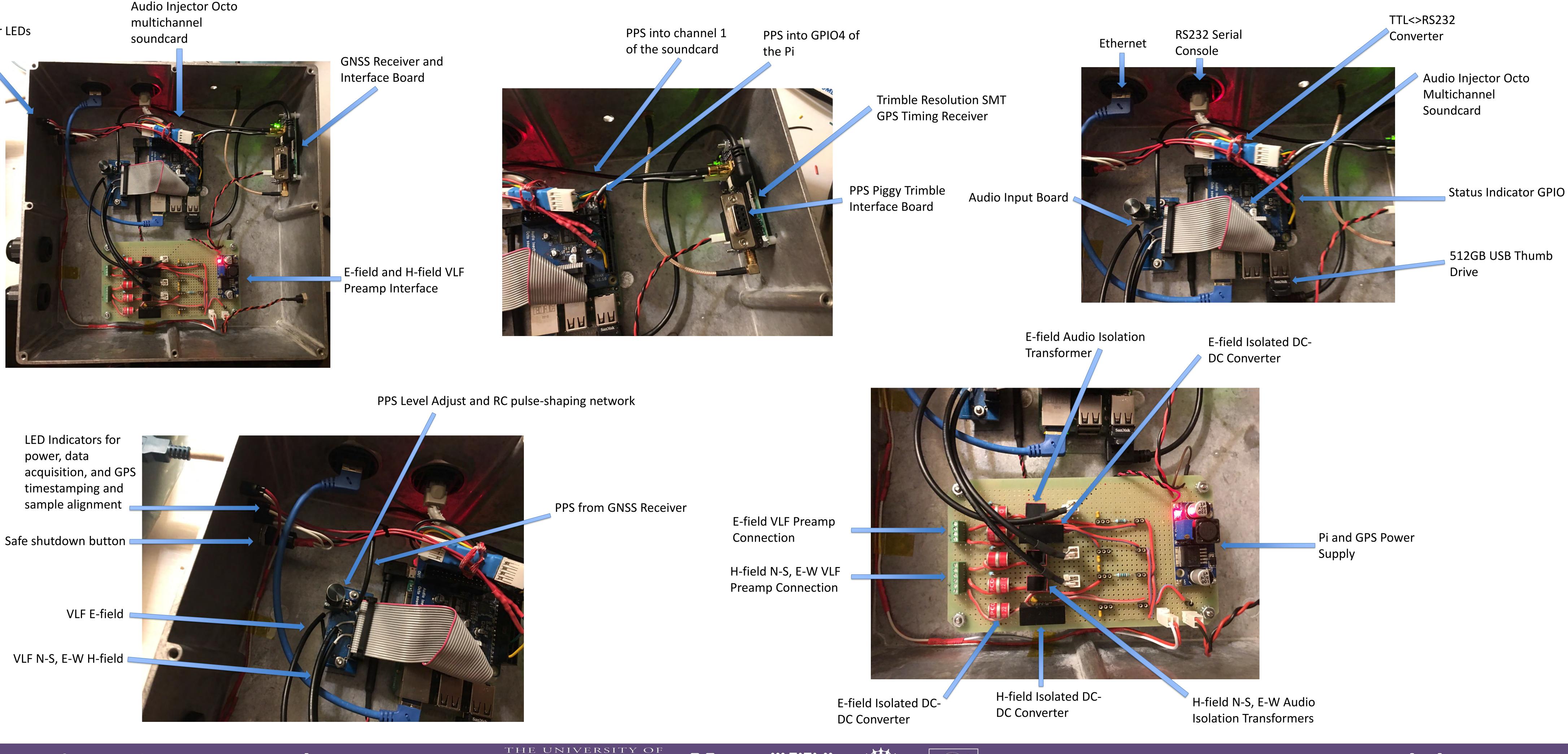
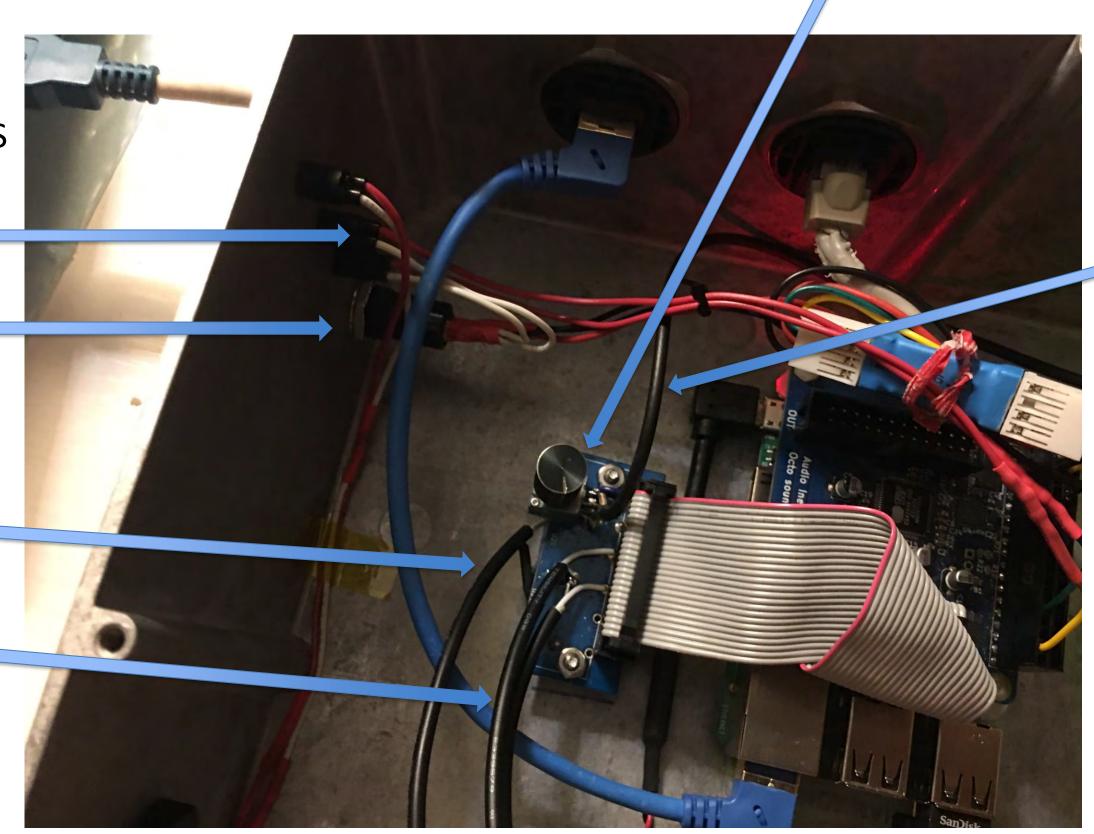
A low-cost, science-grade three-channel VLF reception system can be easily constructed using a Raspberry Pi, multichannel soundcard, and GNSS receiver. An E-field VLF preamp and two-channel H-field VLF preamps are installed outside in a radio-quiet location. The signal is fed into audio isolation transformers through a pair on Cat-5 feedlines attached to the VLF preamps with isolated DC-DC converters. The signals (E-field and N-S, E-W H-field) are fed into channels 1-3 of the Audio Injector Octo soundcard for sample alignment and UT timestamping. The PPS is also fed into GPIO4 of the Raspberry Pi to discipline the time-of-day clock via GPS daemon and NTP daemon and timestamping. Four channels of audio are captured using the Audio Injector Octo multichannel soundcard attached to a Raspberry Pi 3. On the Pi, vlfrx-tools software handles data capture, sample alignment and time stamping, mains hum filtering, whistler and dawn chorus event detection, SID detection via VLF transmitters, data storage and retrieval, live listening, and sferic analysis. Data is stored with a rotating buffer on a 512MB USB thumb drive. It can also be streamed over the network to a local or internet-connected server for heavier signal analysis tasks, such as lightning location calculations using multiple VLF receivers and decoding of VLF amateur transmissions. Using three channels for triple axis reception, signal bearing calculations can be made as well as digitally steering the H-field loop antennas for more gain of interesting signals. It also allows for analysis of natural radio signals of both E-field and H-field.

Status Indicator LEDs

Raspberry Pi 3B and





jonathan.rizzo2@scranton.edu

Three-Channel VLF Reception System using a Raspberry Pi, Soundcard, and GNSS Receiver

Jonathan Rizzo KC3EEY¹, Dr. Nathaniel Frissell W2NAF^{1,2} ¹HamSCI, ²University of Scranton

Three-Channel VLF Reception System Demonstration

A IESUIT UNIVERSITY

Hamöcï

N-ASA

Partner

{NSF}

HamSCI Workshop 2024