

Success Criteria

The following, which constitutes a minimal, finished piece of work, should be achieved:

- A phone running the application produced should be able to detect another phone in its vicinity running the same application, retrieve location and contact data from that phone, and build a map of the relative locations of the devices with this data, allowing the user to view contact data for the devices.
- A DTMF-style full duplex acoustic modem implementation that achieves over 20bps across a 3 metre distance with a 0.006 percent symbol error rate.¹ This value will include bits solely to support functionality such as cyclic redundancy checks, so the *effective* transmission rate may be less.

The items above should be achieved by the 28th of January according to my timetable. Should everything go to plan, the sending of emails and/or Short Message Service (SMS) messages to phones from the map of relative locations will also be possible, and it should be possible for any number of phones to be discovered (i.e. the network is not flooded by many phones simultaneously producing sound).

Should the project proceed at a fast pace, the following extension options may be implemented:

- Implement a non-DTMF modulation scheme involving OFDM (orthogonal frequency-division multiplexing) and/or DSSS (direct-sequence spread spectrum). This can be compared to the DTMF schemes for bit rate and perceptability.
- Make idle phones listen out for data passing between other phones and cache any GPS and contact information heard for potential rapid map generation.
- Dynamically vary the transmission rate in response to the error rate.
- Attempt to estimate distance of phones by sound amplitude and phone orientation knowledge (using accelerometers and magnetometers) as well as knowledge of whether the phone is out in the open or in a pocket/bag (through proximity sensors and/or ambient light sensors).
- Create a desktop version of the application that looks for phones and sends them information upon detecting them (similar to the example of a fixed system welcoming guests to a hotel or restaurant).

¹An improvement on a previous result achieved with DTMF, detailed on page 2: <http://anil.recoil.org/papers/2005-ieee-audio.pdf>