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Latest developments of OhmPi, an open-hardware resistivity meter for small scale monitoring applications

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Shallow geophysics is being increasingly applied to solve a broad range of problems in hydrology, ecology, and beyond. In the recent years, geophysical monitoring, and geoelectrical monitoring in particular, has also become more popular to track down physical processes. In this context, the accessibility of geophysical equipment is key to expanding the use of geophysical monitoring, and to developing novel, versatile strategies, especially in the environmental sector. Commercial equipments have participated to the development of applied geophysics and are usually robust and practical. However, their cost can be prohibitive in some contexts, such as for humanitarian, non-profit applications or simply to equip a large number of sites. Being designed for generic use, they can also come with a lack of versatility for dedicated monitoring applications. For these reasons, the OhmPi project (https://gitlab.irstea.fr/reversaal/OhmPi) was initiated to provide an open-source, open-hardware resistivity meter to the community, in a DIY fashion. It is designed to offer enhanced flexibility, especially for monitoring experiments, and can easily incorporate new functionalities. Relying on low-cost components and devices, OhmPi is specifically designed for laboratory or small-scale field experiments. Developed as an open-source project, new collaborations are warmly welcomed.

The OhmPi hardware is based on a Raspberry Pi board which pilots I2C multiplexer boards, and an acquisition board triggering the current injection and voltage readings. The software is written in Python and allows to interact with the OhmPi instrument via a web interface, IoT communication protocols (e.g. MQTT) and/or directly through the Python API. Here, we will introduce the latest and future developments, comprising voltage injection up to 80V, sensor-controlled acquisitions or multi-channel voltage readings. We will also present dedicated applications including a case study detailing the field deployment of a small-scale 3D panel for monitoring water infiltration.