

# Chun-Fu Yeh

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## PROFESSIONAL PROFILE

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- Lead 2 projects as principal investigator, targeting the development of transformative technology for medical and healthcare service
- Raised \$1M (USD) in funding with 2 research proposals within 2 years
- Manage 3 research projects as an AI engineer lead for the development of deep learning / machine learning models for medical and healthcare services
- Selected to be one of 30 alumni coaches as part of the inaugural IDEO U Alumni Fellowship program to engage and guide IDEO U online learners

## WORK & RESEARCH EXPERIENCE

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**Artificial Intelligence Engineer** 06/2019 - Present

*Taiwan AI Labs, Taipei, Taiwan*

**Project: Pretrained Backbones for Medical Images**

- Developed CNN-based pretrained backbones for all kinds of CT and MRI images.
- This aims to boost up the overall performance for semantic segmentation on at least 10 datasets, including Brain, Heart, Liver, Hippocampus, Prostate, Lung, Hepatic Vessel, Pancreas, Spleen, Colon.

**Project: General Medical Image Dataset Framework for Deep Learning Modeling Pipeline**

- Designed a general module to deal with all kinds of CT and MRI images.
- This enabled AI engineers to process medical images efficiently, which saved nearly 80% of the time.

**Principal Investigator & Artificial Intelligence Engineer** 04/2017 - 06/2019

*Service Systems Technology Center (SSTC), Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan*

**Project: AI-based Early-stage Glaucoma Detection with Fundus Images**

- Received \$250K (USD) from government for one year (01/2018 – 12/2019)
- Developed CNN-based auto-encoder and GAN to quantify the retinal nerve fiber layer (RNFL) defects with fundus images and visual field deficit maps

**Project: The Development of Medical Devices for COPD Exacerbation Development Monitoring**

- Received \$900K(USD) from government for nearly one and half years (04/2017 – 12/2018)
- Designed an innovative service system to help patients with chronic obstructive pulmonary disease (COPD) detect acute exacerbation earlier with abnormal lung sound detection
- Achieved 85.78% of accuracy for the model for lung sound detection, 5% higher than the accuracy reported in reference paper

**Artificial Intelligence Researcher** 01/2017 - 06/2019

*SSTC, ITRI, Hsinchu, Taiwan*

**Project: Artificial Intelligence-based Diabetics Fundus Image Decision Support**

- Received \$600K (USD) from government for two years (01/2017 – 12/2018)
- Designed an AI-based system to prevent severe diabetic retinopathy among patients with diabetes
- Built model for classifying the severity of diabetic retinopathy with kappa score up to 84.15%, higher than that reported by Google and that of the 3rd place of Diabetic Retinopathy Detection Challenge in Kaggle

**Project Researcher** 09/2015 - 12/2016

*SSTC, ITRI, Hsinchu, Taiwan*

- Built a performance analysis system with pressure-sensing mat to guide Tai Chi learners home practice

**Research Assistant** 09/2013 - 08/2015

*Movement Science and Assistive Technology Lab,*

*School of Occupational Therapy, College of Medicine, NTU, Taipei, Taiwan*

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### **Project: Development and Application of Rehabilitation Games for Children with Cerebral Palsy Using Motion Sensing Technology**

- Designed a Kinect-based rehabilitation program using modern therapeutic approach
- Collaborated with cross-disciplinary team, including occupational therapist, industrial designer, and software engineer

### **Project: The Development of Brain-Computer Interface for Motor-Imagery Training**

- Discovered models (SVM / KNN) to quantify motor imagery ability with EEG signals

### **Occupational Therapy Intern (Full Time)**

07/2012 - 06/2013

National Taiwan University Hospital (NTUH), Taipei, Taiwan

- Learned to be an independent occupational therapist in pediatric, physical, and psychological fields
- Earned certificate for being an occupational therapist in 09/2013

## **PATENTS**

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**Yeh, C.**, Luo, Y., Chang, C., & Yeh, I. (2018) Method and system for automatically identifying and marking adventitious sounds. U.S. Patent, Patent Pending

Chang, C., Luo, Y., Lee, H., & **Yeh, C.** (2018) Lung sound monitoring device and lung sound monitoring method thereof. U.S. Patent 2019/0239819A1, Patent Pending

