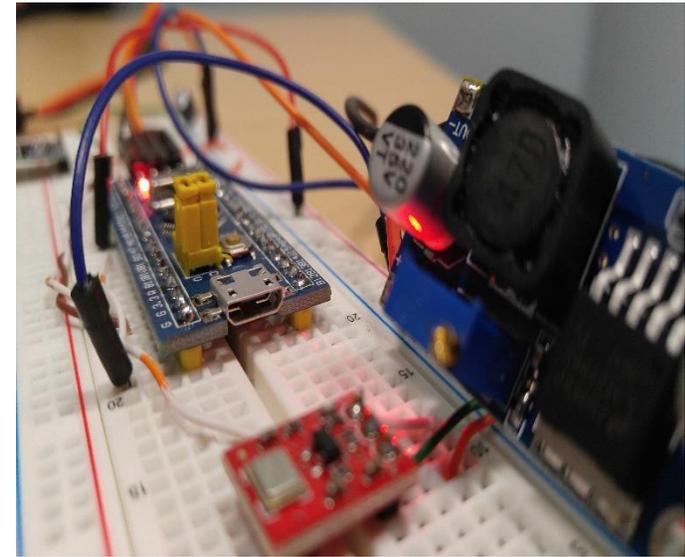




### Infrasound

Infrasound is low frequency sound waves with frequencies below the lower limit of human audibility, 20 Hz. Infrasound sound waves are created from several natural phenomena such as earthquakes, avalanches, lightning, and volcanoes. They can also be created by man-made sources like machinery, wind turbines, missile launches, artillery, helicopters, and drones.



There are few reliable infrasound detection systems on the market today.

We have created a wireless sensor array that could reliably locate infrasound sources. Along with the ability to locate, we wanted to provide a solution that was easy to manufacture, cost effective, easy to deploy, and provides real-time data to the user. The design plan was to use an array of 7 different wireless sensor nodes in a circular array, transmitting to a central receiver 'hub' node. Each node is comprised of a microcontroller, a microphone, and a wireless transceiver.

# Reliably Locate Infrasound

Our mission was to develop a system that could address some common customer needs as it relates to infrasound detection systems. Our goal was to create an infrasound system that could reliably locate infrasound and be able to display the data to the user in real-time.

## PROBLEMS BEING ADDRESSED

- NEED FOR A LARGER ARRAY SIZE
- CUMBERSOME DEPLOYMENT
- HARDWIRED ARRAY
- USER INTERFACE

The array system we built for detecting low frequency sounds below 20Hz can assist with positioning, navigation, and locating. The applicaiotns of such a system are widespread from military applications such as missile and nuclear deterection to academic and scientific research.

## Our solutions

### Reliability

The reliability is improved through the overall design and choice of components used to build the infrasound detection modules.

### Ease of use and easy to Deploy

We've made the array setup wireless, eliminating the difficulties inherent with complicated hard wire setup.



### Wireless Capibility

We used an MK1 NRF24L01 wireless tranceiver. It has been successfully tested to 25 meters in a high loss, high interference environment.

### Larger Array Design

The array is comprised of 7 nodes with a central hub node. Each node is wirelessly connected to the central hub.



### Real-time Processing

We developed code to display the infrasound data in real-time. The modules are controlled through a simple user interface.

