Listening to the birds in the Waikato / New Zealand

Dr Tim D. Hunt

Waikato Institute of Technology

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).
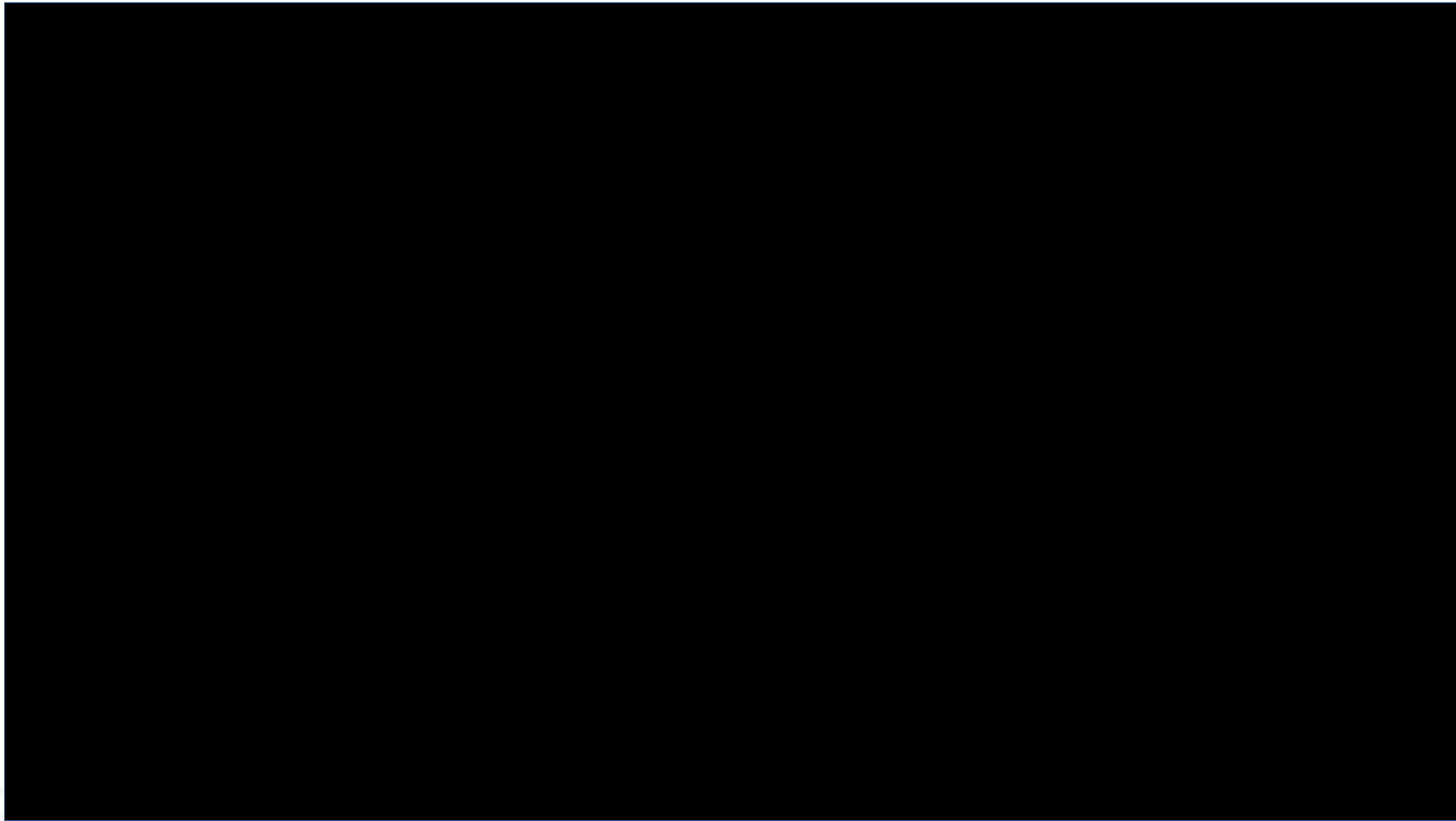
Current Technology

