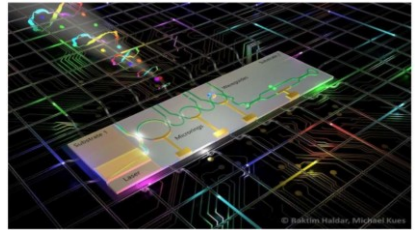


Integrated photonics research

Development of advanced optical devices for next-generation on-chip system and networks



DC interconnects

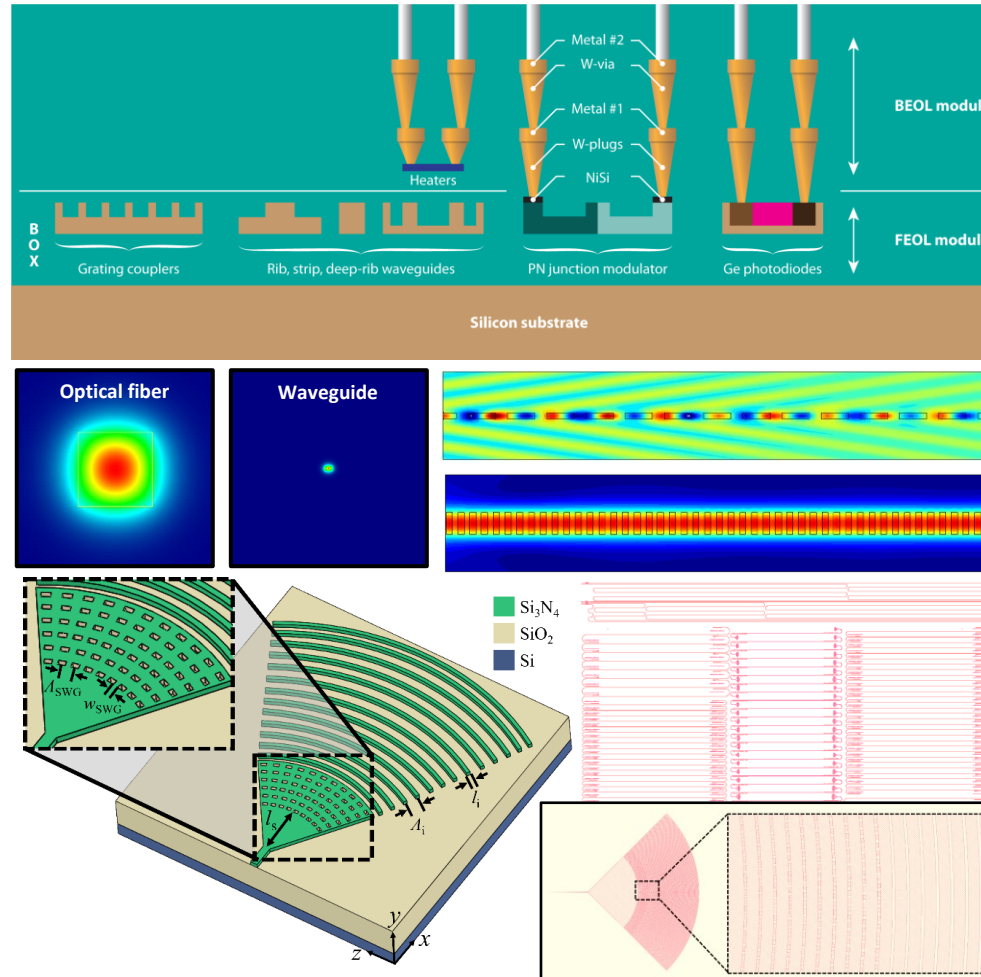


Quantum processing



Communications

Library of photonic building blocks

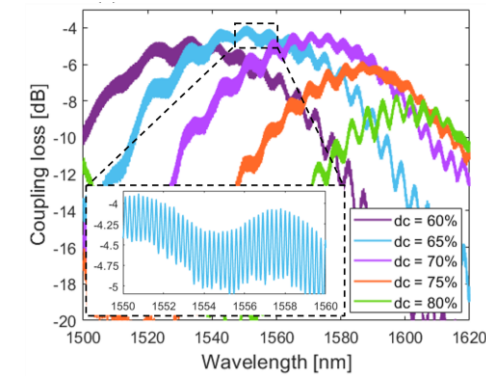
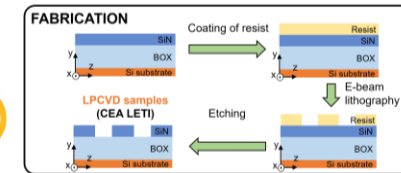
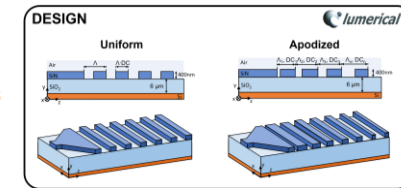


