Tanay Choudhary

https://tanay-choudhary.github.io
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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
GPA: 3.2 / 4

LINKS

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

COURSEWORK

GRADUATE
Advanced Mechatronics
Embedded Systems in Robotics
Feedback Control
Robotic Manipulation
Machine Dynamics
Machine Learning
Computer Vision
Artificial Intelligence
Optimal Control of Nonlinear Systems

UNDERGRADUATE
Engineering Optimization
Computer Aided Design
Kinematics & Dynamics of Machines
Machine Design & Drawing
Production Techniques
Production Planning & Control

SKILLS/TOOLS

ROS
Python
Embedded Programming
(PIC, AVR, ARM)
C/C++
MATLAB
OpenCV
Mathematica
Linux
Git
CAD (Solidworks, Pro/E)
Rapid Prototyping
(3D Printing, Laser Cutting)

EXPERIENCE

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 for a new kind of headphones with ungrounded force actuators to provide instinctive, non-visual and non-auditory feedback to the wearer. I planned and created fully working prototypes, which included:
• Hardware sourcing - microcontrollers, peripherals, actuators, sensors, power sources
• Implementing precise mechanical systems for center-of-gravity-shifting and other ungrounded force actuation techniques, from CAD to 3D printing to assembly
• Designing and miniaturizing electronics modules
• Developing accompanying embedded software as well as Android apps to allow for basic interaction with the system and to demonstrate its usability

TECHNICAL UNIVERSITY OF DARMSTADT | Bachelor's Thesis
Lauflabor Locomotion Lab | Feb 2015 – May 2015, Germany
Project: Gait Analysis and Control Design for Stair Ambulation with Lower-Limb Powered Prostheses | Advisors: Prof. André Seyfarth, Dr. Martin Grimmer
• Performed motion-capture gait experiment on an instrumented staircase, processed the raw data, contributed two new control insights for gait intent and gait percent detection in wearable lower-extremity robots which are not available in the existing literature
• Obtained significant savings in SEA motor peak power and energy requirements

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD | Summer Research Intern
Mechatronics Design Lab | May 2014 – July 2014, India
Project: Development of a Series Elastic Actuator (SEA) for Robotic Applications
• Reviewed existing SEA designs and theory, acquired components and fabricated a low cost, scalable prototype of a rotary SEA
• Performed various experiments (force sensing, manual homing, torque control, spring stiffness measurement) and achieved desirable results

OTHER RECENT 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 new SteamVR Lighthouse tracking technology (used in HTC Vive) for localizing the robot.

Intuitive Teleoperation of a 14 DoF 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

Optimal Control of Kinematic Car Motion
Implemented start to goal motion on the iRobot Roomba while avoiding obstacles. Programmed iLQR algorithm on Mathematica to determine optimal control and state trajectories.

Python Library for Robotic Manipulation
Created a library of robotics functions such as calculating Jacobians, implementing forward and inverse kinematics, trajectory optimization, and simulated them on the UR5 and WAM industrial robot arms using ROS/rviz.

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.