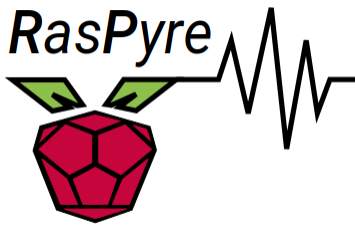


RasPyre Software Framework



Summary

RasPyre is a Software Framework based on the Raspberry Pi hardware platform for applications in Structural Health Monitoring. Various sensor hardware, like accelerometers, can be easily controlled and integrated. A Python module template is provided to develop and extend hardware driver modules, which allows interested users to integrate new sensor hardware. The functionality to control measurements and transfer signal data is offered via a Remote Procedure Call interface (RPC), which can be called from a variety of programming languages (e.g. Python, MATLAB, Java, C). The integrated WiFi mesh configurations allows the implementation of ad-hoc Wireless Sensor Networks (WSN) and to rapidly build flexible network topologies on site. A time synchronization mechanism based on the Network Time Protocol (NTP) enables ordered distributed measurements.

Additional client software enables the easy realisation of measurements. The following functions are provided:

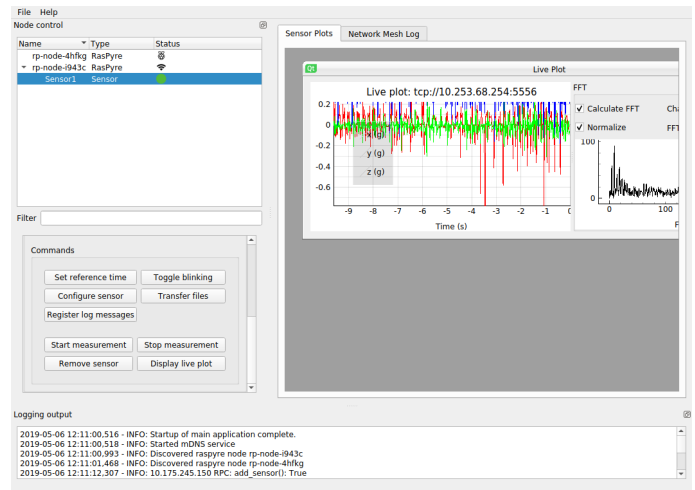
- Automatic configuration of WiFi mesh networks (with an arbitrary number of nodes)
- Time synchronization of sensor nodes
- Configuration of sensor hardware and measurements
- Real time plot of measurement data
- Transfer of measurement data files

Source code

The source code can be obtained via GIT from <https://github.com/msk-buw/raspyre>.

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Client software displaying a list of sensor nodes in the mesh network and live plot of received signal.

Related publications

- [1] MORGENTHAL, Guido ; EICK, Jan Frederick ; RAU, Sebastian ; TARABEN, Jakob: Wireless Sensor Networks Composed of Standard Microcomputers and Smartphones for Applications in Structural Health Monitoring. In: *Sensors* 19 (2019), Nr. 9, 2070
- [2] MORGENTHAL, G. ; RAU, S. ; TARABEN, J. ; ABBAS, T.: Determination of Stay-Cable Forces Using Highly Mobile Vibration Measurement Devices. In: *Journal of Bridge Engineering* 23 (2018)
- [3] MORGENTHAL, G ; RAU, S ; NOWACK, M: *Effizientes Bauwerksmonitoring mit MEMS-Neigungssensoren und Mikrocontrollern (Efficient Structural Health Monitoring with MEMS-inclinometer and Microcontrollers)*. Bd. F 3105. Fraunhofer IRB Verlag, 2019. – ISBN 978-3-7388-0327-3
- [4] MORGENTHAL, Guido ; EICK, Jan Frederick ; RAU, Sebastian ; TARABEN, Jakob: Highly Mobile System Platform for Vibration Measurements in Structural Health Monitoring. In: SU, Z. (Hrsg.) ; YUAN, S. (Hrsg.) ; SOHN, H. (Hrsg.): *The Proceedings of the 7th Asia Pacific Workshop on Structural Health Monitoring (APWSHM-2018)*, NDT.net, November 2018. – ISBN 978-3-00-060359-4, S. 1003-1013