FEIT UNIZA

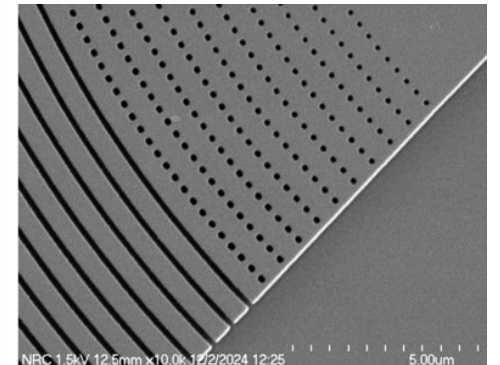
International
collaborators



R. Korcek et.al, Scientific Reports **13**, (2023)



R. Korcek et.al, Optics Letters **48**, (2023)



W. Fraser et.al, Scientific Reports **14**, (2024)

<https://optolab.feit.uniza.sk/>

Development of computer vision and AI based applications and systems



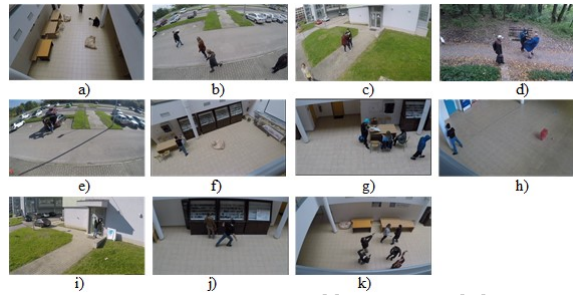
Computer vision



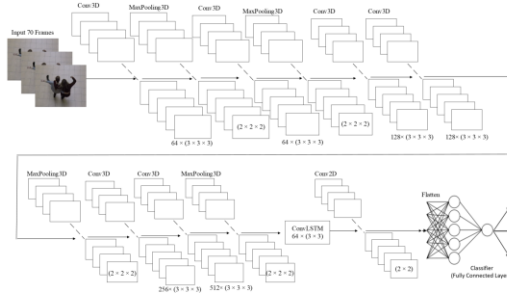
AI



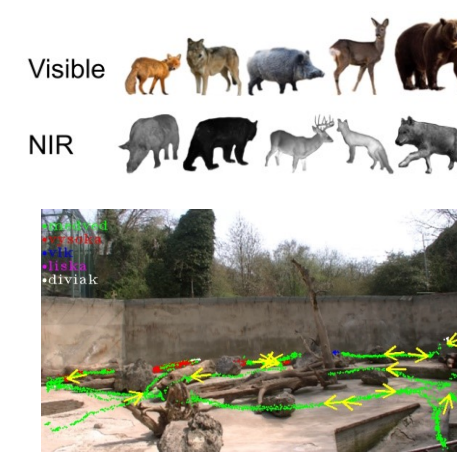
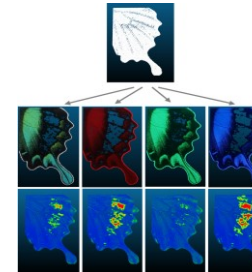
Sensors



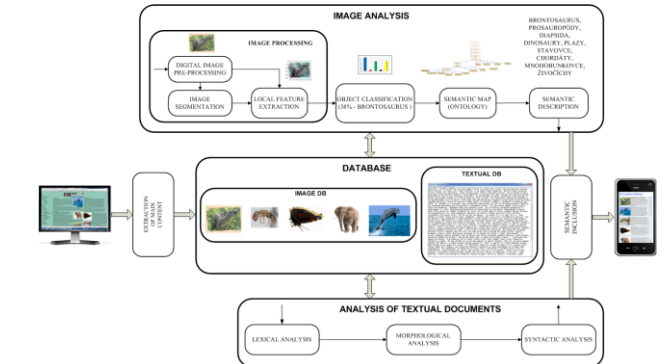
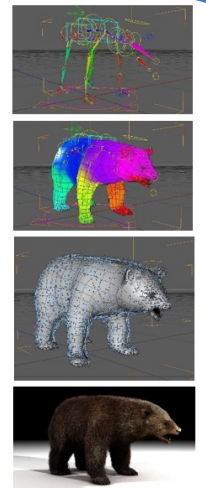
Human activity recognition



