# Tanay Choudhary

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## SUMMARY

Senior Robotics Software Engineer with 5+ years of industry experience across robot navigation, manipulation, localization, sensing, and perception. I intend to contribute to meaningful emerging applications of robotics in the real world.

## EDUCATION

**NORTHWESTERN UNIVERSITY**
MS in Robotics
Dec 2016 | Evanston, IL
GPA: 3.89 / 4

**BITS PILANI UNIVERSITY**
BE (Hons) in Mechanical Engineering
Aug 2015 | Goa, India

## LINKS

LinkedIn: **linkedin.com/in/tanayc**
Portfolio: **tanay-choudhary.github.io**
Github: **github.com/tanay-bits**

## COURSES/ CERTIFICATIONS

Data Structures and Algorithms Nanodegree (Udacity)
Robotic Manipulation
Machine Learning
Computer Vision
Artificial Intelligence
Controls

## SKILLS/TOOLS

Meta-Skills
• Agile Software Development
• Critical Thinking • Resilience
Programming Languages
• C++ • Python • Java
Operating System
• Linux
SW Libraries and Tools
• ROS • Gazebo • PCL
• OpenCV • Git • Gerrit
• Jenkins • Ansible

## EXPERIENCE

### VECNA ROBOTICS | Senior Robotics Software Engineer
Oct 2018 – present, Cambridge, MA
• Responsible for developing, integrating, testing, deploying, and maintaining the autonomy stack of Vecna's suite of mobile heavy material handling robots
• As module owner for navigation, worked on creating best-in-class path planning and obstacle avoidance features which significantly improved speed and robustness in tight, dynamic spaces
• Unlocked an untapped use-case by leading a small team to develop autonomy SW for a completely new platform for robotic shelf picking
• Brought key improvements to pallet docking behaviors which significantly increased pallet handling reliability and throughput in long, densely packed lanes
• Took on the role of C++ domain expert; discussed and documented best practices, encouraged their use via code reviews, emphasized removal of tech debt

### VECNA TECHNOLOGIES | Robotics Software Engineer
Mar 2017 – Sep 2018, Cambridge, MA
• Implemented 3D teleoperation, control, and path planning modules for a dual arm mobile manipulator using C++, ROS, RViz and MoveIt
• Integrated a grasp pose detection library for autonomous picking of arbitrary objects using CNN on point cloud data from a depth sensor

### HARMAN INTERNATIONAL | Summer Intern, Future Experience
Corporate Technology Group | Jun 2016 – Sep 2016, Mountain View, CA
Exploratory R&D and rapid end-to-end prototyping of a new kind of headphones with ungrounded force actuators to provide instinctive, non-visual and non-auditory feedback to the wearer. I designed and created fully working prototypes, and showcased them to the broader research and business teams.

### TECHNICAL UNIVERSITY OF DARMSTADT | Bachelor's Thesis
Lauflabor Locomotion Lab | Feb 2015 – May 2015, Germany
"Gait Analysis and Control Design for Stair Ambulation with Lower-Limb Powered Prostheses"
Performed motion-capture gait experiments on an instrumented staircase, processed the raw data in MATLAB, contributed two new control insights for gait intent and gait percent detection in wearable lower-extremity robots, and obtained significant savings in Series Elastic Actuator peak power and energy requirements

## OTHER PROJECTS

### Mobile Robot Control and Localization on Frictionless Surface
Built a lightweight robot which can float on an air-hockey table, and control its orientation using reaction wheels and IMU sensor fusion. Reverse engineered the SteamVR Lighthouse tracking technology (used in HTC Vive) for localizing the robot.

### Intuitive Teleoperation of a Dual Arm Manipulator
• Created a ROS package for the Baxter robot, which uses skeleton data from a depth camera to track user's hand movements via joint velocity control
• Developed a custom numerical inverse kinematics solver which finds the optimum set of joint angles to minimize joint travel in addition to reaching target end-effector position
• Featured in National Robotics Week exhibit at the Chicago Museum of Science & Industry

### Nonlinear Dynamics of the Tumbling Toy
Modeled and simulated the impact-driven nonlinear dynamics of a wooden case containing a metal ball, which tumbles down an inclined saw-toothed rail. Employed Lagrangian dynamics in Mathematica to solve for this 4 DoF motion.

### Optimal Control of Differential Drive Mobile Robot
Implemented start to goal motion on the iRobot Roomba while avoiding obstacles. Programmed iLQR algorithm on Mathematica to determine optimal control and state trajectories.