

Yuanyuan Gao

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Education

PhD | Mechanical Engineering

RPI | 2015-2020

- Research: machine learning, image processing, Brain imaging, surgical skill assessment, neuromodulation
- Advisor: Suvranu De, Xavier Intes

Visiting scholar | industrial & Systems Engineering

University of Buffalo | 2018-2019

- Advisor: Lora Cavuoto

MS | Mechanical Engineering

Beihang University | 2010-2013

BS | Aircraft Environment and Life Security Engineering

Beihang University | 2006-2010

Skills

Programming language

Python • C/C++/C# • VB • SQL

Statistical tools

Matlab • SPSS • Minitab • G*Power;

Hardware

fNIRS spectrometers • Trans-cranial electrical stimulation device

Laparoscopic skill trainer

Others

Microsoft Office Series • Latex

Certification

Introduction to Transcranial Direct Current Stimulation

Harvard Medical School | 03.2016

Language Skills

English and Mandarin

Patents

201210110543X • 2012100914371
2012101268206

Experience

Research Assistant | Rensselaer Polytechnic Institute (2015-2020)

- Project 1: Evaluating brain activation changes during motor learning
 - I demonstrated that specific brain areas (PFC, M1 and SMA) were activated neuromodulation and the bimanual motor skills were enhanced as well.
 - Led the collaboration with researchers and surgeons from [University of Buffalo](#) and [Harvard Medical School](#)
 - Drafted Army grant proposal (**\$6.5M**)
- Project 2: Predicting surgical skills from fNIRS
 - Achieved $R^2 = 0.73$ and $AUC = 0.91$ by designing a CNN model to extract features from fNIRS data to regress out the motor skill level, which is much higher than SVR, KPLS and RF.
- Project 3: Predicting learning curve characteristics
 - Predicted accurately ($R^2 = 0.81$) the learning curve characteristics from the initial ten trials performance of the medical students.
- Project 4: Removing motion artifacts in fNIRS data
 - Constructed a sophisticated designed deep learning model to remove the motion artifact existing in fNIRS data.

Motor Design Engineer | SAIC MOTOR (Shanghai) (2013-2015)

Publication and Talks

Journal Papers

- A Machine Learning approach to predict surgical learning curves. **Gao, Y. et al.** 2019. [Surgery](#)
- Functional brain imaging reliably predicts bimanual motor skill performance in a standardized surgical task. **Gao, Y. et al.** 2019. IEEE TBME (Under review). [Preprint](#)
- A comprehensive review of experimental neuroimaging studies of the effect of transcranial electrical stimulation on human motor skills, **Gao, Y. et al.** 2020. Science Translational Medicine. (In preparation)

Conference Presentations

- SPIE.bios, San Francisco, 2019.
- OSA Biophotonics Congress: Optics in the Life Sciences, 2019.

Workshops

- Multiple invited talks in 'Deep Learning Journal Club' in RPI, 2016-2020

Teaching and mentoring

- Graduate Teaching Assistant at RPI (4 Semesters)
- Undergraduate Research Program (URP) mentor at RPI