**Yeh, C.**, Tzo, S., & Tsai, M. (2016) Body motion analysis system, portable device and body motion analysis method. U.S. Patent 2018/0178060A1, Patent Pending

## **RESEARCH PUBLICATIONS**

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### Journal Papers

Chen, H., **Yeh, C.**, & Howe, T. (2015). Postural control during standing reach in children with Down syndrome. *Research in Developmental Disabilities*, 38, 345-351. doi:10.1016/j.ridd.2014.12.024

### Conference Papers & Posters

**Yeh, C.**, Chen, G., Wu, K., & Huang, M. (2019) Localization of retinal nerve fiber layer defect in fundus image by visual field guided learning network. The 32st IPPR Conference on Computer Vision, Graphics and Image Processing, Taitung, Taiwan, August 25-27. Oral Presentation

**Yeh, C.**, Chen, G., Wu, K., & Huang, M. (2018) Feasibility of early detection for retinal nerve fiber layer defect with digital fundus image in glaucoma patients. The 31st IPPR Conference on Computer Vision, Graphics and Image Processing, Tainan, Taiwan, August 19-21. Oral Presentation

Chen, H., Lin, S., **Yeh, C.**, Wang, T., Tang, H., & Ruan, S. (2016). Development of a unilateral Kinect-based rehabilitation game for children with cerebral palsy. The 16th annual research colloquium of the Department of Occupational Therapy, National Taiwan University, Taipei, Taiwan.

**Yeh, C.**, Huang, W., Lin, S., & Chen, H. (2015) Effects of task difficulty on reaching tasks in typically developing children. 2015 International Occupational Therapy Conference, Shenzhen, China, March 20-22.

Lin, S., **Yeh, C.**, Huang, W., & Chen, H. (2015) Trunk control during reaching within and beyond arm length in typically developing children, 2015 International Occupational Therapy Conference, Shenzhen, China, March 20-22.

Chen, H., & **Yeh, C.** (2014) Dynamic Postural Control During Functional Reaching in Children with Down Syndrome and Typical Development. The 1st Global Conference on Biomedical Engineering (GCBME 2014), Tainan, Taiwan, October 9-12. Oral Presentation

Wu, C., Liu, Y., Hsu, W., Chen, P., **Yeh, C.**, Seng, G., & Chen, H. (2014) A potential biofeedback BCI design for motor imagery training using single-trial EEG. 2014 IEEE International Conference on Automation Science and Engineering, Taipei, Taiwan, August 18-22.

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**Yeh, C.**, Hsu, W., Liu, Y., Chen, P., Hsiao, Y., Chen, Y., Wu, C., & Chen, H. (2014) The “imagery” Fitt’s law of motor control in human brain single-trial EEG analysis. The 21st Annual Meeting of the Cognitive Neuroscience Society, Boston MA, USA, April 5-8.

Liu, Y., Chen, H., Hsu, W., Chen, P., Hsiao, Y., **Yeh, C.**, Chen, Y., & Wu, C. (2014) Classification of perception-based motor imagery with single-trial EEG analysis. The 21st Annual Meeting of the Cognitive Neuroscience Society, Boston MA, USA, April 5-8.

## EDUCATION

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**National Taiwan University (NTU)**, Taipei, Taiwan

**Master of Science in Occupational Therapy**

07/2013 - 08/2015

- Overall GPA: 4.08 / 4.3
- *Master’s Thesis*: The Effects of External Task Difficulties on Arm-Trunk Movements in Children with Hemiplegic Cerebral Palsy
- *Relevant Courses*: Academic English Writing, MATLAB Programming & Application, Computer Methods in Human Motion Analysis, Statistics in Psychology & Education, Advanced Cognitive Neuroscience

**Bachelor of Science in Occupational Therapy**

09/2009 - 06/2013

- Overall GPA: 86.94 / 100.00
- Dean’s List - Ranked in top 5% of students in class for two semesters
- Relevant Courses: Engineering Mathematics, Assessment and Application of Assistive Technology, Clinical Reasoning and Evidence-based Practice

