PHANI TEJA SINGAMANENI

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As a Postdoctoral researcher at LAAS-CNRS, I specialize in HRI and motion planning, building on my Ph.D. in social robot navigation from the same institution. My research interests encompass task planning, artificial intelligence, robotic design, and control, with a focus on developing socially intelligent robots.

Education

Ph.D., Robotics and HRI Dec 2022
LAAS-CNRS, Toulouse, France
Dept. of Computer Science and Telecommunications, Université Toulouse III - Paul Sabatier, France
Dissertation: *Combining Proactive Planning and Situation Analysis for Human-Aware Robot Navigation*
Advisor: Dr. Rachid Alami

M.S by Research, Robotics Aug 2018
RRC, Dept. of Electronics and Communications, IIIT-Hyderabad, Hyderabad, India
Dissertation: *Learning Multi-Goal Reachability in a Humanoid Robot Using Deep Reinforcement Learning*
Advisors: Dr. Madhava Krishna K and Dr. Abhishek Sarkar

B.Tech (Honors), Electronics and Communication Engineering Aug 2016
IIIT-Hyderabad, Hyderabad, India
University Gold medalist, IIIT-Hyderabad, for the Dual Degree Class of 2012 in ECE

Research Experience

Postdoctoral Researcher, LAAS-CNRS, Toulouse, France Mar 2023 - Present
Under Dr. Rachid Alami and Dr. Thierry Simeon

Designing new software architectures in ROS and ROS2 and implementing a human-aware robot navigation planner. It is envisioned to assist the future development of social navigation and maintained for a significant amount of time.

Research Engineer (Ingénieur de recherche), LAAS-CNRS, Toulouse, France Jan 2023 - Feb 2023

- Research focused on improving human-aware robot navigation in terms of behavior and evaluation.
- Proposed new evaluation metrics to benchmark the *human awareness* of the planning system studying how the robot's behavior could influence humans. The proposed metrics are flexible compared to proxemics and apply to multiple contexts.
- I have also developed an adaptive robot planning by combing the human-aware navigation system with a task planner. Depending on the task and the action parameters provided by the task planner, the motion's planner parameters and hence the robot behavior are adapted to suit the context better.

Graduate Student, LAAS-CNRS, Toulouse, France Jan 2019 - Dec 2022
Under Dr. Rachid Alami

- The aim of my thesis is to propose better motion planning solutions for a robot navigating in human environments, otherwise called human-aware or socially-aware robot navigation planning.
- As human-aware robot navigation is a complex problem, it requires decisional abilities on top of contextual understanding for which I proposed a ROS-based human-aware navigation stack that can be employed in a variety of contexts.
- During the course of my thesis, I have developed several methodologies and algorithms to handle both visible and occluded humans better. These solutions have been tested vigorously in simulation and then transferred onto robot platforms, Pepper and PR2, for real-world experiments.
- I have also contributed to the MuMMER European project both by providing a human-aware navigation planner and remote assistance to run the guidance task on the Pepper robot for user studies.

Research Assistant, Robotics Research Center, IIIT-Hyderabad, India Aug 2016 - Nov 2019
Under Dr. Madhava Krishna, Dr. Suril V. Shah and Dr. Abhishek Sarkar

- I have worked on various projects like designing stair-climbing robots, building a 3D-printed humanoid robot and building the required circuitry for it, followed by the work on whole-body motion planning of humanoids. Over the duration of these projects, I have gained experience in CAD, mechanisms and robot designing, robot simulators, MATLAB and motion-planning algorithms for walking and manipulation.
- While continuing my research on motion planning in my masters, I designed a novel reinforcement learning framework for dual arm reachability tasks of a humanoid robot using Tensorflow and MuJoCo. I have also worked with Vicon motion capturing system and on human to robot motion transfer.
- Further, I have assisted and guided some students in the lab on different robotic projects.

Teaching Experience

Teaching Assistant (Vacataire), INSA, Toulouse, France — Apr 2022 - Jun 2022
Labs for real-time systems course.

Teaching Assistant (DCE), INSA, Toulouse, France — Sep 2020 - Aug 2021
Tutorials for hardware logic and computing, labs for real-time systems

Teaching Assistant, IIIT-Hyderabad, Hyderabad, India — Aug 2014 - Dec 2017
Tutorials, labs and exam evaluations for 4 courses in 6 semesters

Industry Experience

Summer Intern, Uurmi Systems (now Mathworks), Hyderabad, India — May 2015 - Jul 2015

- Contributed to the design and development of the software and embedded hardware for an autonomous car project's controller.
- I have also worked on a control system to make Crazyflie quadcopter follow a Nintendo Wii remote.

Publications

Google scholar G

[18] **Phani Teja Singamaneni**, Alessandro Umbrico, Andrea Orlandini, and Rachid Alami. "*Towards Enhancing Social Navigation through Contextual and Human-related Knowledge*", International Conference on Social Robotics 2022 Workshop: ALTRUIST, 2022.

[17] Olivier Hauterville, Camino Fernández, **Phani Teja Singamaneni**, Anthony Favier, Vicente Matellán, and Rachid Alami. "*Interactive Social Agents Simulation Tool for Designing Choreographies for Human-Robot-Interaction Research*", ROBOT2022: Fifth Iberian Robotics Conference: Advances in Robotics, 2022.

