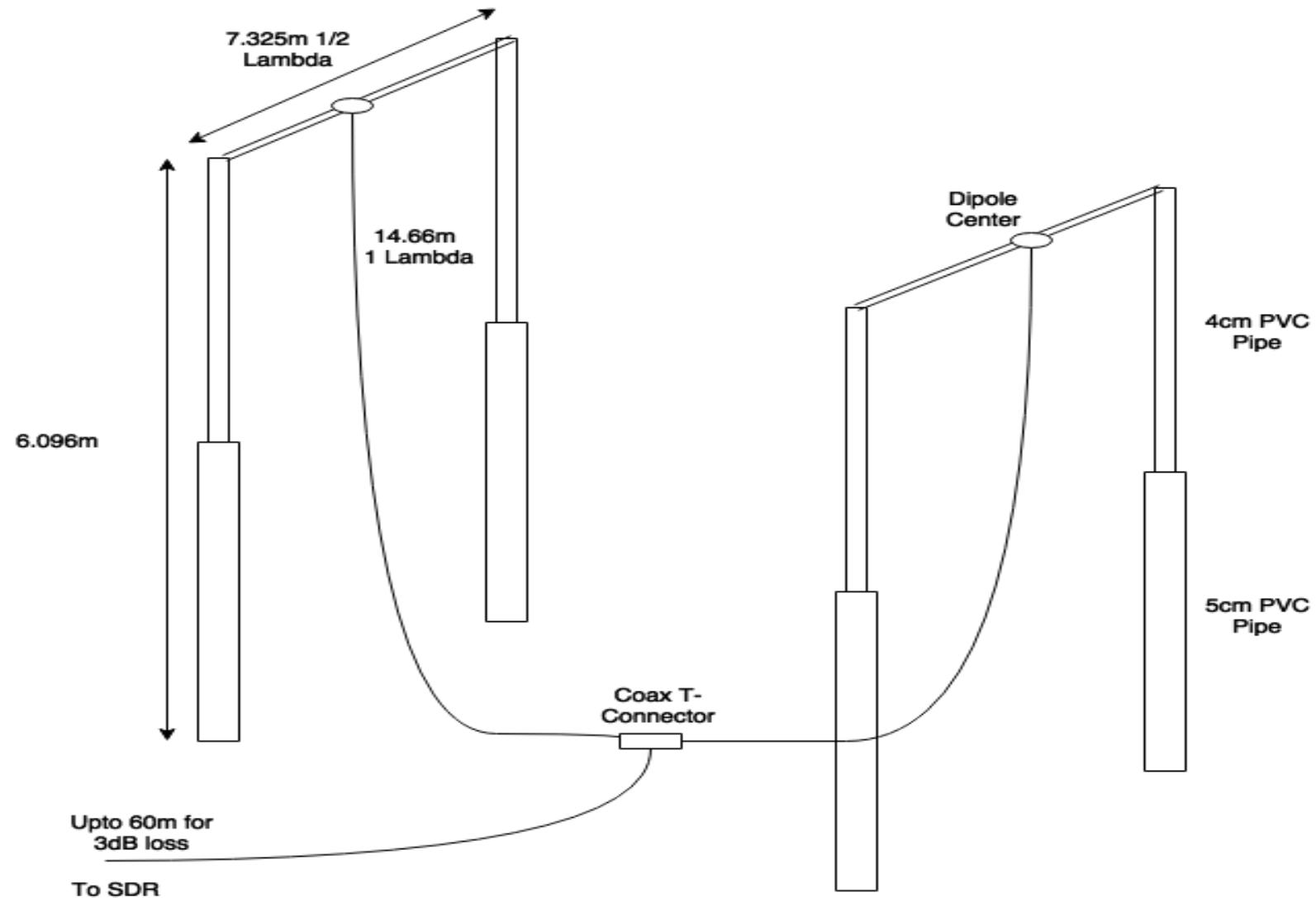
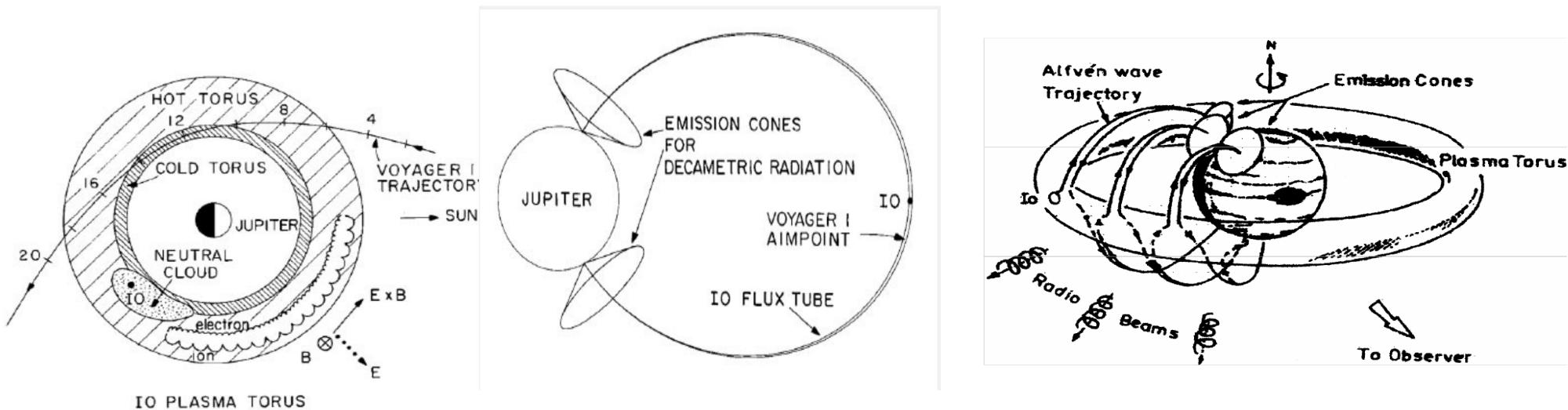


