Yassine OUZAR

2 rue du Général Delestraint
57000 Metz
Tel : 07 51 10 36 00
E-mail : yassine.ouzar@univ-lorraine.fr

Education

2019-present **Phd in Automatic, Computer Science, Signal/Image processing**
LCOMS Lab, University of Lorraine, Metz, France

2018-2019 **Master degree's in Embedded Systems and Data science**
Option: Data science, Paris Saclay University, Orsay, France

2017-2018 **Master degree's in Embedded Systems**
Abdelhamid Ibn Badis University, Mostaganem, Algeria

2015-2016 **Bachelor degree's in Electronic Engineering**
Option: Electronic, Abdelhamid Ibn Badis University, Mostaganem, Algeria

Skills

Technical:
Data science and Machine learning (Numpy, Pandas, Matplotlib, SciPy, Sckit-Learn, Keras, Tensorflow)
Computer vision - Signal/Image processing (Matlab, Python)
Biomedical signals processing and Remote Photoplethysmography
Affective computing, Automatic, Robotic
Hardware and software design of embedded systems (Microcontroller, Arduino, Raspberry pi, FPGA)
Real time embedded systems and concurrent programming
Computer architecture (Motorola 6809/68000, MIPS, ARM) Analog and degital electronics

Software:
Operating Systems: Windows, Linux
Programming language: C/C++, Python, Matlab, VHDL, Bash, HTML/CSS, JavaScript

Professional Experience

Teaching assistant:

2021 – 2022 **University of Lorraine, Metz, France**
- Machine learning (master's in human machine systems engineering)

2020 – 2021 **University of Lorraine, Metz, France**
- Oriented Object Programming (master's in human machine systems engineering)
- Machine learning (master's in human machine systems engineering)

Mentoring:

2021 - 2022
- Master's Internship: Multimodal emotion recognition: approach based on contactless technologies (Lynda LAGHA).

2021 - 2022
- Master's project - Human machine systems engineering: Non-contact heart rate variability measurement from facial video recordings (Walid BOUNOUA, Yasmine DAHLAB).

2020 - 2021
- Master's project - Human machine systems engineering: Non-contact pulse wave extraction based on deep learning (Walid BOUNOUA, Yasmine DAHLAB).

2020 - 2021
- Master's project - Human machine systems engineering: Non-contact pulse rate measurement by camera based on deep learning (Souhila MOKADDEM)

Publications:

- **OUZAR, Yassine**, DJELDJLI, Djamaleddine, BOUSEFSAF, Frédéric, et MAAOUI, Choubeila. X-iPPGNet: a Novel One Stage Pulse Rate Estimation from Face Videos Based on 3D Xception Network. *IEEE Journal of Biomedical and Health Informatics* ***(Soumis)***.
- **OUZAR, Yassine**, Lagha, Lynda, BOUSEFSAF, Frédéric, et MAAOUI, Choubeila. Multimodal stress state detection from facial videos using physiological signals and facial features. In: *Proceedings of the IEEE/CVF International Conference Pattern Recognition*. ***(Soumis)***.
- **OUZAR, Yassine**, BOUSEFSAF, Frédéric, DJELDJLI, Djamaleddine, et MAAOUI, Choubeila. Video-based multimodal spontaneous emotion recognition using facial

expressions and physiological signals, In: *Proceedings of the IEEE/CVF Computer Vision and Pattern Recognition.*

- BOUSEFSAF, Frédéric, DESQUINS, Théo, DJELDJLI, Djamaleddine, **OUZAR, Yassine**, MAAOUI, Choubeila, et PRUSKI, Alain. Estimation of Blood Pressure Waveform from Facial Video Using a Deep U-Shaped Network and the Wavelet Representation of Imaging Photoplethysmographic Signals, *Biomedical Signal Processing and Control,* 2021.
- **OUZAR, Yassine**, DJELDJLI, Djamaleddine, BOUSEFSAF, Frédéric, et MAAOUI, Choubeila. LCOMS Lab's approach to the Vision for Vitals (V4V) Challenge. In: *Proceedings of the IEEE/CVF International Conference on Computer Vision*. 2021. p. 2750-2754.
- BOUSEFSAF, Frédéric, DJELDJLI, Djamaleddine, **OUZAR, Yassine**, MAAOUI, Choubeila, et PRUSKI, Alain. iPPG 2 cPPG: Reconstructing contact from imaging photoplethysmographic signals using U-Net architectures. *Computers in Biology and Medicine*, 2021, vol. 138, p. 104860.
- **OUZAR, Yassine**, BOUSEFSAF, Frédéric, et MAAOUI, Choubeila. Mesure sans contact de la fréquence par caméra basée sur l'apprentissage profond. *Colloque Jeunes Chercheurs IFRATH,* 2021.