Photogrammetry and 3D reconstruction



Animal activity recognition

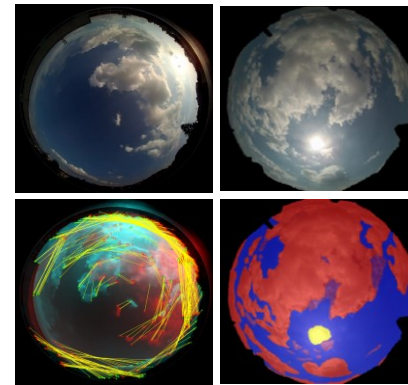


Semantic WEB

<https://kmikt.uniza.sk/index.php/component/content/article?id=1946>



Photovoltaic power prediction



Development of AI architectures and health applications



Computer vision



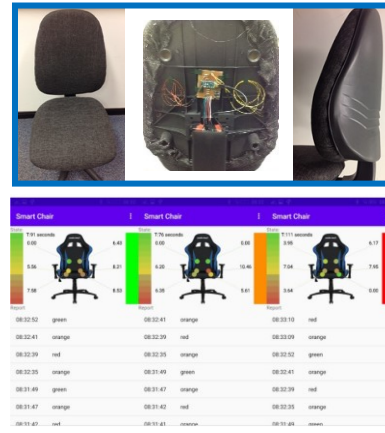
AI



Medicine



Serious games in medicine

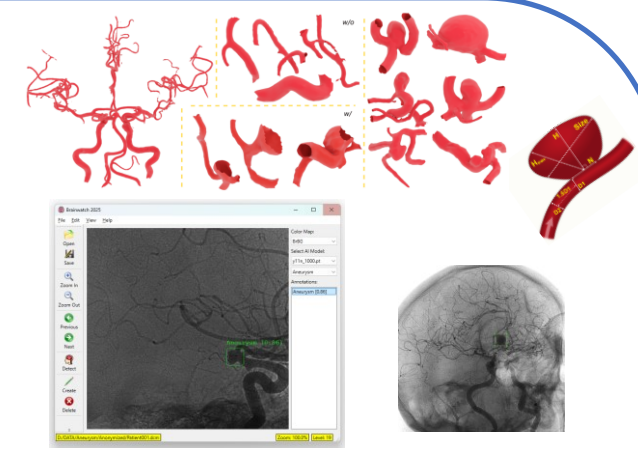


Smart medical devices

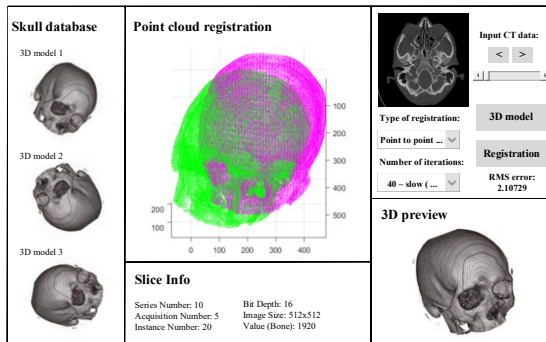


Subject ID: Room 112 - bed 1
Actual state: Measurements is running
Current position: Lying on back
Duration of the current position: 2h:15min
Next position change in: 5h:45min