Observing Jovian DAM Emissions with a SDR Telescope



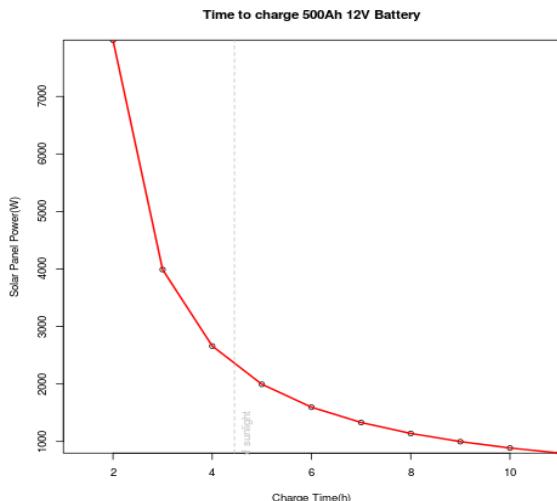
Jovian DAM Emissions

- The planet Jupiter emits strongly in the radio spectrum in the 10-100m wavelength range



RQ1

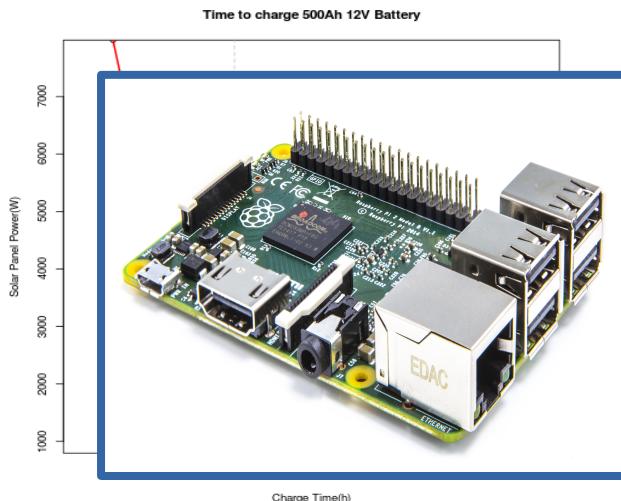
- What current Internet of Things (IoT) technologies would best suit the development of a software defined radio signal listening station and how cheaply can it be created?



