Jingjie Li

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EDUCATION

Xi'an Jiaotong University (XJTU), Xi'an, China   08/2015-07/2019
- B.S. in BioMedical Engineering (degree expected in Jul. 2019)
- Overall GPA: 3.57/4.3 (86.53/100)   Math & Science GPA: 3.63/4.3 (87.29/100)
- Siyuan Scholarship, 2016 & 2017   Outstanding Student, 2016 & 2017

New York University Shanghai, China   06/2018-09/2018 & 06/2017-09/2017
- Summer Undergraduate Research Program (SURP), NYU-ECNU Institute of Brain and Cognitive Science

Peking University (PKU), Beijing, China   07/2016
- 4th CLS/McG Neuroscience Summer School

RESEARCH EXPERIENCES

Undergraduate Researcher, NYU-ECNU Institute of Brain and Cognitive Science, NYU Shanghai [Link]

Advisor: Prof. Jeffrey Erlich(PI)   Dr. Evgeniya Lukinova(Postdoc)   06/2017-09/2018

Project 1 Visual working memory guided orienting task for the Rodent
- Developed a super-low latency (~1ms) latency, high performance sound service system for the B-Pod using Raspberry Pi. Source code and design files are available on Erlich Lab Github. [Github Link]
- Designed a power supply PCB for the whole B-Pod system.
- Learned to program the state-of-the-art B-Pod behavioral training system developed by the lab, and designed a 9-stage experiment protocol to train mice to perform a visual working-memory guided orienting task.
- Made the mouse to interact with the B-Pod system by using the light color as a cue which was matched by the port chosen by the mouse to gain reward.
- Report can be found from the NYUSH's website. [link]

Project 2 Spatial temporal tuning of rat FOF in a hierarchical movement planning task
- Performed in *vivo* electrophysiology analysis (eg. LFP, PSTH, tuning curve, tuning selectivity), and participated in spike sorting using MountainSort, JRCLUST.
- Found that there are ~5 different firing dynamics in rat's FOF encoding 6 directions orientating: some of the cells have 'sharp' receptive field, some have 'wider' receptive field, and there are 3 different tuning properties (Uni-directional tuning, Up/Down tuning, Left/right tuning).
- Found that like monkey's FEF, rat's FOF has planning related predictive activity before moving.
- Found that rat's FOF can be selectively fired for the final goal, rather than the intermittent sub-goal, and revealed that rat's FOF is also involved into some higher order cognitive processing, not only motor.
- Part of my summer research results was presented on Dr. Erlich's oral speech on 2018 society for neuroscience meeting.

Project 3 History dependence modeling (time-normalization divisive model) of the experiential based delay-reward decision-making tasks for human subjects (Under Evgeniya's project)
- Developed computational models for measuring and detecting history dependence in experiential based delay-reward decision-making tasks.
- Found that the bigger the delay the more history matters, but the parameter responsible for the history is negligibly small.
- The model failed to beat the simple hyperbolic model in terms of BIC(Bayesian information criterion) on the same dataset.

Undergraduate Researcher, Institute of Artificial Intelligence and Robotics, XJTU   03/2016-Present

Advisor: Prof. Badong Chen

Project 1 Visual working memory affects the perception of ambiguous SFM (Structure-From-Motion) by enhancing internal representation
- Studied perceptual memory phenomenon by observing how previous SFM bias the perception of the up-coming SFM using combination of psychophysical experiments and brain imaging technique (fMRI, EEG).
- Showed that the VWM dual task can strengthen the perceptual memory effect significantly.
- Showed that distractors in the delay period could impair the perceptual bias by eliminating the internal representation in MT+, but not affect the storage of VWM.
- Revealed that the delay activity (Top-down modulation caused by VWM) in MT+ induced this perceptual memory.
- *Results presented on VSS 2017 conference* [Link].

