

# TECHNOLOGY OFFER

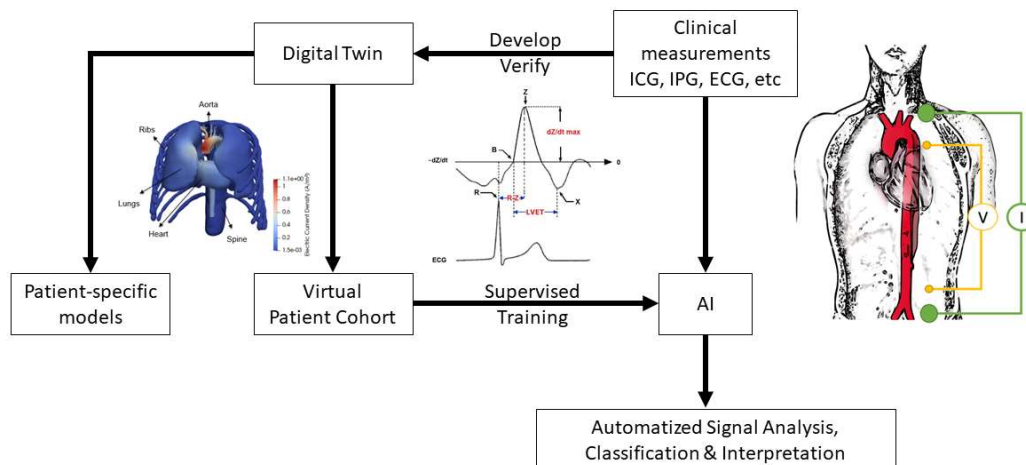
## Intelligent Digital Twins for Arterial Assessment with Bio-Impedance Signals



The next-generation patient monitoring methodology greatly benefits from modern technologies like AI and Digital Twins. I.e., simulations correctly predict the response of bio-impedance signals to arterial pathologies like arterial stiffening. Clinical time constraints of these simulations are met through machine learning algorithms trained on both an offline simulation database and patient-specific parameters. The software facilitates an automatized analysis of bio-impedance data, which can be acquired non-invasively and cost-efficiently.

### BACKGROUND

Assessment of arterial pathologies relies on medical specialists who are trained in expensive imaging techniques. Bio-impedance methods, e.g., impedance cardiography or impedance plethysmography, provide a non-invasive, time-continuous, cheap, and convenient technology for determining, e.g., arterial wall compliance and blood flow characteristics. A lack of and difficult accessibility to data obstructed the improvement of signal interpretability and parameter estimate accuracy, hence widespread clinical adoption.



### TECHNOLOGY

The limitations mentioned above are overcome with multi-physics simulations of real scenarios, allowing for the creation of digital twins or virtual patients. Bio-impedance measurements of different body segments resulting in arteries-related impedance changes are obtained with standard multi-channel devices. The data is then used to calibrate digital twins through a machine learning surrogate. From that, a cohort of virtual patients is created for the supervised training of an AI. In particular, the AI is trained for classifying, analyzing and interpreting bio-impedance signals with respect to arterial pathologies, which is not possible by the naked human eye.

### ADVANTAGES

- Bio-impedance measurements are non-invasive, convenient, simple, and cheap
- Machine analysis of complex signals that are difficult to interpret by humans
- Digital twin data augmentation mitigates prohibitive cost of large real cohorts
- Allows predictive measurements of arterial diseases by general practitioners
- Monitor arterial thrombosis associated and warn of postoperative complications
- Enables personalized digital twins for patient-specific precision medicine

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#### KEYWORDS:

Arterial assessment  
Bio-impedance  
Digital twins  
Artificial Intelligence

#### EXAMPLES:

Aortic pathology detection  
Arterial stiffness determination  
Blood flow characterisation  
Impedance cardiography  
Impedance plethysmography

#### INVENTORS:

Dr. Sascha Ranftl  
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#### COOPERATION OPTIONS:

Licensing or buying

#### DEVELOPMENT STATUS:

Clinical tests

#### STATUS OF PATENTS:

PCT – application has been filed

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