RAT BITE MARKS

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.
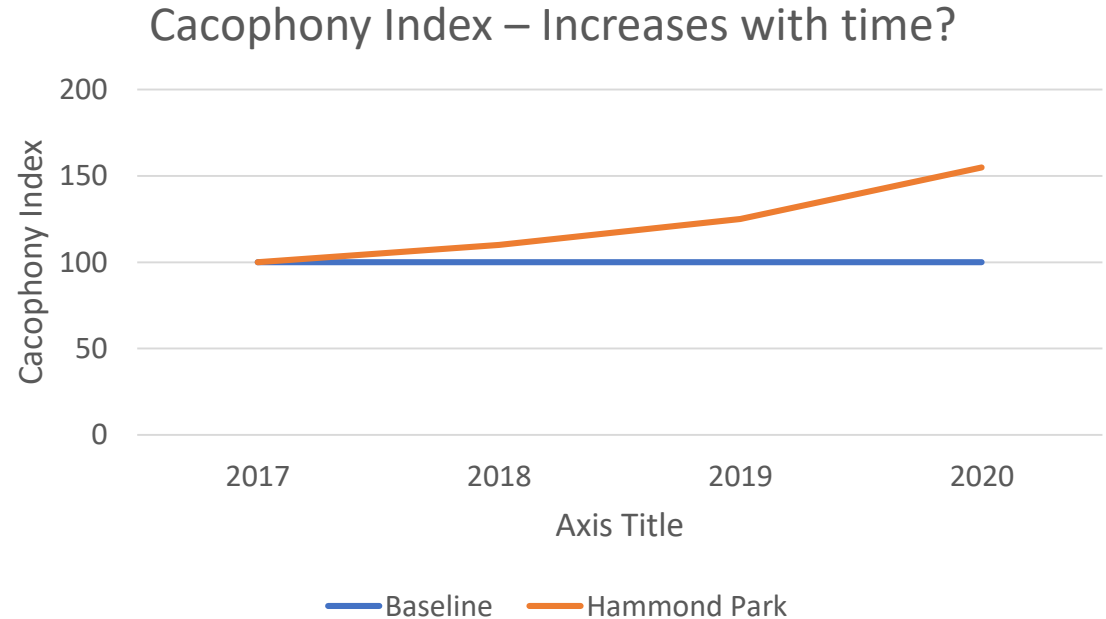
- Auto-reset (multi-catch).

Why Listen?

Obtain a baseline 'Cacophony Index'.

– Use any change from baseline to help determine if an intervention has had an effect?

Cacophony Index – Increases with time?

```java
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();
```

```java
// Start recording.
try {
    mRecorder.start();
    messageToDisplay = "";
    jsonObjectMessageToBroadcast = new JSONObject();
    try {
        jsonObjectMessageToBroadcast.put( name: "messageType",  value: "RECORDING_STARTED");
        jsonObjectMessageToBroadcast.put( name: "messageToDisplay",  value: "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 {
```