[16] Olivier Hauterville, Camino Fernández, **Phani Teja Singamaneni**, Anthony Favier, Vicente Matellán, and Rachid Alami. "*IMHuS: Intelligent Multi-Human Simulator*", IROS2022 Workshop: Artificial Intelligence for Social Robots Interacting with Humans in the Real World, 2022.

[15] **Phani Teja Singamaneni**, Anthony Favier, and Rachid Alami. "*Watch out! There may be a Human. Addressing Invisible Humans in Social Navigation*", IEEE/RSJ IROS, 2022.

[14] **Phani Teja Singamaneni**, Anthony Favier, and Rachid Alami. "*Invisible Humans in Human-aware Robot Navigation*", IEEE ICRA Workshop: Social Robot Navigation: Advances and Evaluation, 2022.

[13] Jérôme Truc, **Phani Teja Singamaneni**, Daniel Sidobre, Serena Ivaldi, and Rachid Alami. "*Khaos: a kinematic human aware optimization-based system for reactive planning of flying-coworker*", IEEE ICRA, 2022.

[12] Anthony Favier, **Phani Teja Singamaneni**, and Rachid Alami. "*An Intelligent Human Avatar to Debug and Challenge Human-aware Robot Navigation Systems*", ACM/IEEE HRI, 2022.

[11] **Phani Teja Singamaneni**, Anthony Favier, and Rachid Alami. "*Human-Aware Navigation Planner for Diverse Human-Robot Interaction Contexts*", IEEE/RSJ IROS, 2021.

[10] Anthony Favier, **Phani Teja Singamaneni**, and Rachid Alami. "*Simulating intelligent human agents for intricate social robot navigation*", RSS Workshop on Social Robot Navigation, 2021.

[9] **Phani Teja S** and Rachid Alami. "*Hateb-2: Reactive planning and decision making in human-robot co-navigation*",IEEE RO-MAN, 2020.

[8] Raghu Ram Theerthala, AVS Sai Bhargav Kumar, Mithun Babu, **S Phaniteja**, and K. Madhava Krishna. "*Motion planning framework for autonomous vehicles: A time scaled collision cone interleaved model predictive control approach*", IEEE Intelligent Vehicles Symposium, 2019.

[7] Meha Kaushik, Nirvan Singhania, **Phaniteja S** and K. Madhava Krishna. "*Parameter sharing reinforcement learning architecture for multi agent driving*", Proceedings of the Advances in Robotics, 2019.

[6] **Phaniteja Singamaneni**, Parijat Dewangan, Abhishek Sarkar, and Madhava K. Krishna."*Learning Multi-Goal Inverse Kinematics in Humanoid Robot*", 50th International Symposium on Robotics, 2018.

[5] **S Phaniteja**, Parijat Dewangan, Pooja Guhan, K. Madhava Krishna, and Abhishek Sarkar. "*Learning dual arm coordinated reachability tasks in a humanoid robot with articulated torso*", IEEE-RAS Humanoids, 2018.

[4] **S Phaniteja**, Parijat Dewangan, Pooja Guhan, Abhishek Sarkar, and K. Madhava Krishna. "*A deep reinforcement learning approach for dynamically stable inverse kinematics of humanoid robots*", IEEE ROBIO, 2017.

[3] Divyanshu Goel, **S Phani Teja**, Parijat Dewangan, Suril V. Shah, Abhishek Sarkar, and K. Madhava Krishna. "*Design and development of a humanoid with articulated torso*", IEEE RAHA, 2016.

[2] Sri Harsha Turlapati, Mihir Shah, **S Phani Teja**, Avinash Siravuru, and Suril V. Shah. "*Stair climbing using a compliant modular robot*", IEEE/RSJ IROS, 2015.

[1] **S Phani Teja**, Sri Harsha, Avinash Siravuru, Suril V. Shah, and K. Madhava Krishna. "*An improved compliant joint design of a modular robot for descending big obstacles*", Proceedings of Conference on Advances In Robotics, 2015.

Workshops and Competitions

Organizing Committee Member, "*The 2nd Workshop on Social Robot Navigation: Advances and Evaluation*", IEEE/RSJ IROS, 2023
Organizing Committee Member, "*Workshop on Joint Action, Adaptation, and Entrainment in Human-Robot Interaction*", ACM/IEEE HRI, 2022
Team Member, CanSat, IIIT-Hyderabad, 2015
Team Member, RoboCon, IIIT-Hyderabad, 2014

Awards and Honors

Best Student Paper Award, Fifth Iberian Robotics Conference, 2022
Best Student Paper Award Finalist, IEEE RO-MAN, 2020
Microsoft Student Travel Grant, International Symposium on Robotics, Munich, 2018

Skills

Languages: Proficient in C, C++, Python, Matlab; Familiar with R and Java
Tools/Libraries: ROS, Git, LaTeX, Tensorflow, PyTorch (familiar), Solidworks, Blender, Cadence, Xilinx, AVR
Simulators: Gazebo, MORSE, Stage, MuJoCo, OpenRave, Webots
Robots: Pepper, PR2

Languages

English - Proficient, **Telugu** - Native, **Hindi** - Bilingual Proficiency, **French** - Beginner (A1)