

Hao Fang

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RESEARCH INTERESTS:

Machine learning, Biomedical signal processing, image processing, BCI, etc.

EDUCATION

09/2021-09/2022 University of Edinburgh

Edinburgh, UK

MSc Signal Processing and Communications

Merit

Main courses: *Machine Learning in Signal Processing, Discrete-Time Signal Analysis, Image Processing, Advanced Wireless Communication, Advanced Coding Techniques, Adaptive Signal Processing, Array Processing Methods and MIMO Systems, Probability, Estimation Theory and Random Signals (PETARS), Engineering Research Methods with Grand Challenge, etc*

09/2017-06/2021 University of Leeds (Joint Program with Southwest Jiaotong University)

Leeds, UK/Chengdu, CN

BEng Electronic and Electrical Engineering (Leeds)

First class

Main courses: *Engineering Mathematics, High Frequency Electronics, Transistors and Optoelectronic Devices, Power Electronics, Embedded Systems Project, Microprocessors and Programmable Logic, Circuit Analysis and Design, Circuit Theory, Communications Networks and Signals, Communications Systems, Digital Electronics and Microcontrollers, etc.*

Awards and Honours:

- 2020 Winner of Leeds's Monthly Technology Contest
- 2019-2020 First Class Comprehensive Scholarship (Top 3%)
- 2019-2020 Merit Student

WORK EXPERIENCE

11/2022-Present Jiangsu JITRI Brain-Machine Fusion Intelligence Institute

Jiangsu, CN

Software algorithm engineer

- Design, develop WeChat mini-programs.
- Designing and developing algorithms for image processing and biomedical signals processing.

01/2020-02/2020 Institute of Ocean Electronic Engineering and Intelligent Systems, Zhejiang University

Zhejiang, CN

Intern Project Assistant

- Assisted in the circuit analysis and design of a marine state monitoring device and engaged with the design of multiple sub-circuits, including PreAmp, Filter, and Light sensor.

PROJECT EXPERIENCE

12/2022-12/2022 Bluetooth console and music station for EEG acquisition and tDCS headset based on WeChat mini-programs

- Set the communication protocol between the WeChat mini-program and the Bluetooth Low Energy (BLE) of the head-mounted hardware device;
- Designed and developed the console of the WeChat mini-program with which the users can select and switch the working mode of the headset between EEG acquisition mode and transcranial electrical stimulation mode;
- Designed and developed the music station of the WeChat mini-program with which the users can select songs from other music stations and play them on the mini-program;
- Tested and launched the WeChat mini-program.

12/2022-12/2022 Image fusion algorithm software for visible light images and short-wave infrared images

- Designed and developed the interactive software based on the image fusion algorithm of the designed visible light images and short-wave infrared images; users can select the images above that they want to input on the software side, and obtain the corresponding fusion image;
- The software has applied for copyright.

RESEARCH EXPERIENCE

03/2023-Present Towards Usable and Cost-Effective Closed-Loop EEG-Based BCIs: Emotion Recognition with Minimal Electrode Channels

- The R&D of algorithms, JITRI Brain-Machine Fusion Intelligence Institute, Jiangsu Industrial Technology Research Institute.;
- Exploring the location of brain regions associated with the changes in human emotion.
- Extracting, based on the SEED dataset, different electrode combinations, especially the electrodes in the temporal lobe; applying deep learning in model training and emotion recognition testing;
- Conducting the comparison test that includes SVM, RF, DT, CNN, RNN algorithm;
- Designing the Hybrid (CNN+RNN) scheme and the Ensemble (SVM+CNN + RNN + Hybrid) solution, rendering that this scheme achieves higher robustness.

03/2023-03/2023 The EEG-based detection of epilepsy status

- The R&D of algorithms, JITRI Brain-Machine Fusion Intelligence Institute, Jiangsu Industrial Technology Research Institute.;
- Performed model training and testing for epilepsy detection using epilepsy EEG data sets combined with deep learning;
- Conducted the comparison test on multiple algorithms including CNN, ResNet, SVM, MLP, Random Forest, Decision Tree and Gradient Boosting, etc.

11/2022-12/2022 Image fusion algorithm of visible light image and shortwave infrared image based on evolutionary algorithm and discrete wavelet transform

- Calibrated the visible light images and short-wave infrared images based on evolutionary algorithms;
- Realized image fusion based on discrete wavelet transform;
Colored fusion image based on RGB channel separation and reconstruction;
- Wrote paper on the research (ready to submit) and applied for the patent.