Project 2 Decoding visual representation and building up voxel-level visual encoding model based on fMRI signals

- Repeated works from three articles (Miyawaki et al., 2008, Neuron; Kay et al., 2008, Nature; Sprague & Serences, 2013, Nat. Neuroscience).
- Used SVM classifier MVPA to reconstruct 10x10 binary pixels from subject's V1 activity while they were watching that pixels visual image in the fMRI (reconstruction performance > 84%) [Link].
- Modeled voxels activities in visual cortex using the Voxel-Wise Model by constructing a liner receptive field model for each voxels using the Gabor wavelet filter according to the encoding theory of the primary visual cortex.
- Achieved remarkable accuracy in the identification task (about 48.8%, meanwhile the chance level is about 0.8%) [Link] .
- Code shared on github [Link].

Undergraduate Researcher, Department of BioMedical Engineering, XJTU — 11/2016-05/2017
Advisor: Prof. Gang Wang

Anesthesia monitoring using a combination of Bispectral, WT, FFT and entropy analysis in EEG signal
- Used algorithms, like WT and FFT analysis, to capture the time-frequency characteristics; used Bispectral to detect phase coupling characteristics; used entropy/ complexity analysis to capture the none-linearity characteristics of EEG signal.
- Successfully detected significant difference between anesthesia and wake state.

ENGINEERING EXPERIENCES

First Prize (Highest), National Biomedical Engineering Competition — 04/2018-08/2018
Advisor: Prof. Xiang Chen, and Prof. Jin Li

A ECG/Oximeter Monitor design using TI's AFE4400 and ADS1293 IC, and MSP430MCU [Github Link]
- Used TI's (Texas Instrument) ADS1293/AFE4400 analog front-end IC to acquire physiology data from human body, used TI's MSP430F149 MCU to control these chips, and send the data to our Android Smartphone App via TI's Bluetooth IC CC2540
- Designed and made a PCB running high speed SPI signal (3.2Mbps) with delicate power management
- Performed embedded system programming for MSP430 using IAR IDE
- Achieved outstanding power consumption performance: the hardware only took about 300mW Power for Li-ion battery (about ~180mW for Bluetooth)

Undergraduate Open Lab Project, XJTU [Link] — 10/2017-12/2017
Advisor: Prof.Yinbin Jin, and Prof. Gaidi Ning

Rodent behavior measurement and control system using FPGA and MATLAB
- Made a hardware platform and successfully built up my own B-Pod system
- Used FPGA to control LEDs around the mouse port, and monitored the IR collector to detect animals' activity
- Used MATLAB to drive a FSM(Finite State Machine) to control the FPGA and record all the experiment data automatically
- Tested on real rats and mice

PUBLICATION

[1] **Jingjie Li**, Hao Wu, Badong Chen. "Visual working memory affects the perception of ambiguous SFM (Structure-From-Motion) by enhancing internal representation", Poster presented at the 17th Annual Meeting of the Vision Sciences Society. Naples, FL. doi:10.1167/17.10.1217.

[2] **Jingjie Li**, Jinming Li, Badong Chen. "The Influence and Disassociation Effect Between Visual Working Memory and Serial Dependence effect to Perceptual Memory in a Bistable Perception Task". (ready to submit)

FUNDING AWARDED

[1] Project Manager, "The Relationship Between Visual Working Memory and Visual Cognition Encoding", National Undergraduate Innovation Training Program (No. GJ201710698093), 10000 RMB, 06/2017 - 06/2018.

[2] Project Manager, "The Neural Mechanism of Multi-Sensory Working Memory in the Rodent", National Undergraduate Innovation Training Program (No. GJ201810698087), 10000 RMB, 06/2018 - 06/2019.

SKILLS

Rodent Experiment: Handling rodents; Developing and running rodent experiment protocol using B-Pod System
Programming: Python, MATLAB (Proficient); R (ggplot2); C; C++; Verilog HDL (FPGA); x86 Assembly; Git; SQL DB
Hardware: PCB & Circuit Design; MCU programming (MSP430, STM32, Arduino); Problem solving using IC.
Electrophysiology (in *vivo*): Spike sorting; LFP analysis; PSTH analysis; Tuning analysis.
Psychophysics: Psychtoolbox programming (MATLAB) & basic experiment design skills
fMRI Data Analysis: SPM12 preprocessing and univariate analysis; MVPA; Forward encoding model; Voxels activities modeling (Voxel-Wise Model)
EEG Data Analysis: Running EEG experiments, ERP data analysis, Higher order nonlinear feature extracting.