Listening to the birds in the Waikato / New Zealand

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An open source startup dedicated to increasing bird song in New Zealand by applying modern IT techniques to predator control.
Why bother?

- 80% of native birds endangered/in decline.
- NZ’s native birds evolved without mammals.
- $70 million spent per year controlling pests.
- Benefits for agriculture (TB).
Current Technology
How much better?

Compared to a conventional trap, a single Cacophony Project device could:

- Cover 100 times the area.
- Catch 4 types of pests.
- Catch at least 10 times as often.
- Auto-reset (multi-catch).
Why Listen?

Obtain a baseline ‘Cacophony Index’.
– Use any change from baseline to help determine if an intervention has had an effect?
mRecorder.setOutputFile(filePath);

    // Sampling configuration
    mRecorder.setAudioChannels(1);
mRecorder.setAudioSamplingRate(16000);

    // Encoding configuration
mRecorder.setOutputFormat(MediaRecorder.OutputFormat.MPEG_4); // MPEG 4
    mRecorder.setAudioEncoder(MediaRecorder.AudioEncoder.AAC); // AAC added
    mRecorder.setAudioEncodingBitRate(256000);

mRecorder.prepare();

// Start recording.
try {
    mRecorder.start();
    JSONObjectMessageToDisplay = "";
    jsonObjectMessageToBroadcast = new JSONObject();
    try {
        jsonObjectMessageToBroadcast.put("messageType", "RECORDING_STARTED");
        jsonObjectMessageToBroadcast.put("messageToDisplay", "Recording has started");
    } catch (JSONException e) {
        e.printStackTrace();
    }
    Util.broadcastAMessage(context, action, "MANAGE_RECORDINGS", jsonObjectMessageToBroadcast);
    } catch (Exception e) {
    Log.e(TAG, msg: "mRecorder.start " + e.getLocalizedMessage());
    return;
}

// Sleep for duration of recording.
try {
    Thread.sleep( (long) recordingSeconds * 1000L);
}
Challenges

Code reliability

- Fail-safe operation – works without user intervention.
- Fight Google Android – alarms when I say.
- Multiple versions of Android.
Challenges - 2

Power

- Fight Google Android – let me turn on Airplane (Flight) mode.

Recording quality

- Fight Google Android – trade off quality/compatibility.
Challenges - 3

User interface

- Simple interface, but allow for many options.
Automated Testing Using Espresso Framework
Permanent listening at two locations in the Waikato

(Almost) every hour,
Every day,
Since June/Oct 2018
Future Work

Audio Analysis.

● Manually ‘tag’ recordings.
● Train Artificial Neural Networks to automatically recognise birds/humans.
● Create a Cacophony Index of New Zealand
Mark Nikora
Our supporters - Thanks!
The Team

These people have contributed to the project by giving us the benefit of their expertise and time. Nothing happens without their hard work, so many thanks!

- Menno Finlay-Smits - Project Manager/lead developer
- Cameron Ryan-Pears - Hardware engineering & software development
- Grant Ryan - Project initiator/coordinator
- Clare McLennan - Software development
- Tim Hunt (Wintec) - Cacophonometer lead
- Matthew Aitchison - Machine learning
- Arthur McGregor - Software development
- Andy Saunders - Software development
- David Blake - Software development and field testing
- Simon Matthews - Software development
- Ben Biddington - Software development
- Giampaolo Ferraro - Software development
- Huub Nijis - System administration
- Sara Coutinho - User experience
- Jimmy Kirkus-Lamont - Software development & graphic design
- Jessica Lyons - Social media (Concentrate Ltd)
- Finn Maunsell - Cacophonony Index - bird song analysis
- Pete Higgins - Mechanical engineer
- Dave Lane - Open source design and Drupal CMS integration
- Brent Martin - Machine learning (University of Canterbury)
- Elaine Murphy (DOC) - Animal behaviour
- Living Springs - Field testing and hosting meetings
- Roger McKenzie - Hardware advice
- Gray Rathgen - Designer
- Kate Holcy - Supporter
- Paul Campbell - Electronics design
- Tim Sjoberg (DOC) - Animal behaviour and field testing
- Mark Nikorla (Wintec) - Data visualisation
- Michael Busby - Website design and development
- Max Johns - Content
- Matt Kaevermann - Digital lures
- Nigel Sharpin and Logan Stephens from Infact - Weatherproofing advice
- Donald McKellar - Software testing
- Alex James and Michael Plank (University of Canterbury) - Modelling and statistics
- Stephen Marsland (Massey University) - Bird song analysis
- Shaun Hendy - Science supporter

Find out more
https://cacophony.org.nz/