Internships:

April-September 2019 (6 months)

ETIS Laboratory " Data Processing and Systems Teams "

An expressive robotic head capable of recognizing secondary facial expressions

- Image processing, Neural networks, Developmental robotics (Matlab, C)

January-June 2018 (5 months)

LEOG Laboratory "Electromagnetism and Guided Optics"

Design of embedded systems used in remote laboratories

- Design and production of a switching matrix for remote practical work
- Development of programs to control digital potentiometers (SPI Protocol) and memories (1WProtocol) using Python and C languages
- Development of the web interface of the remote lab for the manipulation of electronic practicals (HTML / CSS / Javascript) and implementation of the web server based on Node.js
- Concept Design and production of TP cards (CAD, CNC)

Lab projects:

2020 - 2021 (8 months)
- Imaging Photoplethysmography for contactless heart rate measurement using deep learning(Remote Photoplethysmography, XceptionNet, Keras)

2020 (4 months)
- Deep facial expression recognition system based on deep learning (SE-Net, Keras)

2019 (6 months)
- Compound facial expression recognition system (C, Neural networks, Developmental robotics)

2019 (2 months)
- Road traffic monitoring system based on machine learning and IoT (Raspberry Pi, Python, OpenCV, TensorFlow, Node.js, HTML/CSS/JS)

2019 (1 months)
- Facial recognition system (Python, TensorFlow, OpenCV)

2018 (2 months)
- Voice command by keywords (Python, Keras, LibROSA)

2018 (5 months)
- Design and creation of a platform for remote electronics practical work (C, Python, Node.js)

Research Activities

My research interests lie in the intersection of efficient machine learning, affective computing and healthcare. Currently, my thesis research focuses on video-based vital signs measurement and multimodal emotion recognition systems based on facial expressions and physiological parameters. I am also interested

in the hardware and software design of embedded and communicating systems. A brief description of my research activities during my research internships and my doctoral thesis is given in the following paragraphs.

Research activities during my doctoral thesis:

The main objective of my thesis work is to develop a multimodal system that merges facial expressions and physiological signals to address the problem of acted emotions. Unlike existing approaches, we adopt the first fusion of multiple modalities using a single input source (video). Two deep neural networks were developed to extract features of each modality from facial videos. The first one extracts the facial expressions features using a new spatiotemporal squeeze and exitation Xception network, while the second pipeline allows to extract physiological signals using a state-of-the-art architecture called MTTS-CAN. The latter recovers the IPPG signal and from which pulse rate variability features can be measured. The extracted features of each modality are then fused and fed to a neural network for emotion classification.

Keywords: emotion, non-contact, photoplethysmography, signal/image processing, deep learning

Research activities during my 2nd research internship (An expressive robotic head capable of recognizing secondary facial expressions):

My internship focused on facial expressions recognition for human-robot interaction which is increasingly attracting the intention of research in robotics and artificial intelligence. My aim was to develop a neural model that allows a robotic head to learn to recognize compound facial expressions online and in autonomous way interacting with a human partner. I proposed a sensorimotor architecture (PerAc) that combines the extracted expressive characteristics with the actions of the servomotors, each acting as a facial muscle. Inspired by the baby's ability to learn facial expressions without a supervision signal, the training based on unsupervised neural networks learns online to recognize facial muscle groups through an imitation game between the robot and an experimenter. After a short learning period, the robot will be able to produce a multitude of primary and secondary facial expressions.

Keywords: emotions, expressive robotic head, HCI, developmental robotics, unsupervised learning, online learning, facial expressions, motor primitives, expressive intensity

Research activities during my 1st research internship (Design of embedded systems used in remote laboratories):

Most of currently remote laboratories implementations include interactive experimentation. In this case, students use real devices and equipment to perform real experiments, which need some flexibility of interaction with the hardware platform. The hardware platform is composed of a Raspberry Pi as a lab server, a switching board (SB), a practical work circuit board and some measurement instruments. The SB is used to make configuration of experimentation by establishing connection between the practical work circuit and measurement instruments. During the experimentation process, students change the setup using a web

page. In the background, the hardware configuration is realized using SB, which is controlled by the lab server. The purpose of this work is to develop a new SB in order to provide more possibilities, interaction flexibility with the hardware platform, ease of use, improve performance in response time and finally reduce the cost of the hardware. The SB is based on switches instead of relays. This board can be plugged directly on a Raspberry Pi to facilitate the assembly. It extends the “SPI” bus in order to control some electronic components such as digital potentiometers. Its use is illustrated with a circuit with multiple combinations.
Keywords: remote laboratory, e-learning, switching board, Raspberry Pi

References

- Pr. Choubeila MAAOUI
  Professor
  Tel: 03 72 74 93 10
  Email: choubeila.maaoui@univ-lorraine.fr
- Dr. Frédéric BOUSEFSAF
  Associate professor
  Tel: 03 72 74 92 94
  Email: frederic.bousefsaf@univ-lorraine.fr

Hobbies

- New technologies, Photography, Traveling, Sport