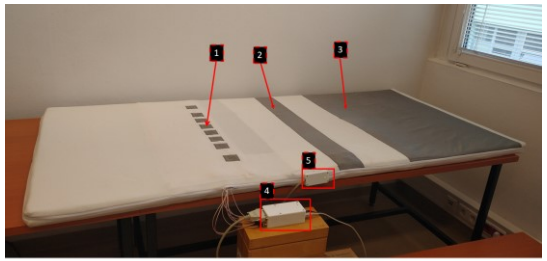
Smart sensors and systems in biomedicine

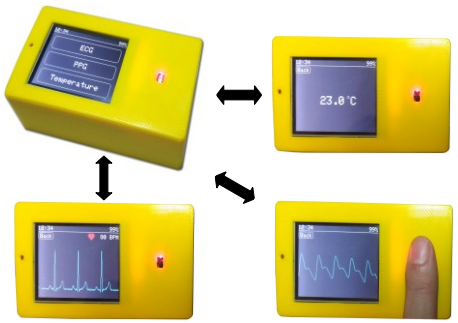
Development of advanced and innovative systems

Development of unique biomedical sensors and systems

Sensors development

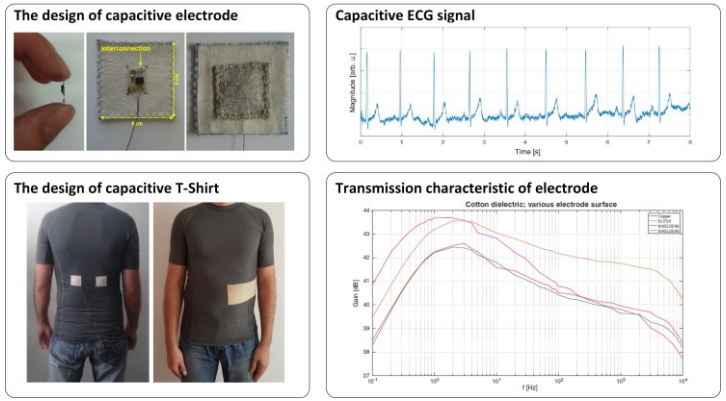
Telemedicine





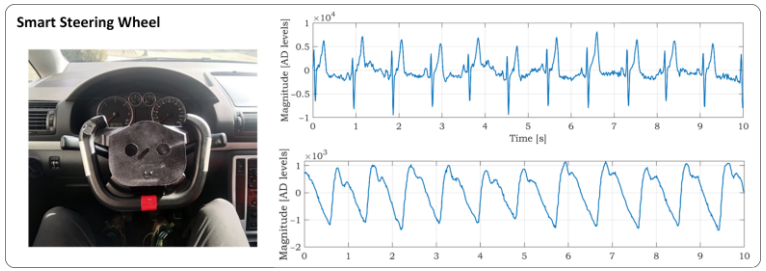
Capacitive measurement of ECG

B. Babusiak et.al, Measurement **114**, (2018)

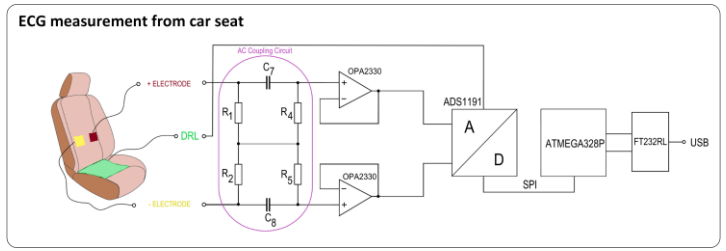


Smart monitoring systems

B. Babusiak et.al, Sensors **21** (16), (2021)



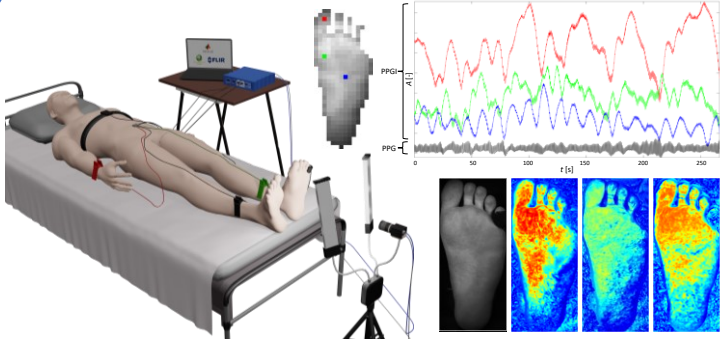
J. Kafkova, B. Babusiak et.al, Measurement **240**, (2025)