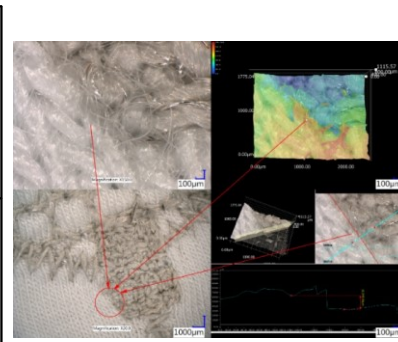
Start measurement				Stop measurement			
6.9	13.8	94.0	45.0	69.0	87.0	76.0	4.0
6.5	13.0	36.0	10.0	80.0	92.0	10.0	4.5
6.8	11.8	18.0	21.0	16.0	32.0	4.0	4.5
6.0	14.0	11.0	12.0	16.0	16.0	4.0	4.5
6.5	12.0	60.0	18.0	94.0	84.0	1.0	4.5
9.0	16.0	76.0	73.0	108.0	112.0	19.0	4.5
1.5	11.0	45.0	34.0	68.0	76.0	13.0	1.5
1.0	9.0	10.0	1.0	10.0	11.0	1.0	4.0



Intracranial aneurysm detection



3D medical data reconstruction and registration



Smart textile



<https://kmikt.uniza.sk/index.php/component/content/article?id=1952>

Laboratory of Digital Communications (LoDC)

Researching QoE assessment approaches and Vehicular communication for C-ITS



QoE assessment of
multimedia
transmission

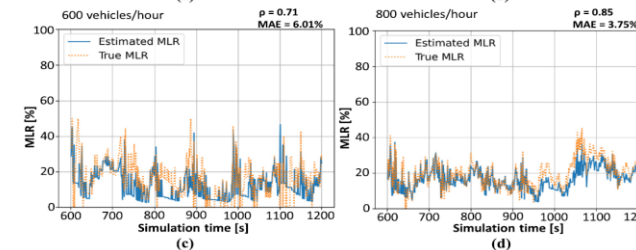
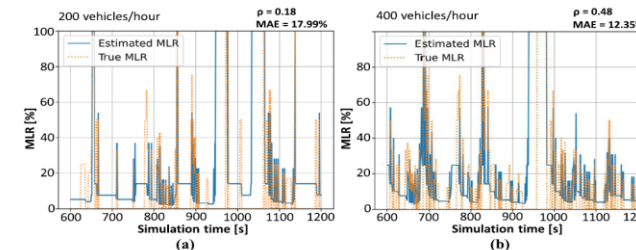
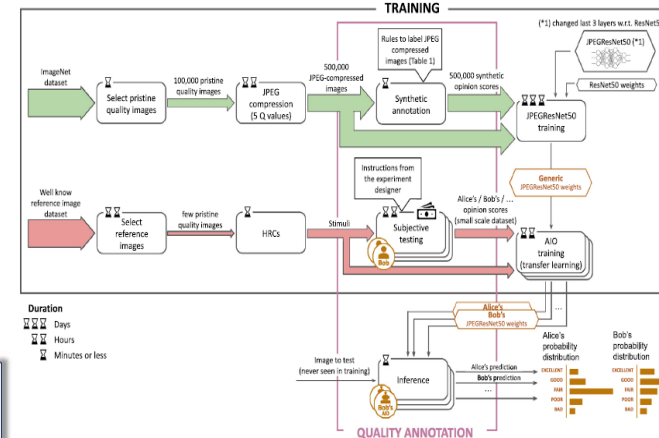
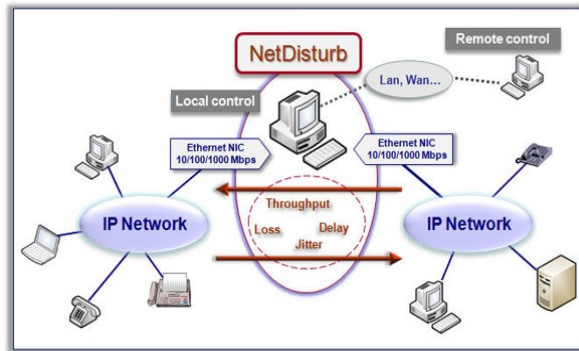


V2X

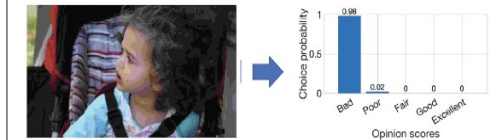
More details about the research:

- Subjective and objective assessment of quality experienced by the end user
- Vehicular communication for