10/2021-Present Postgraduate Graduation Project: Neural Art Meets Edinburgh

- Explored the innovative application of machine learning in art creation;
- Inspired by that human beings can express many scenes in art through NST (neural style transfer), designed the project to use the scenes around the city captured by our mobile phones or cameras to generate artwork.

01/2021-01/2021 Design based on image processing of detecting scarf stripes on conveyor belts

- Acquired through a series of image preprocessing the completed scarf image; reduced the motion blurring and out-of-focus blurring that may exist in the image acquisition process; detected the defects via image segmentation.

10/2020-06/2021 Undergraduate Graduation Project: Real-time Face Covering detection design based on Deep Learning

- Conducted real-time detection of the correctness of wearing face masks based on deep learning (YOLO v5s) as the graduation design;
- Created a custom dataset and divided the detection task into three categories, effectively determining whether the mask wearer was wearing the mask correctly, which has high practical and commercial value.

08/2020-09/2020 Innovative Training Program for Undergraduates of the Chinese Academy of Sciences/Leading researcher

- Engaged with the project on FPGA-based Machine Learning and Hardware Acceleration
- Completed a Python-based GUI design, a real-time handwritten digit recognition based on machine learning using Verilog programming, with which users can input data through handwriting and output recognition results via real-time detection.

01/2020-06/2020 Individual Game Project: Abyss

- Completed the embedded doomsday survival game design project with C++ programming on the FRDM-K64 development board, enabling players to control the characters on the development board, get supplies and restore life for final victory;
- Achieved full marks in "Software Engineering", "Testing and De-bugging", "Complexity, Creativity and Functionality", "Version Control", "Documentation".

02/2019-04/2019 Buggy Project/Team leader

- Led a team of four members in designing a remote control car, realizing its intelligent abilities such as obstacle avoidance, tracking and tailing;
- Designed and welded the H Bridge, remote control and power module of the car, and combined the single-chip microcomputer to complete the design of the obstacle avoidance function.

RELATED SKILLS

- Language: native in Chinese and fluent in English.
- Programming package:
 - ❖ C, C++, Python, Verilog HDL, Java Script, html, wxml, css, wxss, MATLAB,
 - ❖ Open CV

方浩

13258283318 | fanghao0506@qq.com | 苏州，江苏
24岁 | 男 | 汉族 | 共青团员



教育经历

爱丁堡大学	海外QS前100	2021年09月 - 2022年11月
通信与信号处理	硕士 工学部	爱丁堡，英国
核心课程：离散时间信号分析，图像处理，高级无线通信，高级编码，机器学习，自适应信号处理，阵列处理方法和MIMO系统，概率论与随机信号等		
利兹大学	海外QS前100	2017年09月 - 2021年06月
电子信息工程	本科 工学部	成都，中国 / 利兹，英国
利兹大学一等荣誉工学学士（First Class）		
西南交通大学	211 双一流	2017年09月 - 2021年06月
电子信息工程	本科 利兹学院	成都，中国 / 利兹，英国
均分：90.36 / 100		
核心课程：工程数学、高频电子、晶体管与光电子器件、电力电子、嵌入式系统、微处理器与可编程逻辑、电路分析与设计、电路理论、通信网络与信号、通信系统、数字电子与微控制器等		

荣誉奖项

西南交通大学综合奖学金一等奖	2020.12
西南交通大学三好学生	2020.12

工作经历

江苏省产业技术研究院脑机融合智能技术研究所	2022年11月 - 至今
软件算法工程师	苏州，中国
图像以及脑电相关的算法的设计，开发与应用；微信小程序开发。	

项目经历

基于微信小程序的脑电采集与经颅电刺激头戴耳机的蓝牙控制台及音乐台	2022年12月 - 2022年12月
软件开发	苏州，中国
<ul style="list-style-type: none">小程序与头戴硬件设备的低功耗蓝牙之间的通信协议的设定；小程序控制台部分的设计和开发。在控制台界面，用户可以选择和切换头戴设备的工作模式，即脑电采集模式和经颅电刺激模式。在脑电采集模式中，用户可以通过小程序设定采集时间，并在采集结束后通过低功耗蓝牙获取采集结果并进行数据统计和分析；在经颅电刺激模式中，用户可以通过小程序设定电刺激时间，电刺激电流大小以及电刺激模式。小程序音乐台部分的设计和开发。用户可以在该界面选择存储在网易云客户端对应电台的古典音乐，在小程序端进行播放、暂停和歌曲切换。小程序的测试和发布。	
可见光图像与短波红外图像的图像融合算法软件	2022年12月 - 2022年12月
软件开发	苏州，中国
<ul style="list-style-type: none">基于所设计的可见光图像与短波红外图像的图像融合算法完成对应的可交互软件的设计和开发；用户可以在软件端自主选择想要融合的可见光图像及短波红外图像，并获取对应的融合图像；软件已申请软件著作权。	

