The dynamic development of material technologies and biotechnology provides the possibility to develop diagnostic tools, allowing for rapid identification of biochemical compounds while reducing the analysis costs. Such devices are called biosensors. In the age of constant threat from infectious and civilization diseases, there is a clear stimulus for the development of out-of-laboratory, point-of-care medical devices. Their miniaturization and use of flexible substrates allow biosensors to be wearable.

The project focuses on creating a new diagnostic platform to identify biochemicals allowing the identification of pathogen presence in real environments. Here, electrochemical biosensors, which measure changes in the current flow are among the most popular, mainly due to offered detection limits, often reaching femtograms (billion millions of times smaller than a gram). On the other hand, reproducibility issues from complex nanoarchitecture designs and a high share of false positive results are among their fundamental challenges.

As a result of the project, a new diagnostic platform will be designed and built, whose task will be to solve the above-mentioned reproducibility problems. The heart of the platform is the array of additively manufactured carbon-based conductive patterns, working as biosensor transducers, with tailored electric properties. Next, selected receptor grafting at these patterns' surfaces will allow the simultaneous detection of numerous compounds challenging the selectivity issues. We will choose pathogenic *E. coli* (enterohemorrhagic or uropathogenic) as the proof-of-concept pathogen for our biosensor platform, as they are very problematic for specific identification while causing hazardous infections even in low quantities. The approach proposed by us is based on the implementation of impedance monitoring, aided by advanced statistical analysis to investigate automation capabilities and molecular modelling to understand interactions between the studied biochemicals.