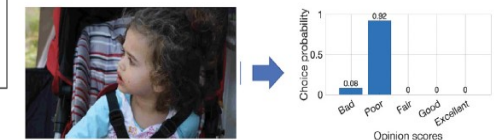
Deployed devices
and frameworks: POLQA3



T. Petrov et al., Vehicular Communications, vol. 45 (2024), 100693



(a) JPEG Quality Parameter equal to 5



(b) JPEG Quality Parameter equal to 15



(c) JPEG Quality Parameter equal to 35



(d) JPEG Quality Parameter equal to 65



(e) JPEG Quality Parameter equal to 95

L. Tiotsop et al., Signal Processing: Image Communication, vol.112 (2023), 116917

Laboratory of Acoustics and Audio Signal processing

Development of AI solutions for speech and audio processing applications



Speech and Audio Processing



Voice biometrics



Speech/music emotion detection

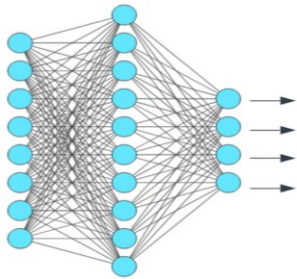


Auditory scene analysis

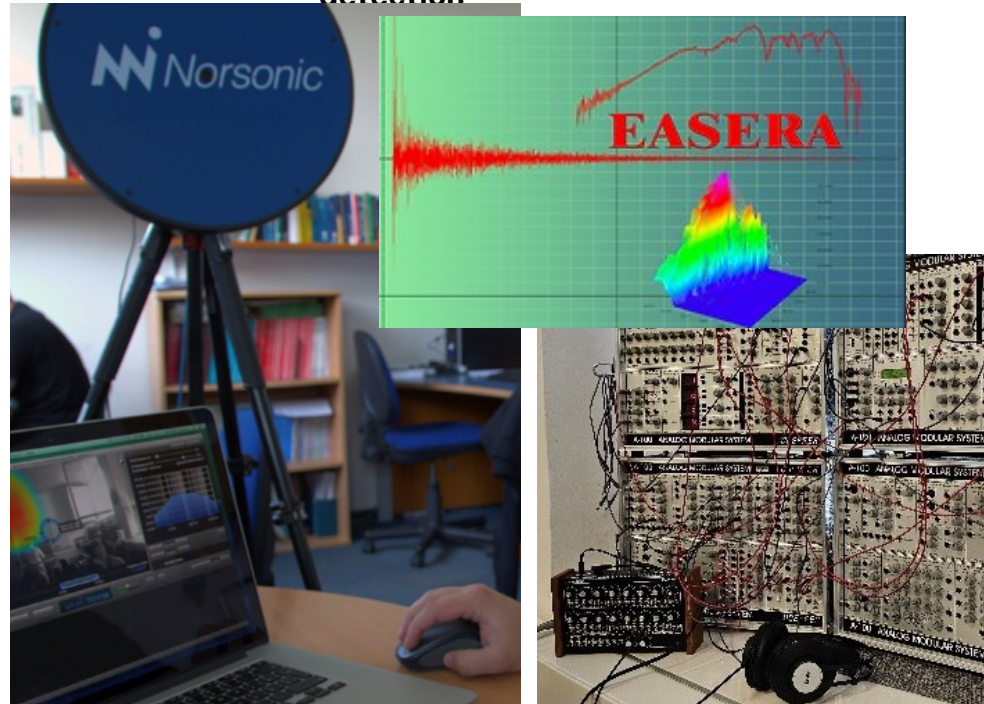
Speech Emotion Recognition Using Transfer Learning: Integration of Advanced Speaker Embeddings and Image Recognition Models, M. Jakubec, et al. *Appl. Sciences*, 2024

Development and Experimental Comparison of Deep speaker embeddings for speaker verification, M. Jakubec, et al. *Engineering Appl. of Artificial Intelligence* 127, 2024

Machine Learning



Acoustics and Electroacoustics



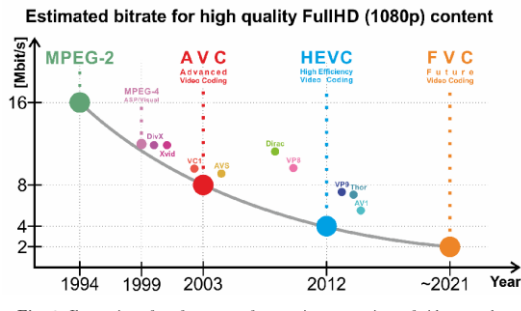
Embedded voice authentication - demo system



