Sonia Mary Chacko

Robotics Researcher

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Motivated and talented robotics researcher with experience in research and development of robotic systems and human-robot interactive methods. Goal-oriented with a desire to contribute multidisciplinary skills in building innovative autonomous robotic technologies and solutions.

Research Experience

- Designed, developed, and user-tested intuitive augmented reality (AR) user interface (UI) applications for human-robot interactions (HRI) for various robotic applications.
- Developed AR- UI for object manipulation for human shared collaborative tasks.
- Developed an AR-based robot programming interface for manipulator robots.
- Developed an AR spatial referencing system for robot ROS enabled mobile robots.
- Conducted comprehensive quantitative and qualitative user studies to examine user perspective and performance of proposed AR approaches for HRI.

Education

2016-07 - Current
Ph.D.: Mechanical Engineering (Robotics Specialization)
NYU Tandon School of Engineering - Brooklyn, NY

2010-07 - 2012-05
Master of Technology: Mechatronics
National Institute of Technology Karnataka - Surathkal, India

2003-06 - 2007-07
Bachelor of Technology: Electronics and Communications Engineering
Mahatma Gandhi University - Kottayam, India

Skills

Programming Skills/Tools (C/C++, C#, Python, OpenCV, MATLAB, LabView)

Robotics Software Development (ROS, Dynamixel SDK)

Augmented Reality Development Platforms (ARCore, Vuforia, Unity3D)

Work History

2016-07 - Current

Doctoral Researcher, Research Mentor

NYU Tandon School of Engineering, Brooklyn, NY

- Full-time robotics researcher focusing HRI by applying AR technology
- Worked as a professional development trainer for NYC public school teachers for implementing robotics into science and math lessons in an NSF-funded project
- Providing training and guidance to graduate, undergraduate and high school summer interns

2014-06 - 2016-04

Assistant Professor

Nagpur University, Nagpur, India

- Taught concepts of digital electronics, microprocessors and micro controllers to undergraduate students
- Collaborated with faculty members in designing micro-controller curriculum for lab courses

2011-06 - 2012-12

Intern, Software Engineer

Robert Bosch Engineering & Business Solutions Ltd, Bangalore, India

- Intern at autonomous lawn mower development team
- Embedded system software engineer at thermal controller development team

2008-01 - 2009-01

VLSI Engineer

Wipro Technologies, Cochin, India

- ASIC design and functional verification

Research Publications

Peer-reviewed journal/conference papers:

1. **S.M. Chacko** and V. Kapila, "An Augmented Reality Interface for Human-Robot Interaction in Unconstrained Environments," IEEE Int. Conf. on Intelligent Robots and Systems (IROS), Macau, China, 2019.
2. **S.M. Chacko** and V. Kapila, "Augmented Reality as a Medium for Human-Robot Collaborative Tasks," Proc. IEEE Int. Symp. Robot and Human Interactive Communication (RO-MAN), New Delhi, India, 2019.
3. **S.M. Chacko**, A. Granado, and V. Kapila, "An Augmented Reality Framework for Robotic Tool-path Teaching," CIRP Conference on Manufacturing Systems, 2020 (Accepted).
4. **S.M. Chacko**, A. Granado, A. RajKumar, and V. Kapila, "An Augmented Reality Spatial Referencing System for Mobile Robots," IEEE Int. Conf. on Intelligent Robots and Systems (IROS), 2020. (under review).

5. H.S. You, **S.M. Chacko**, S. B. Rajguru, and V. Kapila, "Designing Robotics-based Science Lessons Aligned with the Three Dimensions of NGSS-plus-5E Model: A Content Analysis (Fundamental)." Proc. ASEE Annual Conference and Exposition, Tampa, FL, 2019.
6. H.S. You, **S.M. Chacko**, and V. Kapila, "Teaching Science with Technology: Science and Engineering Practices of Middle School Science Teachers Engaged in a Professional Development for Robotics Integration into Classroom (Fundamental)," Proc. ASEE Annual Conference and Exposition, Tampa, FL, 2019.
7. I.F. Ghalyan, **S.M. Chacko**, and V. Kapila, "Simultaneous robustness against random initialization and optimal order selection in Bag-of-Words modeling," Pattern Recognition Letters, 116, pp.135-142, 2018.
8. S.M. Rahman, **S.M. Chacko**, S. B. Rajguru, and V. Kapila, "Fundamental—Determining Prerequisites for Middle School Students to Participate in Robotics-based STEM Lessons: A Computational Thinking Approach," Proc. ASEE Annual Conference and Exposition, Salt Lake City, UT, 2018.
9. S.M. Rahman, **S.M. Chacko**, and V. Kapila, "Building trust in robots in robotics-focused STEM education under TPACK framework in middle schools.", Proc. ASEE Annual Conference and Exposition, Columbus, OH, 2017.