

Bijo Sebastian

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EMPLOYMENT

TORC ROBOTICS, BLACKSBURG

SOFTWARE ENGINEER
Motion Planning Team
November 2019 - current

EDUCATION

VIRGINIA TECH

PHD - MECHANICAL ENGINEERING

Grad.- October 2019
GPA: 3.90/4.00

ACSIR, INDIA

M.TECH - MECHATRONICS

Grad.- May 2015
GPA: 9.45/10.00
Junior Research Fellow

KERALA UNIVERSITY, INDIA

B.TECH - MECHANICAL ENGINEERING

Grad. - May 2013
GPA: 9.03/10.00
Best outgoing student, 2013 Batch
Fourth rank in University

COURSEWORK

GRADUATE

Robotics
Robot Motion Planning
Applied Linear Systems
Non-linear Systems
Adaptive Control Systems

Micro controllers
Advanced Mechatronics
Computer Vision

Analytical Mechanics
Multi-Body Dynamics
Model Based Estimation

SKILLS

PROGRAMMING

C++ | Python | MATLAB/Simulink

TOOLS

SolidWorks | Pro/ENGINEER
Autodesk Eagle | 3D Printing

Gazebo | Pybullet
V-REP | MSC ADAMS

ROS | OpenCV | Git
Scikit-learn | \LaTeX

RESEARCH

ROBOTICS AND MECHATRONICS LAB | GRADUATE RESEARCHER

Jan 2016 – Present | Virginia Tech, Blacksburg, VA

Semi-Autonomous Victim Extraction Robot

- Developed conceptual design for novel rescue robot system
- Developed simulations demonstrating casualty extraction capability
- US Provisional patent has been filed on the developed design

Autonomous navigation of tracked robots

- Explored the use of physics engines to aid in path planning [1]
- Developed Active Disturbance Rejection Controller to reduce vehicle slip [2]
- Developed Support Vector Machine (SVM) architecture for terrain identification

Exoskeleton glove for rehabilitation and assistance

- Design, integration and development of three different versions of exo-glove [3]
- Optimization of mechanisms imitating natural finger motion
- Design of miniature series elastic actuators (SEA) to provide force control
- US Provisional patent has been filed on the developed design

Mobile robots

- **V-REP simulation:** Vectorised RRT* for following a moving target, Kino-dynamic RRT* implementation with physics engines, A*, D* Lite, EKF SLAM using LIDAR data, low-level state-machine controllers for obstacle avoidance.
- **Hardware** Implemented and tested above algorithms on Pioneer P3AT platform and ROVER 5 integrated with encoders, IMU and proximity sensors.

Tracking of arm joints using three IMU cluster Performed Hardware and software integration and testing.

SURFACE ROBOTICS LAB | JUNIOR RESEARCH FELLOW

Jun 2014 – Dec 2015 | CSIR-CMERI, West Bengal, India

Climbing robot

- Design of robotic system for horticulture and pipeline inspection
- Kinematic and dynamic analysis through ADAMS-MATLAB Co-Simulation
- Completed hardware and software integration and testing of prototype system

Design and integration of novel mechanism for plate washing, won first prize Student Mechanism Design Contest iNaCoMM 2013, IIT Roorkee, design registration filed.

Detailed design of spherical robot with simplified drive mechanism, selected for institutional funding under Cluster Innovation Centre, CSIR-CMERI, India.

PUBLICATIONS

[1] Sebastian, B., Ben-Tzvi, P., "Active disturbance rejection control for handling slip in tracked vehicle locomotion", Journal of Mechanisms and Robotics, Transactions of the ASME, Vol. 11, Issue 2, pp. 021003:1-12, April 2019.

[2] Sebastian, B., Ben-Tzvi, P., "Physics Based Path Planning for Autonomous Tracked Vehicle in Challenging Terrain", Journal of Intelligent and Robotic Systems, Published online, April 2018.

[3] Refour, E., Sebastian, B., Ben-Tzvi, P., "Two-Digit Robotic Exoskeleton Glove Mechanism: Design and Integration", Journal of Mechanisms and Robotics, Transactions of the ASME, Vol. 10, Issue 2, pp. 025002: 1-9, April 2018.

For the complete list of publications (14+) refer to my Google Scholar Page.