- How feasible is it to use renewably generated energy such as solar to power the SDRT system?

RQ1

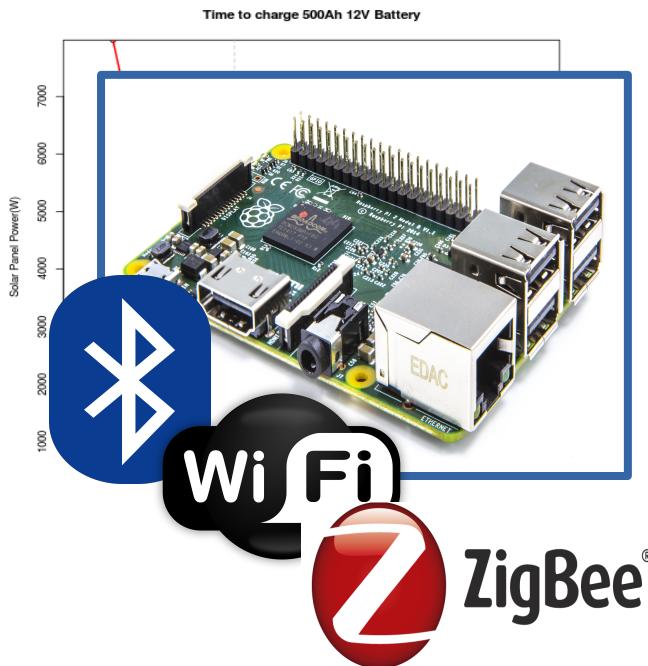
- What current Internet of Things (IoT) technologies would best suit the development of a software defined radio signal listening station and how cheaply can it be created?



- How feasible is it to use renewably generated energy such as solar to power the SDRT system?
- Can a low powered computing platform such as the Raspberry Pi host the SDRT system?

RQ1

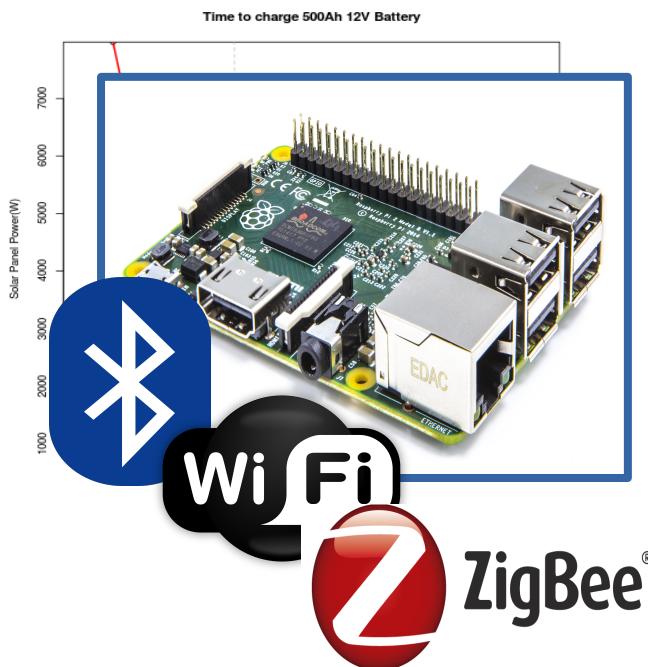
- What current Internet of Things (IoT) technologies would best suit the development of a software defined radio signal listening station and how cheaply can it be created?