Non-Invasive Cardiovascular Diagnostics „HemodynamiX Lab“

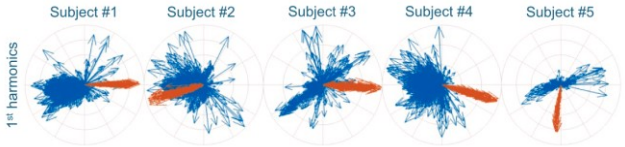
Camera-based optical methods for non-invasive hemodynamic monitoring and physiological assessment

Application of photoplethysmography imaging (PPGI) in different scenarios

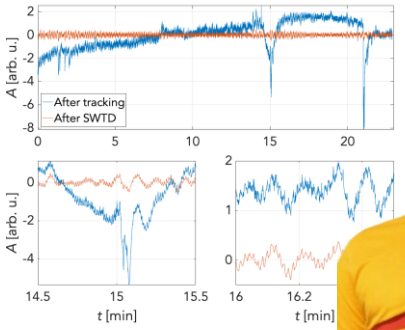


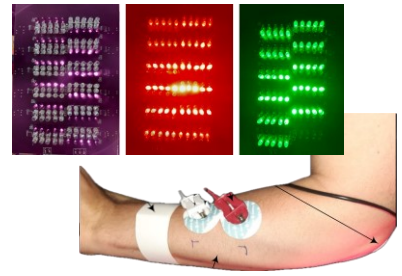
Angiology

Allergology



Advanced biosignal processing algorithms





Multiwavelength measurements

Magnetic Induction Monitoring of Vitals

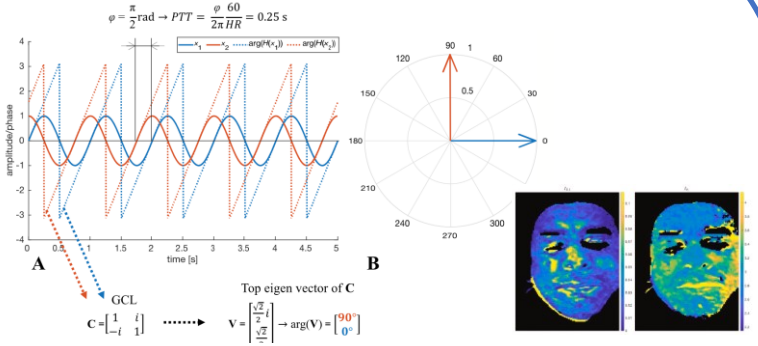
FEIT UNIZA

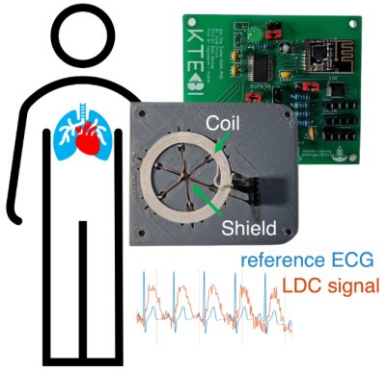
International collaborators

Yale SCHOOL OF MEDICINE

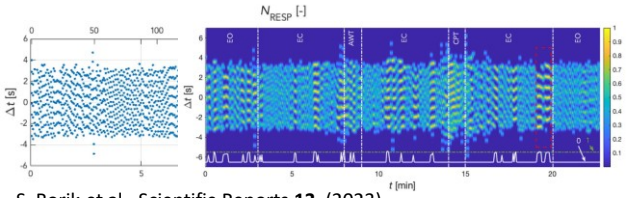
RWTH AACHEN UNIVERSITY

S. Borik et.al, Biomedical Signal Processing and Control **96** (2024)

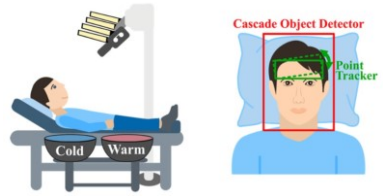




S. Borik et.al, IEEE Sensors Journal **23**, (2023)



S. Borik et al., Scientific Reports **13**, (2023)



S. Borik et al., Scientific Reports **12**, (2022)

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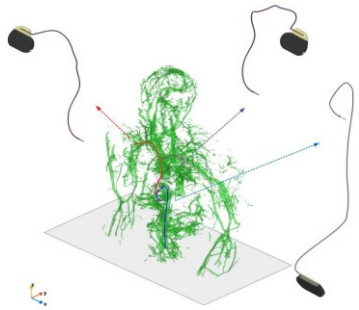
Electromagnetic Biocompatibility Laboratory „EMCare Lab“