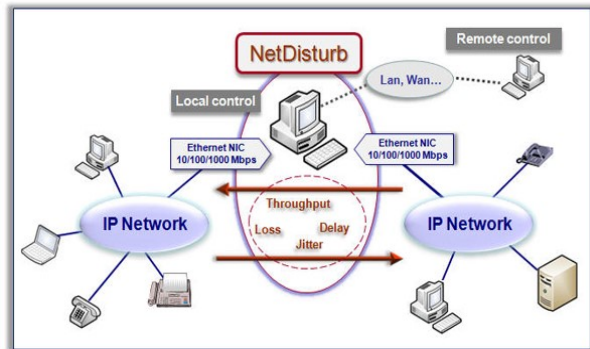
Acoustics of FATRA House of Arts in Žilina, P. Kasák, et al. *Akustika* 2025, www.akustikad.com

Researching QoE and QoS assessment approaches

Codecs performance

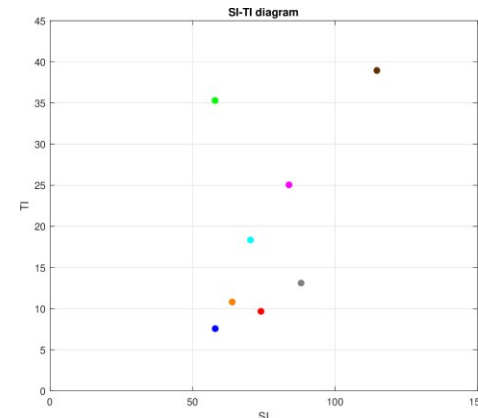
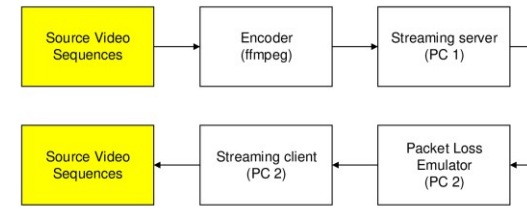


QoE and QoS assessment of multimedia signal transmission

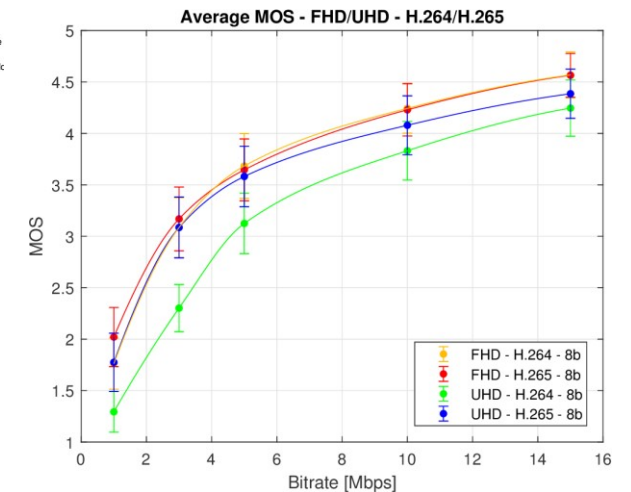
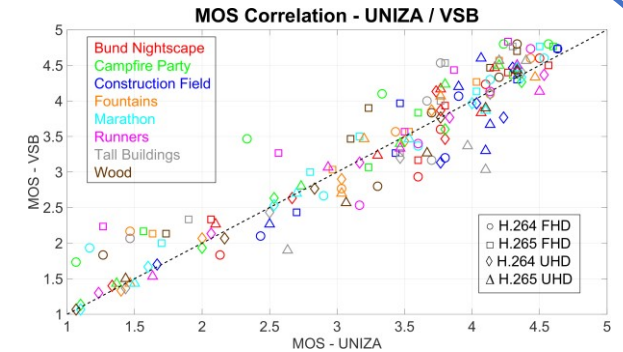


More details about the research:

- Subjective and objective quality assessment of multimedia content
- Adaptive bitrate streaming
- Parametric model development
- QoE and QoS assessment of multimedia signal transmission



Impact of Packet Loss Rate on Quality of Compressed High Resolution Videos, A. Holesova et al., MDPI Sensors 2023



Impact of Scene Content on High Resolution Video Quality, M. Uhrina et al., MDPI Sensors 2021