- How feasible is it to use renewably generated energy such as solar to power the SDRT system?
- Can a low powered computing platform such as the Raspberry Pi host the SDRT system?
- How feasible are wireless technologies such as Bluetooth, Wifi or Zigbee to stream data?

RQ1

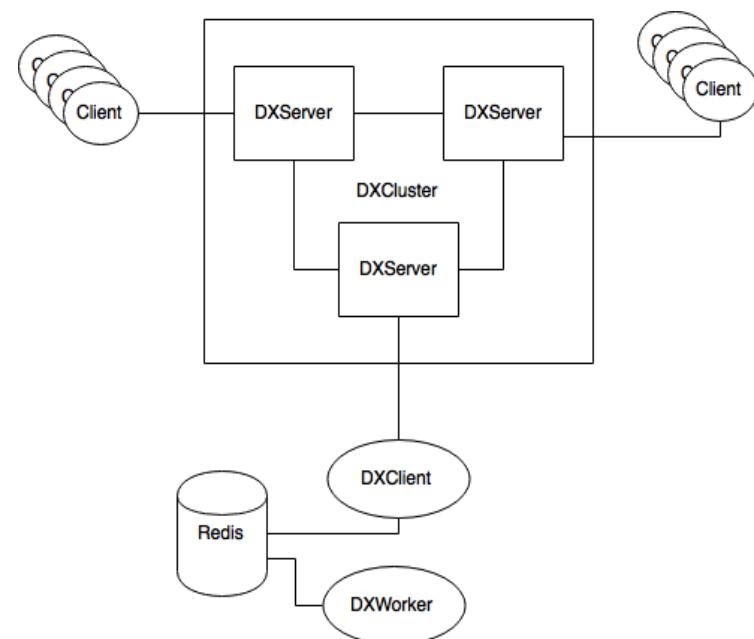
- What current Internet of Things (IoT) technologies would best suit the development of a software defined radio signal listening station and how cheaply can it be created?



- How feasible is it to use renewably generated energy such as solar to power the SDRT system? **€2,500**
- Can a low powered computing platform such as the Raspberry Pi host the SDRT system? **No, Intel Atom minimum**
- How feasible are wireless technologies such as Bluetooth, WiFi or Zigbee to stream data? **Wifi or better is required eg: Ethernet**

RQ2

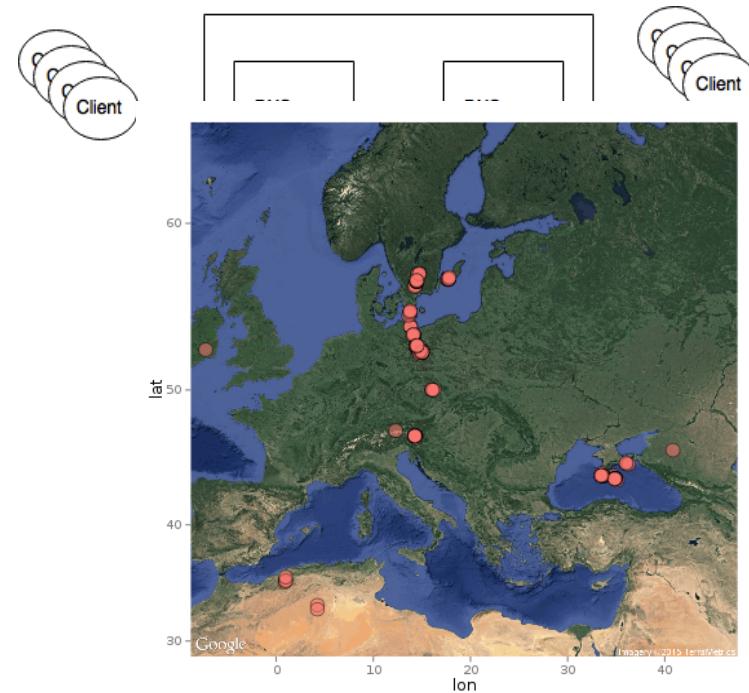
- What processes or algorithms need to be developed to filter or flag known instances of human interference from radio signal observations?