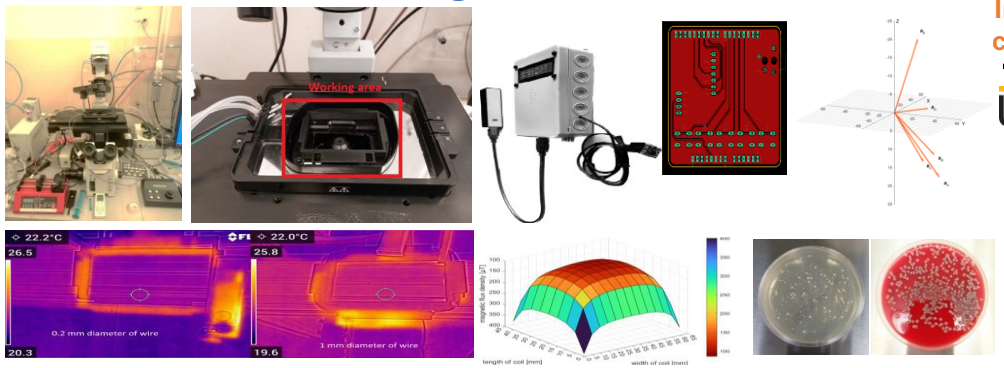
Investigations of impacts of exogeneous electromagnetic field on living organisms

Nonthermal biological effects of Low Frequency Magnetic Field (LF MF)

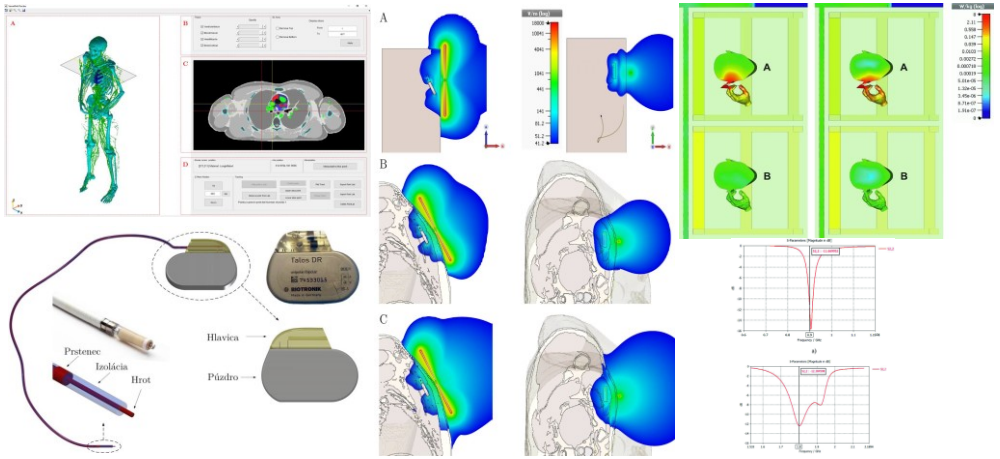


Effects of electromagnetic field on medical implantable devices

Exposure of specific microbiological samples to various levels of LF MF
Development of experimental protocols, exposure set-ups and devices for ambient conditions monitoring



Numerical assessment of potential health risks related with exposure to various levels of electromagnetic quantities