Laboratory of Mobile Communication Systems

Research and development of mobile positioning and communication solutions for smart cities applications



Mobile positioning



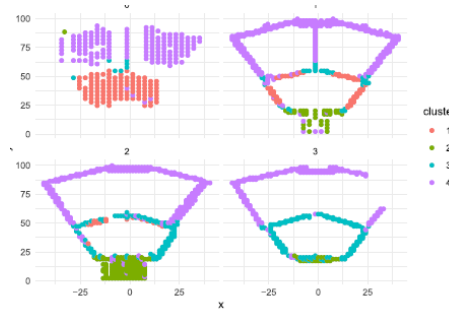
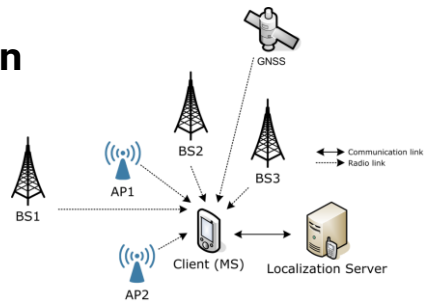
Wireless communication



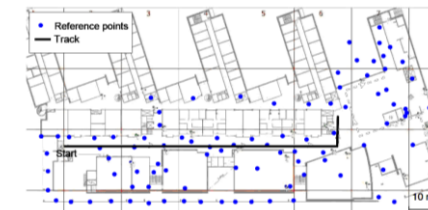
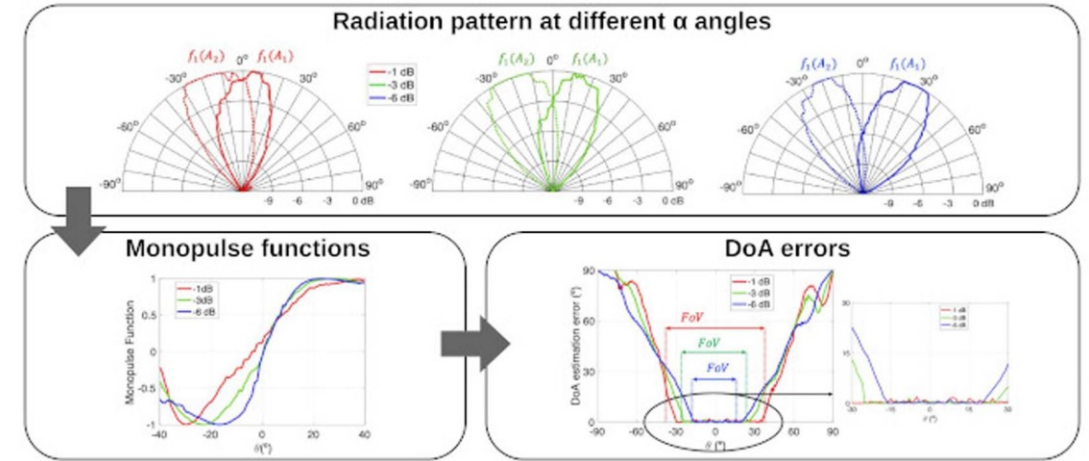
RF desing

Unique equipments

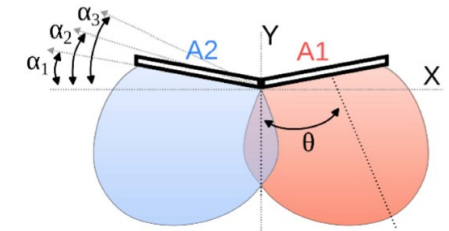
- GNSS simulator GSS6700
- Wi-fi network simulator for positioning process GSS5700
- Vector generators and analyzers
- SDR receivers



Luckner, Marcin, Sebastian Sowik, and Peter Brida. "Selection of signal sources influence at indoor positioning system." IEEE Transactions on Wireless Communications 23.1 (2023): 45-57.



Machaj, Juraj, Peter Brida, and Robert Piché. "Rank based fingerprinting algorithm for indoor positioning." 2011 international conference on indoor positioning and indoor Navigation. IEEE, 2011.



Hutar, M., et al. "Combined phase-difference and amplitude-comparison technique for Wi-Fi direction-finding with high angular sensitivity and ambiguity mitigation in a wide field of view." Results in Engineering (2025): 104711.