- Flag transmission signals identified by amateur radio enthusiasts from a local DXSpider server in recorded data.

RQ2

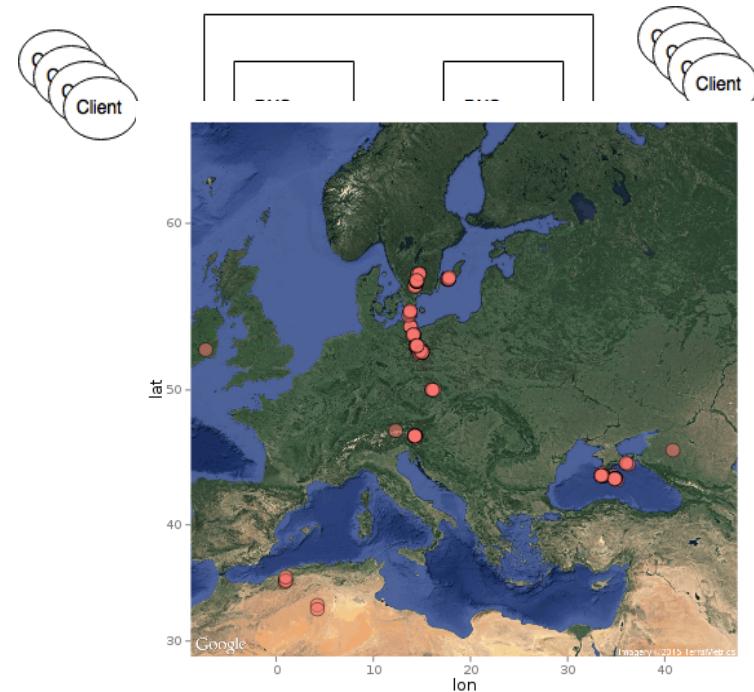
- What processes or algorithms need to be developed to filter or flag known instances of human interference from radio signal observations?



- Flag transmission signals identified by amateur radio enthusiasts from a local DXSpider server in recorded data.
- Flag instances of natural radio interference such as lightning from the Blitzortung server in recorded data.

RQ2

- What processes or algorithms need to be developed to filter or flag known instances of human interference from radio signal observations?



- Flag transmission signals identified by amateur radio enthusiasts from a local DXSpider server in recorded data. **Client captures and filters data outside Europe and outside monitored range**
- Flag instances of natural radio interference such as lightning from the Blitzortung server in recorded data. **Client captures data and filters lightning strikes > 1000km**

RQ3

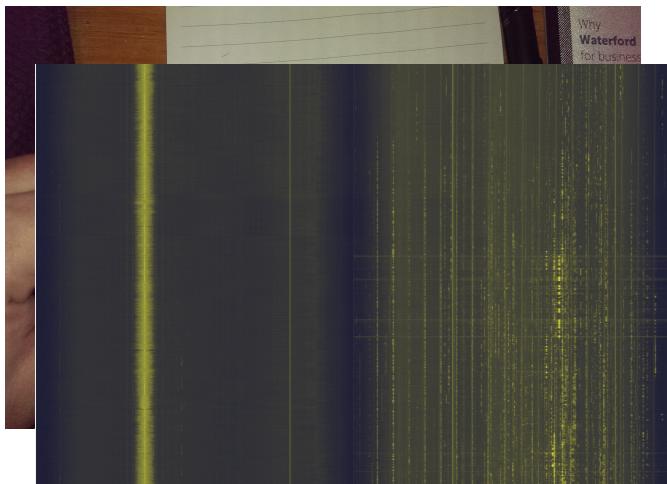
- What SDR tools, processes and or algorithms need to be developed to identify instances of the three main DAM emission types?