研究经历

基于EEG的情绪检测	2023年03月 - 至今
算法研发 江苏省产业技术研究院脑机融合智能技术研究所	苏州，中国

<ul style="list-style-type: none"> 探究与人类情绪变化相关的脑区域位置。 基于SEED数据集，提取不同的电极组合，尤其是颞叶区的电极，结合深度学习算法进行情绪检测的模型训练及测试。 对比测试包括CNN, RNN算法以及Hybrid (CNN+RNN) 方案。 进一步设计了Ensemble (CNN+RNN+Hybrid) 方案。实验表明，此方案实现了更高的准确率。 		
基于EEG的癫痫状态检测	2023年03月 - 2023年03月	
算法研发 江苏省产业技术研究院脑机融合智能技术研究所		苏州，中国
<ul style="list-style-type: none"> 利用癫痫脑电数据集，结合深度学习算法进行癫痫检测的模型训练及测试。 对比测试了包括CNN、ResNet、SVM、MLP、Random Forest、Decision Tree和Gradient Boosting在内的多个算法。 		
基于进化算法和离散小波变换的可见光图像与短波红外图像的图像融合算法	2022年11月 - 2022年12月	
算法研发 江苏省产业技术研究院脑机融合智能技术研究所		苏州，中国
<ul style="list-style-type: none"> 实现基于进化算法的可见光图像与短波红外图像的校准； 实现基于离散小波变换的图像融合； 实现基于RGB通道分离与重建的融合图像上色； 撰写算法对应的发明专利及论文。 		
神经艺术遇见爱丁堡 (Neural Art meets Edinburgh)	2021年10月 - 2022年08月	
爱丁堡大学		爱丁堡，英国
<ul style="list-style-type: none"> 基于包括Neural Style , VQGAN-CLIP , DALLE-2以及Stable Diffusion在内的深度学习算法生成与爱丁堡有关艺术作品 在GitHub Pages搭建线上画展平台进行作品展览 完成相关数据分析与论文撰写 		
围巾条纹缺陷检测	2021年11月 - 2021年11月	
爱丁堡大学		爱丁堡，英国
<ul style="list-style-type: none"> 基于图像分割等图像处理技术，设计相关算法实现围巾条纹缺陷检测 完成相关报告撰写，报告获评为卓越 “distinction” 		
基于深度学习的实时口罩佩戴及正确性检测	2020年10月 - 2021年06月	
西南交通大学，利兹大学		成都，中国
<ul style="list-style-type: none"> 构建相关的三分类数据集； 基于YOLO v5，训练深度学习模型并实现了实时的口罩佩戴及佩戴正确性检测； 完成相关论文撰写。 		
基于FPGA的机器学习及硬件加速	2020年08月 - 2020年09月	
第一学生主研 中国科学院半导体研究所		北京，中国
<ul style="list-style-type: none"> 中国科学院创新实践训练计划，学习了与FPGA以及硬件加速有关的知识 完成了一个基于Python的GUI设计以及基于卷积神经网络的手写数字识别设计 完成相关报告撰写 		
智能越野车项目 (Buggy Project)	2019年02月 - 2019年04月	
团队主创 西南交通大学，利兹大学		成都，中国
<ul style="list-style-type: none"> 智能小车的H桥以及遥控器的电路焊接； 智能小车避障功能的实现。 		
独立嵌入式游戏项目：Abyss	2020年01月 - 2020年06月	
西南交通大学，利兹大学		成都，中国
<ul style="list-style-type: none"> 完成了一个基于C++的末日生存游戏设计与编程实现，游戏可在FRDM-K64上运行； 该项目在利兹大学最终评价中获得满分。 		

社团和组织经历

泰康之家·蜀园		成都，中国
志愿者 养老社区		
蜀都义工社	2017年02月 - 2021年06月	

技能/证书及其他

- **技能**: c/c++ , Python , MATLAB , Verilog HDL , javascript , html&css , wxss , wxml
- **语言**: 英语 (CET-4) , 英语 (CET-6) , 雅思