Department of Mechanical and Aerospace Engineering
Missouri University of Science and Technology
400 W 13th St, Rolla
MO 65409, USA
+1 (573) 201-5601
sambadregmi@mst.edu
Personal Web Page

Sambad Regmi

Curriculum Vitae

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: (alphabetical order)

- Data Acquisition and Management
- Design and Analysis of Human Experiments
- Human-Human and Human-Robot Interaction
- Human Neuromechanics, and Human arm mechanics
- Kinematics and Dynamics of Robotic Manipulators
- Mechatronics, Robotics, and Control
- Rehabilitation Robotics

Education

Present **Ph.D, Mechanical Engineering**, *Missouri University of Science and Technology*, Rolla, MO, (Expected completion: May 2022, Current GPA: 3.933).
Doctoral Thesis Title: "Development of an Interactive Robot for Overground Physical Human-Robot Interaction"
Project: "Human Arm Impedance Modulation during Overground Physical Interactions" *(funded by National Science Foundation)*
Advisor: Dr. Yun Seong Song

Jun 2016 **B.E, Mechanical Engineering**, *Visvesvaraya Technological University*, Bangalore, India, (Percentage: 85%).

Professional Experience

Aug 2017 – present **Graduate Research Assistant**, *Missouri University of Sci. and Tech.*, Rolla, MO.

- 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 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 – Dec 2021 **Engineering Intern, (Mechatronics)**, *ASML*, Wilton - CT.

- Worked on sub-systems involving robotics, mechatronics, and precision mechanics, which involved understanding the functional requirements and deriving specifications
- Worked with system architects in a multi-discipline project team to develop concepts, perform engineering analysis, and build and test prototypes

Jun 2016 – Jun 2017 **Quality Assurance and Maintenance Engineer**, *Nepal Health Research Council*, Nepal.

- Involved in solving various issues related to the equipment for ECG and Sprirometry 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 Roobt for Overground Physical-Human Robot Interaction and Validation Experiment", *In review.*

[4] **Regmi, S.**, Burns, D., and Song, Y. S., "How humans modulate arm stiffness during an overground robot guided experiment?", *In progress.*

Conference Abstract

[1] Presented a poster "Design Methods for Robots for Overground Physical Interaction" at 41st IEEE Engineering in Medicine and Biology Conference (EMBC 2019), Berlin, Germany.

Patent

In process Robot for overground physical human-robot interaction experiment (Ophrie Robot)

Awards

Nov 2020– Apr 2021 **John W. Claypool Fund for Medical Research**, *Received student research funding to advance research on human-human and human-robot interaction at Missouri University of Science and Technology.*

Jul 2012– May 2016 **COMPEX Scholarship Scheme 2012, Embassy of India**, *Got selected through an open competition to pursue BE (Mech.) in India.*

Teaching and Mentoring Experience

Jan 2020 – May 2021 **Graduate Teaching Assistant**, *Missouri University of Sci. and Tech., Rolla, MO.*

- 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 and 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 contollers (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 and Application, Mechanics of Machinery, Neuromechanics of Human Movement, Statistical Data Analysis (alphabetical)
Coursera	Control of Mobile Robots, Machine Learning, Python (specialization)

References

1. **Dr. Yun Seong Song**
   E-mail: *songyun@mst.edu*
   Phone: +1 (573) 341-4371
   Assistant Professor, Department of Mechanical and Aerospace Engineering
   Missouri University of Science and Technology
   292D Toomey Hall, 400 West 13th Street,
   Rolla, MO 65409.

2. **Dr. Ashok Midha**
   E-mail: *midha@mst.edu*
   Phone: +1 (573) 341-4298
   Professor, Department of Mechanical and Aerospace Engineering
   Missouri University of Science and Technology
   186 Toomey Hall, 400 West 13th Street,
   Rolla, MO 65409.

3. **Dr. Devin Burns**
   E-mail: *burnsde@mst.edu*
   Phone: +1 (573) 341-4807
   Associate Professor, Department of Psychological Science
   Missouri University of Science and Technology
   113 Humanities and Social Science, 500 West 14th Street,
   Rolla, MO 65409.