POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

STER PROGRAMME

name of the unit:

TELECOMMUNICATIONS DIVISION

Institute of Electronics, Lodz University of Technology

symbol:

I-23

http://www.eletel.p.lodz.pl

head of the unit:	potential promoters:	contact person:
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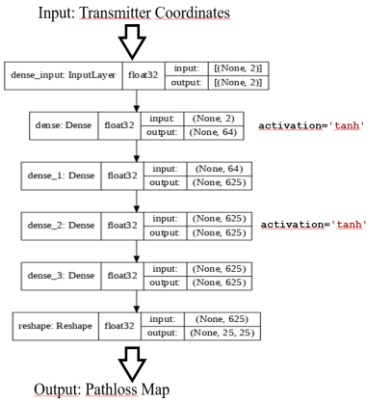
scope of activities:

- Modelling of radio wave propagation for the design of mobile radio communication systems, including application of Deep Neural Networks and stochastic optimisation methods;
- Indoor and outdoor terminal positioning methods (both RSSI and TDoA);
- Design and modelling of 5G radio communication systems for Industry 4.0 and Internet of Things (IoT) applications;
- Performance measurement of radio communication systems;
- Evaluation of the quality of service in radio communication networks.

present activities:

- Development of demonstrators of the capabilities offered by 5G mobile communications networks, including UAV communications, e-health systems, machine diagnostics, critical communications (MCPTT), Internet of Things, and smart cities;
- Measurement and modelling of massive MIMO systems for UAV communications;
- Development of methods for localization of indoor terminals;
- Optimization of indoor radio network placement for joint terminal localization and coverage;
- Applications of 5G radio base stations as illuminators in passive radar systems.
- Management of the 5G test network on the Lodz University of Technology campus for research on 5G applications;

graphic material



Future activities:

- Development of methods for the prediction and assessment of radio access network performance for communication with UAVs (drones);
- Development of DNN-based methods for fast radio network planning in complex environments using Physics Informed Neural Networks (PINNs).

Publications/patents, awards, projects:

P. Samczyński, K. Abratkiewicz, M. Płotka, T.P. Zieliński, J. Wszołek, S. Hausman, P. Korbel, A. Księżyk, "5G Network-Based Passive Radar," in IEEE Transactions on Geoscience and Remote Sensing, 2021 (early access https://ieeexplore.ieee.org/document/9661315) .

R. Kawecki, P. Korbel, S. Hausman, "Influence of User Mobility on the Accuracy of Indoor Positioning with the use of RSSI and Particle Filter Algorithm," 2019 Signal Processing Symposium (SPSympo), 2019, pp. 105-108.

P. Korbel, S. Hausman, P. Di Barba, "Application of Evolutionary Approach for Multi-objective Improvement of Indoor Access Point Placement," 2019 13th European Conference on Antennas and Propagation (EuCAP), 2019, pp. 1-4.

2019-2021 "Digital Innovation Hub 5G in Poland" co-financed under the competition no. 1/2019/4.0 MPiT "Standardization of services of Digital Innovation Hubs to support digital transformation of enterprises" under the Minister's Program for 2019 - 2021 "Industry 4.0" (National Institute of Telecommunications - leader, Ericsson Sp. z o.o., Technical University of Lodz, FundingBox Accelerator Sp. z o.o.) 2014-2016 NCBiR project - PBS2/B3/24/2014 "Comprehensive methods for determining the location of mobile network terminal moving in open terrain and buildings" (Warsaw University of Technology, Lodz University of Technology, Orange Poland SA)
Keywords: radiolocation, radio wave propagation modelling , Physics Informed Neural Networks (PINNs), radio network optimisation
List of internship proposal in this research team: Development of: - software/hardware for 5G application to IoT/smart city/Industry 4.0/UAVs, - modelling tools for simultaneous optimization of coverage and positioning accuracy in radio networks, - Physics Informed Neural Networks (PINNs) for radio wave propagation modelling.