FEIT UNIZA

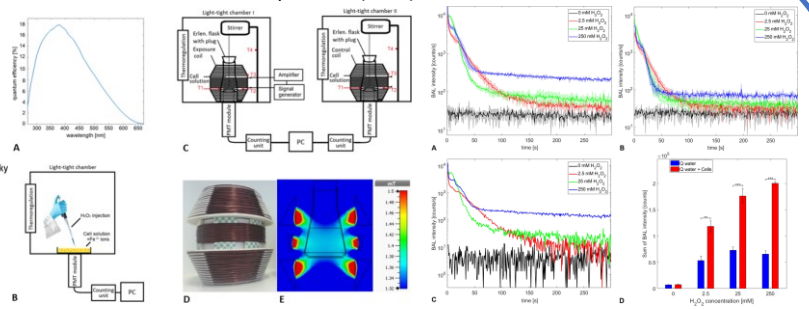
International collaborators

UFE Ústav fotoniky a elektroniky Akademie věd ČR

Silesian University of Technology

University of Colorado Boulder

M. Bereta et.al, Scientific Reports **11**, (2021)



R. Radil et.al, Applied Sciences **14**, (2024)

Z. Pšenáková et.al, Sensors **22**, (2022)

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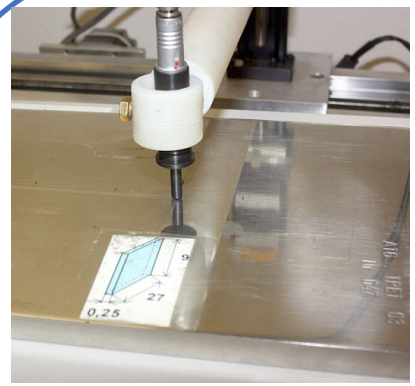
Non-Destructive Investigation Laboratory „DefectoLab“

Research activities in electromagnetic non-destructive evaluation of conductive structures

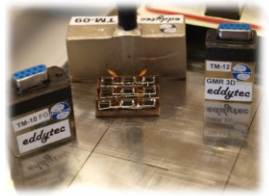


Eddy current method

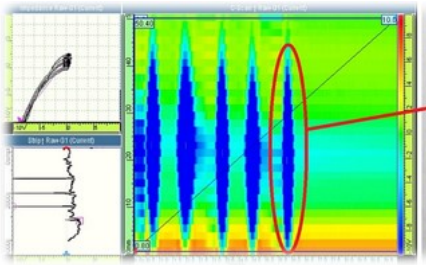
Numerically controlled single-spindle winding machine Ingrid West Machinery, type WH-751 for coils production

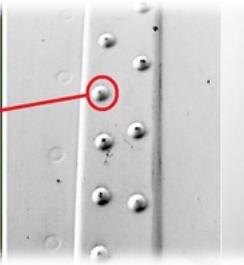
Professional apparatus Olympus Omniscan MX with module Eddy Current Array

Lock-in amplifier Signal Recovery DSP 7280 and wide-band power amplifier Krohn-Hite 7500

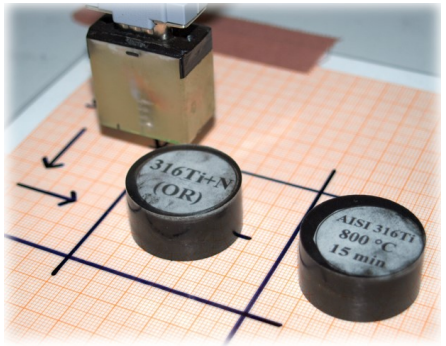


Encapsulated sensors for sensing weak magnetic fields based on different physical principles: 1D a 3D GMR, 3x3 AMR (left), professional probes (middle) and special probes with galvanically isolated excitation and detection system (right)

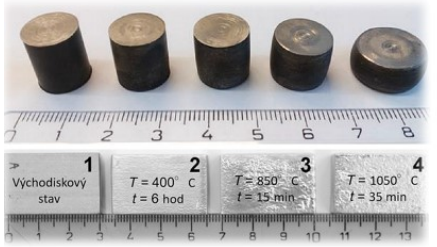


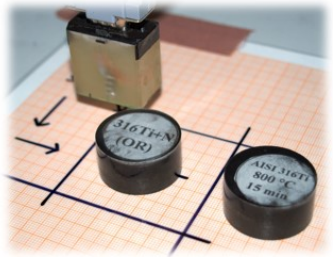


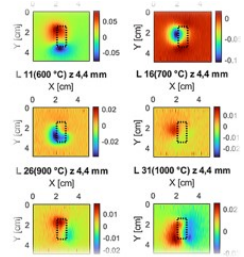
Investigation of riveted joints of the two-seat Zlín Z-142 trainer aircraft using the eddy current method using a matrix arrangement of measuring elements (Eddy Current Array, ECA)



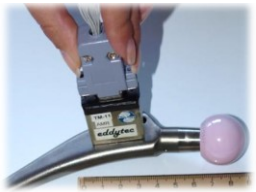
Investigation of internal magnetic field of biomaterials







Series of samples after defined heat treatment (left), investigation of cast samples (middle), display of the resulting magnetic field in the form of a color-coded map (right)



Standards of biocompatible prosthetic replacements for the investigation of electrically conductive biomaterial structures: part of a total hip joint endoprosthesis of a child made of Ti-Al-V alloy (left), a functional part of a knee joint made of stainless austenitic steel (center) and part of an adult hip joint endoprosthesis made of stainless austenitic steel (right)

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