



## **An Open Hardware seismic data recorder – a solid basis for citizen science**

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“Ruwai” is a 24-Bit Open Hardware seismic data recorder. It is built up of four stackable printed circuit boards fitting the Arduino Mega 2560 microcontroller prototyping platform. An interface to the BeagleBone Black single-board computer enables extensive data storage, -processing and networking capabilities.

The four printed circuit boards provide a uBlox Lea-6T GPS module and real-time clock (GPS Timing shield), an Texas Instruments ADS1274 24-Bit analog to digital converter (ADC main shield), an analog input section with a Texas Instruments PGA281 programmable gain amplifier and an analog anti-aliasing filter (ADC analog interface pga) and the power conditioning based on 9-36V DC input (power supply shield).

The Arduino Mega 2560 is used for controlling the hardware components, timestamping sampled data using the GPS timing information and transmitting the data to the BeagleBone Black single-board computer. The BeagleBone Black provides local data storage, wireless mesh networking using the optimized link state routing daemon and differential GNSS positioning using the RTKLIB software.

The complete hardware and software is published under free software - or open hardware licenses and only free software (e.g. KiCad) was used for the development to facilitate the reusability of the design and increases the sustainability of the project.

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