A Framework for the Collection, Analysis, and Verification of Next-Generation Infrasound Data

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CVT Workshop 2015
Traditional Infrasound

- Traditional infrasound arrays are fantastic, but...
  - Higher density
  - Quicker deployment

Figure: IS39 Array
Next Generation Sensors

- Reduce size, weight, power, costs
- Easy to maintain
- Ubiquitous
- Multiple ways to communicate
- Built using industry standard technologies

Figure: Infrasound App
Realm of Big Data
A single server isn’t enough

- Velocity
Realm of Big Data
A single server isn’t enough

- Velocity
- Volume
Realm of Big Data
A single server isn’t enough

- Velocity
- Volume
- Variety
Next Generation Framework

- Scalable Data Acquisition
- Monitoring / Data Discovery
- Time Synchronization
- Real-Time Analysis / Classification
- Embrace open source
Data Acquisition

- Data Acquisition
  - Extract meta-data
  - Store audio files
- Designed for the cloud
  - Akka actors for concurrency
  - Distributed

Figure: Data Acquisition
## Device Health

### Active devices

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Interactive Data Discovery
Time Synchronization

- C++ websocket server
- Constructed message exchange algorithm
- All data is synchronized to master clock
- Relative accuracy 1 ms

Figure: Raspberry Pi
Head in the Clouds

- Distributed real-time analysis
  - Apache Spark & Spark Streaming
  - Python w/ obspy, scipy, numpy
- Real time event reporting
- Collaboration with LLNL
  - Signature classification
  - Data quality / verification
- Everything is a data source
Questions?