

GABRIELE VOLPES

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Electronic Engineer, Ph. D. Student in Information and Communication Technologies (XXXVI Ph. D. Cycle)

ACADEMIC STUDIES

2020-NOW

PH. D. IN INFORMATION AND COMMUNICATION TECHNOLOGIES,

UNIVERSITÀ DEGLI STUDI DI PALERMO, ITALY

Research project title: Development of experimental protocols and use of solutions aimed at the objective and quantitative assessment of work-related stress (*INPS Ph. D. Fellowship Grant*).

Activities: biomedical sensors state-of-art analysis and implementation for minimally-invasive biosignals acquisition for the health-status assessment (e.g. electrocardiography, photoplethysmography, electrodermal activity, respiration rate, oxygenation etc..). Development of novel analog front-end based on silicon photomultiplier for photoplethysmographic signals acquisition. Time series analysis in time, frequency and information domain to assess physiological status.

2018-2020

MASTER'S DEGREE IN ELECTRONIC ENGINEERING – MECHATRONIC FIELD,

UNIVERSITÀ DEGLI STUDI DI PALERMO, ITALY

Graduation Mark: 110L/110

Thesis topic: Detection and analysis of environmental and medical parameters for remote patient monitoring

Thesis work: A telemedical system was designed and implemented capable of monitoring the vital parameters of the individual, the level of stress and the quality of the air breathed, favoring remote doctor-patient interaction. The system was developed using an STM32 microcontroller, a network of analog and digital sensors for the acquisition of parameters relating to air quality and to the state of health of the patient (sweating, body temperature, heart rate and blood oxygenation) and of the Bluetooth and Wi-Fi communication interfaces for sharing the collected data and a central computer. The project was developed in all its parts, from the simulation to the choice of components and to the programming (C language through the STMCubeSuite development environment) of the firmware for managing the sensors.

2014-2018

BACHELOR'S DEGREE IN ELECTRONIC ENGINEERING, UNIVERSITÀ DEGLI STUDI DI PALERMO, ITALY

Thesis topic: Power-line communication systems.

Thesis work: Characterization of low voltage networks and their use as a communication channel. A mathematical model has been found capable of describing the frequency behavior of the low voltage network under varying load conditions and additive disturbances present in the network itself. Subsequently, an application in the automotive field was presented and discussed which involved the frequency response of a vehicle's electrical network and the study of the main non-linear blocks and sources of noise (vehicle loads and battery).

COMPETENCES

- Embedded systems (MCUs and FPGA)
- Analog and digital electronic for both small signal and power applications
- Electrical and electronic laboratory instruments
- Acquisition signals and signal processing
- Telecommunications, wireless networks and cybersecurity
- Mobile robotic and automotive control systems
- Programming languages (C, VHDL, Assembly, Visual Basic, Python, SQL, HTML, PHP)
- MATLAB, Simulink, LabVIEW, LTspice, Microcap, Atmel Studio, Xilinx, Dev-C, Arduino and STM32Suite (Cube, MX and Studio) softwares

WORK EXPERIENCES

12-2018/03-2019

MOBILE AND COOPERATING ROBOTIC SYSTEMS EXAM, UNIVERSITÀ DEGLI STUDI DI PALERMO

Development on Matlab and Simulink software of an autonomous robot, capable of achieving the following objectives on a three-dimensional map (in the presence of random obstacles): path planning, path following, obstacle. The project was proposed, complete in all its parts (modeling, simulation and physical implementation on Arduino board), for the final examination of the subject 'Mobile and Cooperating Robotic Systems'.

12-2019/02-2020

AUTOMOTIVE CONTROL SYSTEMS EXAM, UNIVERSITÀ DEGLI STUDI DI PALERMO

Analysis and design of a speed and torque controller of an asynchronous motor using Matlab & Simulink development environment for the final examination of the subject 'Automotive control systems'.

TEACHING ACTIVITIES

2021-NOW

TUTORING AND THESIS CORRELATOR, UNIVERSITÀ DEGLI STUDI DI PALERMO

Tutoring and correlator activities for bachelor and master students in electronic and biomedical engineering

04-2021/06-2021

SCHOOL-WORK ALTERNATION, UNIVERSITÀ DEGLI STUDI DI PALERMO

Cycle of work-related learning meetings "Elements of design and analysis of a biomedical device for the evaluation of heart rate variability and other physiological parameters" for high school students.

CONFERENCES AND WORKSHOPS

30/08/2021, INTERNATIONAL CONFERENCE

EURO-MEDITERRANEAN MEDICAL INFORMATICS AND TELEMEDICINE 14TH MEETING (EMMIT), AGRIGENTO, ITALY

Covid-19 Health and Social emergency in Mediterranean area: how Digital Technology and Telemedicine can support in decision & problem solving Towards a Mediterranean e-Health Observatory (MeHO).

Presentation of “Low invasive multisensor acquisition system and novel information-theoretic measures to assess physiological interactions”.

30/06/2021, WORKSHOP

L'ESPERIENZA DEL DIPARTIMENTO DI INGEGNERIA DI PALERMO NELLA INTEGRAZIONE DI SENSORI PER SISTEMI WEARABLE DI MISURA SEGNALI FISIologici, DEPARTMENT OF INDUSTRIAL ENGINEERING, TRENTO, ITALY

Presentation of “Sviluppo di un dispositivo biomedico indossabile per la valutazione del benessere psicofisico”.

PUBLICATIONS

02/2022, CONFERENCE PAPER

SUBMITTED FOR 17TH EDITION OF IEEE INTERNATIONAL SYMPOSIUM ON MEDICAL MEASUREMENT & APPLICATIONS, JUNE 22-24 2022

Volpes G., Sparacino L., Valenti S., Parisi A., Busacca A., Faes L., Pernice R. “A portable multisensory system to assess cardiorespiratory interactions through photoplethysmography”.

02/2022, CONFERENCE PAPER

SUBMITTED FOR 17TH EDITION OF IEEE INTERNATIONAL SYMPOSIUM ON MEDICAL MEASUREMENT & APPLICATIONS, JUNE 22-24 2022

Valenti S., **Volpes G.**, Parisi A., Pernice R., Stivala S., Faes L., Busacca A. “A silicon photomultiplier-based analog front-end for DC component rejection and pulse wave recording in photoplethysmographic applications”.

01/2022, CONFERENCE PAPER

SUBMITTED FOR 21ST IEEE MEDITERRANEAN ELECTROTECHNICAL CONFERENCE, JUNE 14-16 2022

Volpes G., Valenti S., Parisi A., Busacca A., Faes L., Pernice R. “Low invasive multisensor real-time acquisition system for the assessment of cardiorespiratory and skin conductance parameters”.

10/2021, CONFERENCE PAPER

43RD ANNUAL INTERNATIONAL CONFERENCE OF THE IEEE ENGINEERING IN MEDICINE & BIOLOGY SOCIETY (EMBC)

Pernice R., **Volpes G.**, Krohova J. C., Javorka M., Busacca A., Faes L. “Feasibility of Linear Parametric Estimation of Dynamic Information Measures to assess Physiological Stress from Short-Term Cardiovascular Variability”.