- Generating spectrograms using the RTL2832 DAB SDR

RQ3

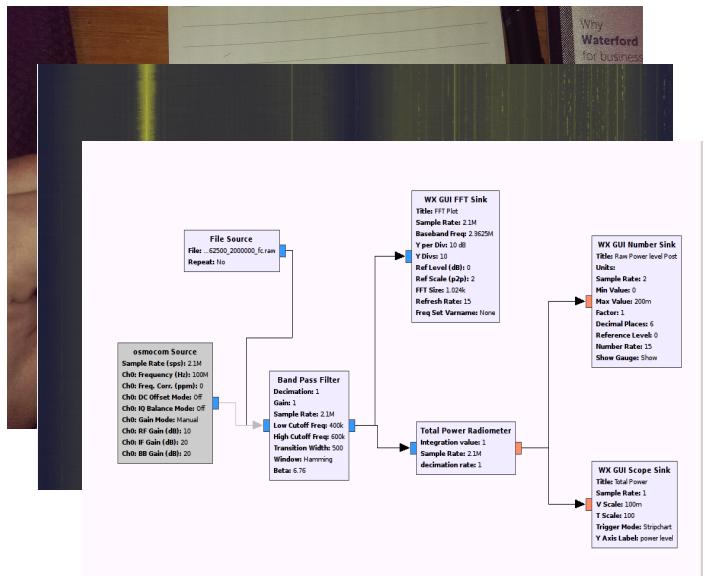
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- Generating spectrograms using the RTL2832 DAB SDR

RQ3

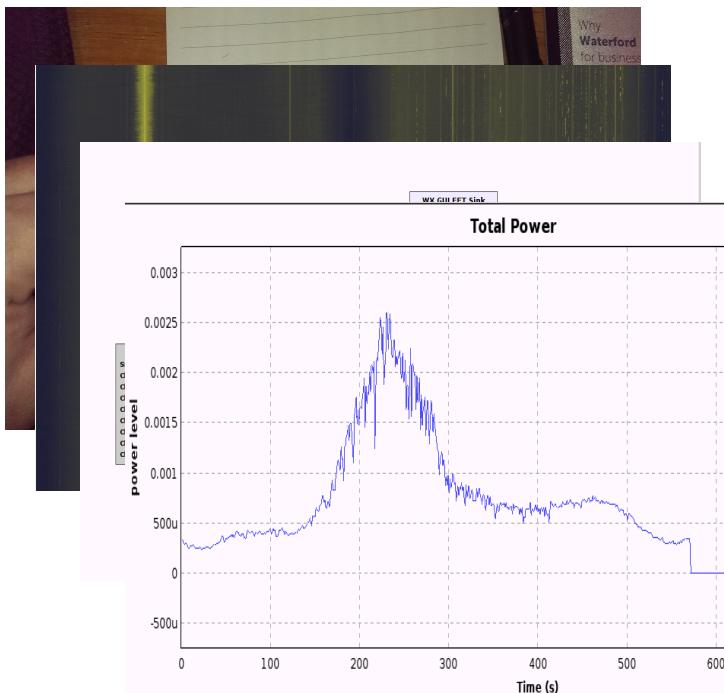
- What SDR tools, processes and or algorithms need to be developed to identify instances of the three main DAM emission types?



- Generating spectrograms using the RTL2832 DAB SDR
- Implementing a HackRF Compatible Flow-Graph in GNURadio

RQ3

- What SDR tools, processes and or algorithms need to be developed to identify instances of the three main DAM emission types?



- Generating spectrograms using the RTL2832 DAB SDR
rtl_power utility records data in csv, heatmap.py generates spectrogram
- Implementing a HackRF Compatible Flow-Graph in GNURadio
GNURadio flow-graph to generate signal temperature intensity plot from live or prerecorded data

Conclusions

- Human signals and natural signals overlay on spectrogram
- Complete spectrogram generator for HackRF
- Calibrate SDRT for accurate power measurements
- Machine learning neural network for identification of DAM emissions using captured data