# Huan **Weng**

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## Education

**Northwestern Univeristy** — *Evanston, IL*

M.S. in Mechanical Engineering, GPA: 3.84/4.0 — *Sep. 2015 - PRESENT*

**Beihang Univeristy (BUAA)** — *Beijing, China*

B.E. in Mechanical Engineering, Cumulative GPA: 86.3/100, Core GPA: 87.2/1000 — *Sep. 2010 - Jun. 2014*

## Interests

Robotics and autonomous systems, control, mechatronics.

## Publications

**In-hand Sliding Manipulation with Spring-Sliding Compliance** — *In preparation*

J. Shi, H. Weng, K. M. Lynch — *Present*

**Divergence in Time Apportionments of Tongue Protraction and Retraction Phases for Feeding Drones and Workers of Honeybees** — *Submitted*

*J. Wu, *H. Weng, S. Yan, Y. Zhao. * **contributed equally** — *Present*

**The New Health Care System** — *Published*

Patent # 201310426297.3 — *Jun. 2014*

**Experimental Research about Effect of Wheel Hub Bearing Preloads on the Natural Frequency** — *Published*

Q. Cao, Z. Weng, S. Chen, D. Huang, S. Shen, H. Weng. In *Light Industrial Machinery* — *May. 2014*

## Honors & Awards

2016 **1st Place in Northwestern Tech Cup**, highest-level design and programming competition of graduate students — *Northwestern Univ.*

2013 **Excellence Prize in 5th National College Students Innovation and Entrepreneurship Contest**, highest-level student innovation competition in China — *Beihang Univ.*

2013 **3rd Place in "Fengru Cup" Science and Technology Competition**, Awarded to top 10% students — *Beihang Univ.*

2012 **Honor of Outstanding Student**, Awarded to top 2.5% students — *Beihang Univ.*

2012 **Scholarship for Learning Excellence (2 times)**, Awarded to 10 out of 200 students — *Beihang Univ.*

2011 **2rd Place in "Fengru Cup" Creativity Competition**, Awarded to top 8% students — *Beihang Univ.*

2011 **3rd Place in 11th Odyssey of the Mind Competition**, Awarded to top 2% students — *Beihang Univ.*

## Skills

**Proficient in** C/C++, ROS, MCU, Solidworks/Simulation, AutoCAD, Matlab, Mathematica, LaTeX, Adobe Illustrator

**Familiar with** Python, Java, Adams

## Research Experience

**Master thesis: Contact Force Control for Dexterous Manipulation** — *Northwestern Univ.*

Department of Mechanical Engineering. Advisor: Prof. Kevin Lynch, Chair — *Jan. 2016 - Present*

- Controlled forces at the fingertips of an Allegro Hand using Optoforce force sensors
- Implemented controllers in ROS using force sensor feedback and feedforward compensation of the manipulator dynamics.
- Utilized the controller on a project aiming to reposition objects in a grasp using sliding compliance at the contacts.

**Analysis of Energy-saving Strategies in Honeybee Feeding** — *Tsinghua Univ.*

Department of Mechanical Engineering. Advisor: Prof. Shaoze Yan — *Jul. 2014 - Jan. 2015*

- Observed the movements of honeybee tongues while feeding and analyzed the motion characteristics of related tiny organs and microstructures of the appendages.
- Introduced a physical model to reveal the energy-saving strategies embedded in the nectar-feeding behavior.
- Analyzed the functional diversities of feeding behavior among bees of different species and sexes to investigate the evolutionary-related adaptability to environment constraints.

### Upper Limb Robot Exoskeleton

*Beihang Univ.*

Robotics Institute. Advisor: Prof. Peijiang Yuan, Vice Director

*Mar. 2011 - Jul. 2014*

- Developed a robot exoskeleton to provide extra force for workers to lift some heavy things, or to be used in patient rehabilitation.
- Led the group to complete the entire research process, including conducting surveys, choosing materials, mechanical simulation, arranging circuits, writing STM32 program, assembling and debugging.

### Bachelor thesis: Analyses of Scanning Mode in Inverse-geometry Volumetric Computered Tomography

*Beihang Univ.*

Department of Mechanical Engineering. Advisor: Prof. Jian Fu

*Jan. 2014 - Jun. 2014*

- Reviewed the basic concepts and algorithms of computered tomography (CT) and of inverse-geometry volumetric computered tomography (IGCT).
- Simulated the IGCT system and its reconstruction algorithm via Matlab.
- Analyzed the reconstruction results to determine how to optimize its performance in future implementations.

### CABOT: Children's Board Processing Machine

*Zhejiang Univ. of Tech.*

Department of Mechanical Engineering. Advisor: Prof. Zeyu Weng

*Oct. 2012 - Nov. 2013*

- Developed a machine box for children to produce some toy puzzles by themselves.
- In charge of preliminary design and 3D modeling and simulation, applied moment transformation method to make it easy for children to operate and protect them from harm.

### Development of a New Physical Examination System

*Beihang Univ.*

Robotics Institute. Advisor: Prof. Peijiang Yuan, Vice Director

*Jun. 2013 - Oct. 2013*

- Created a household monitoring system to sense the temperature, humidity and noise of the environment to notify users' phones over Bluetooth of conditions that could be harmful to their health.
- Responsible for writing STM32 program, connecting sensors, and testing; developed hardware functions using STM32, and found appropriate information transmitting frequency.

### Analysis of Preloads on Wheel Bearing Natural Frequency

*Zhejiang Univ. of Tech.*

Department of Mechanical Engineering. Advisor: Prof. Zeyu Weng

*Mar. 2011 - Oct. 2011*

- Project designed to determine how the preload effects the natural frequency of a wheel hub bearing to increase safety in vehicles.
- Set up the frequency sweep excitation technique testing system, to test different preloads and determine their effect on the natural frequency.

## Academic Experience

### Android Line Follower Mobile Robot

*Northwestern Univ.*

Course: Advanced Mechatronics

*Apr. 2016 - Jun. 2016*

- Designed and fabricated the mobile robot using a 3D printer and laser cutter.
- Developed an Android application to control the robot using the camera as a line detector and sending data to a PIC32 microcontroller by the serial port.
- Designed the PCB for the PIC32 and developed the motor controller code in embedded C.

### DC Motor Control with PIC32 and Matlab

*Northwestern Univ.*

Course: Intro. to Mechatronics

*Jan. 2016 - Mar. 2016*

- Wrote a motor position controller on a PIC32 that included inner loop PID feedback on the current supplied to the motor using PWM as well as outer loop position feedback using encoder feedback.
- Realized serial communication between Matlab (client) and PIC32 (server) and plotted the trajectory results.

### A Matlab Library for Robotic Manipulation

*Northwestern Univ.*

Course: Robotic Manipulation

*Sep. 2015 - Dec. 2015*

- Developed the library including functions from basic transformation of coordinates to dynamic trajectory planning.
- Plotted and Simulated the motion planning using Matlab.

### Simulation of One-arm Basketball Shooting

*Northwestern Univ.*

Course: Machine Dynamics

*Sep. 2015 - Dec. 2015*

- Analysed the motion of both arm and basketball using geometry and kinematics in Lagrangian mechanics.
- Developed Mathematica program to simulate the process of shooting and made the 3D animation.

## Core Graduate Courses

Robotic Manipulation, Machine Dynamics, Feedback Systems, Intro to Mechatronics, Advanced Mechatronics, System Theory.