## TEACHING EXPERIENCE

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**Teaching Assistant**

09/2013 - 06/2015

*School of Occupational Therapy, College of Medicine, NTU, Taipei, Taiwan*

- Helped graduate students learn MATLAB programming and application
- Coached international occupational therapy intern to do clinical physical assessments on stroke patients
- Taught undergraduates to make functional splints
- Taught undergraduates to identify functional human anatomy from cadaver

## PROFESSIONAL ACTIVITIES & TRAINING

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**Mathematics for Machine Learning Specialization** (Course), Imperial College, Coursera 02/2019 – 04/2019

- Review the mathematics for machine learning algorithms
  - Mathematics for Machine Learning: Linear Algebra
  - Mathematics for Machine Learning: Multivariate Calculus

**Algorithms Specialization** (Course), Stanford, Coursera

02/2019 – 04/2019

- Review the basics of algorithms:
  - Divide and Conquer
  - Sorting and Searching
  - Randomized Algorithms

**Computer Vision Nanodegree Program** (Course / Certificate), Udacity

01/2019 – 04/2019

- Learned to build computer vision applications based with Pytorch, completing 3 projects:
  - Facial Keypoints Detection with Convolution Neural Network
  - Image Captioning with CNN plus RNN
  - Landmark Detection & Tracking using SLAM

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### **Immersive Silicon Valley Training (ISVT)**, San Francisco, California 07/2018 - 09/2018

- Designated by the director of Service Systems Technology Center, ITRI
- Looked for potential business and research partners during 2.5-month business trip in Silicon Valley and promoted AI products developed at ITRI
- Successfully built long-term relationship with DirectDerm, a startup for telemedicine in dermatology

### **Artificial Intelligence Nanodegree & Specializations** (Course / Certificate), Udacity 05/2017 - 02/2018

- Learned to build deep learning applications with Python, Tensorflow, and Keras, completing 4 projects:
  - Sign Language Recognizer with Hidden Markov Model
  - Facial Keypoints Detection with Convolution Neural Network
  - Machine Translation (French vs. English) with Recurrent Neural Network
  - End-to-end Speech Recognizer with Recurrent Neural Network

### **Deep Learning Nanodegree Foundation** (Course / Certificate), Udacity 01/2017 - 05/2017

- Learned fundamentals of deep learning, including convolution neural network, recurrent neural network, generative adversarial network and completed 3 projects:
  - Image Classification with Python and Tensorflow
  - TV Scripts Generation with Recurrent Neural Network
  - Human Face Generation with Generative Adversarial Network

### **IDEO U Design Thinking Courses**, IDEO U 06/2016 - 10/2016

- Learned the mindset of design thinking and methods to drive innovation through the courses Insights for Innovation, Storytelling for Influence, From Ideas to Action, and Leading for Creativity

## **VOLUNTEER ACTIVITIES**

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### **IDEO U Alumni Coach**, IDEO U 01/2017-07/2017

- Selected to be one of 30 alumni coaches as part of the inaugural IDEO U Alumni Fellowship program
- Provided guidance to learners, participated in workshops, and built a global community of practice
- Provided high quality, enriched contributions to the IDEO U community, demonstrated a robust understanding of the content (Design Thinking), and worked to apply learnings in my own contexts

## **SKILLS & CERTIFICATES**

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**Languages:** Mandarin (Native), English (Fluent; TOEFL iBT: 107/120 (R: 30, L: 27, S: 23, W: 27))

**Technical:** Python, Deep Learning (Pytorch), Machine Learning (Scikit-learn), C++, HTML, CSS

**Certificate:** Occupational Therapist

## **COMMUNITY ENGAGEMENT**

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### **Director General**, *United Eagle Welfare Committee*, ITRI, Hsinchu, Taiwan 01/2017 - 12/2017

- Managed \$300K budget to hold activities that can benefit employees

## **HONORS & AWARDS**

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### **Outstanding Youth Award**, *NTU College of Medicine* 2014

- Selected by director of college as one of 7 outstanding youths due to clinical and research achievements

### **Altruism Award**, *NTU College of Medicine* 2012

- Awarded by director of college for standing out from 30 classmates for leadership and contributions to class learning environment