., “A Robot for Overground Physical Human-Robot Interaction Experiments”, *PLoS ONE*, **Vol. 17**(11), p. e0276980, 2022.
- [4] **Regmi, S.**, Burns, D., and Song, Y. S., “Humans modulate arm stiffness to facilitate motor communication during overground physical human-robot interaction”, *Scientific Reports*, **Vol. 12**, p. 18767, Nature, 2022.

## Conference Abstract

- [1] Presented a poster “Design Methods for Robots for Overground Physical Interaction” at 41<sup>st</sup> IEEE Engineering in Medicine and Biology Conference (EMBC 2019), Berlin, Germany.

## Patent

- Sep 2023 **Regmi, S.** and Song, Y. S., “MOBILE ROBOT CONFIGURED TO DETERMINE HUMAN ARM STIFFNESS DURING OVERGROUND INTERACTION”, *US Patent App. 17/939,698*.

## Awards

- Mar 2022 **3MT, Missouri S&T**, Received the people’s choice award.
- Dec 2021 **3 Minutes Poster Presentation, Missouri S&T Council of Graduate Students**, Presented a summary of my PhD research, and grabbed 5th place for the best presentation .
- Nov 2020– **John W. Claypool Fund for Medical Research**, Received student research funding to advance research on human-human and human-robot interaction at Missouri S&T.
- Apr 2021
- Jul 2012– **COMPEX Scholarship Scheme 2012, Embassy of India**, Got selected through an open competition to pursue BE (Mech.) in India.
- May 2016

## Teaching and Mentoring Experience

- Jan 2020 – **Graduate Teaching Assistant**, Missouri University of Sci. and Tech., Rolla, MO.
- May 2021 ○ Provided guidance during lab sessions of Control System Laboratory for undergraduate seniors in understanding physical concepts of control systems
- Assisted students in hardware implementation of control algorithms using PLC/LabVIEW software
- Evaluated students’ performance and provided detailed feedback on conceptual understanding
- Maintained regularly scheduled office hours to advise and assist students
- Taught a laboratory-heavy class online during Covid-19 situation using different strategies (whichever is feasible) such as remotely accessing the hardware, using simulated environments, and making video demos

- Experience with course management software like Canvas, and online teaching via Zoom

## Skills

Development Tools	MATLAB, Simulink, LabVIEW, Python, SOLIDWORKS, Mathcad, Maplesoft, PLC
Software Tools	Vicon Nexus, Kollmorgen Workbench, Microsoft Office, Latex, proCalc, JMP, SAS, SQLite
Hardware Experience	Motion capture system (Vicon Motion Systems), LabVIEW Real-Time and associated control systems; LabVIEW SoftMotion, LabVIEW FPGA, and other Modules; Brushless DC motors (Kollmorgen, Anahiem Automations (AA) and others); Motor drives and controllers (Kollmorgen-AKD and AA); ATI Force/Torque sensor, and controller; Data acquisition systems (RS232, NI USB6021, NI cRIO 9045 modules, and AA modules); DirectSoft PLC ; Electrocardiogram Machine; Spirometer

## Relevant Courses

Coursework	Control System, Discrete Neural Network Control, Introduction to Neural Networks, Mechanics of Machinery, Neuromechanics of Human Movement, Statistical Data Analysis (alphabetical)
Coursera	Control of Mobile Robots, Machine Learning, Python (specialization)

## References

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