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

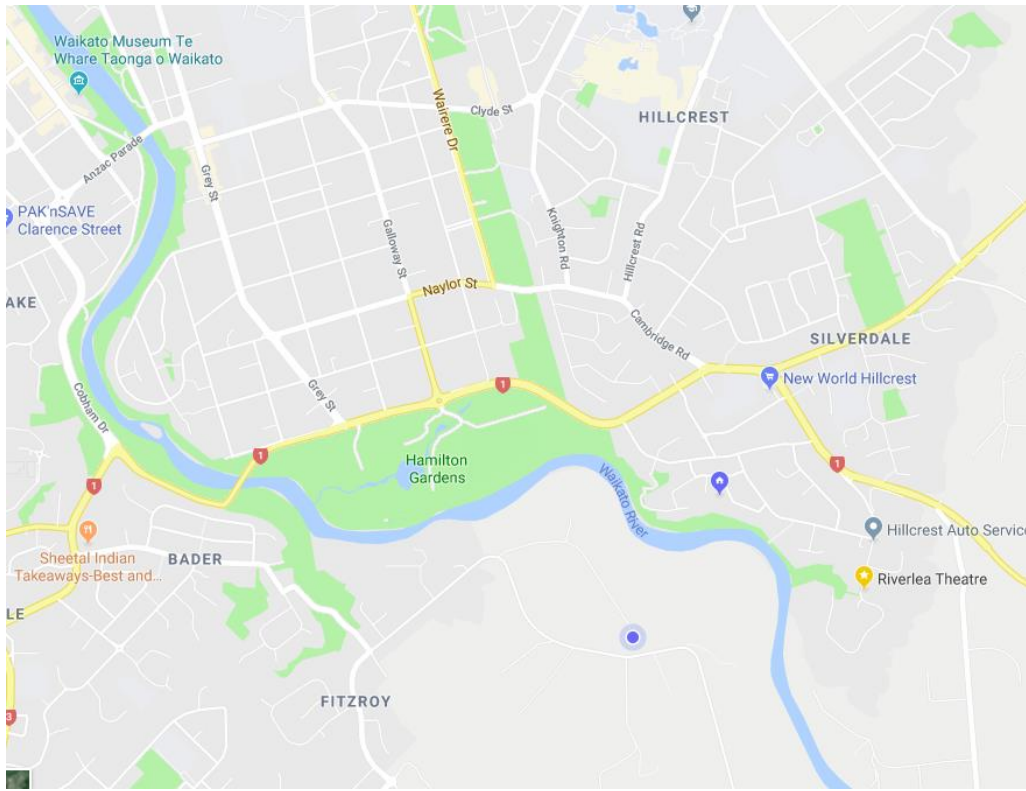User interface

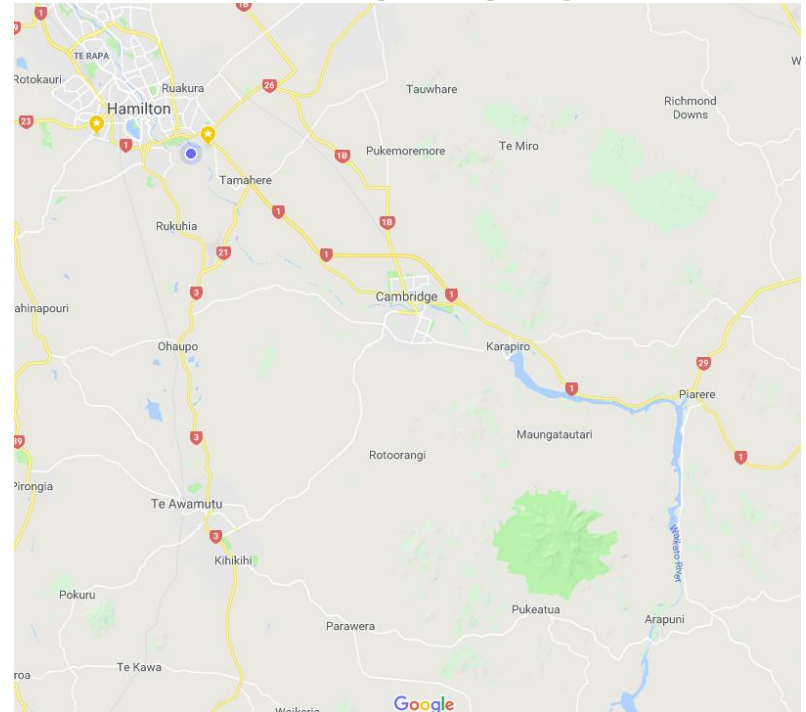- Simple interface, but allow for many options.

Automated Testing

Using Espresso Framework

Permanent listening at two locations in the Waikato

(Almost) every hour,

Every day,

Since June/Oct 2018

The Cacophony PROJECT

2019 ITP RESEARCH SYMPOSIUM
WHANAUNGATANGA
community-centred research
RELATIONSHIPS • NETWORKS • RECIPROCITIES • OBLIGATIONS

Wintec
WAIKATO INSTITUTE OF TECHNOLOGY
Te Kuratini o Waikato
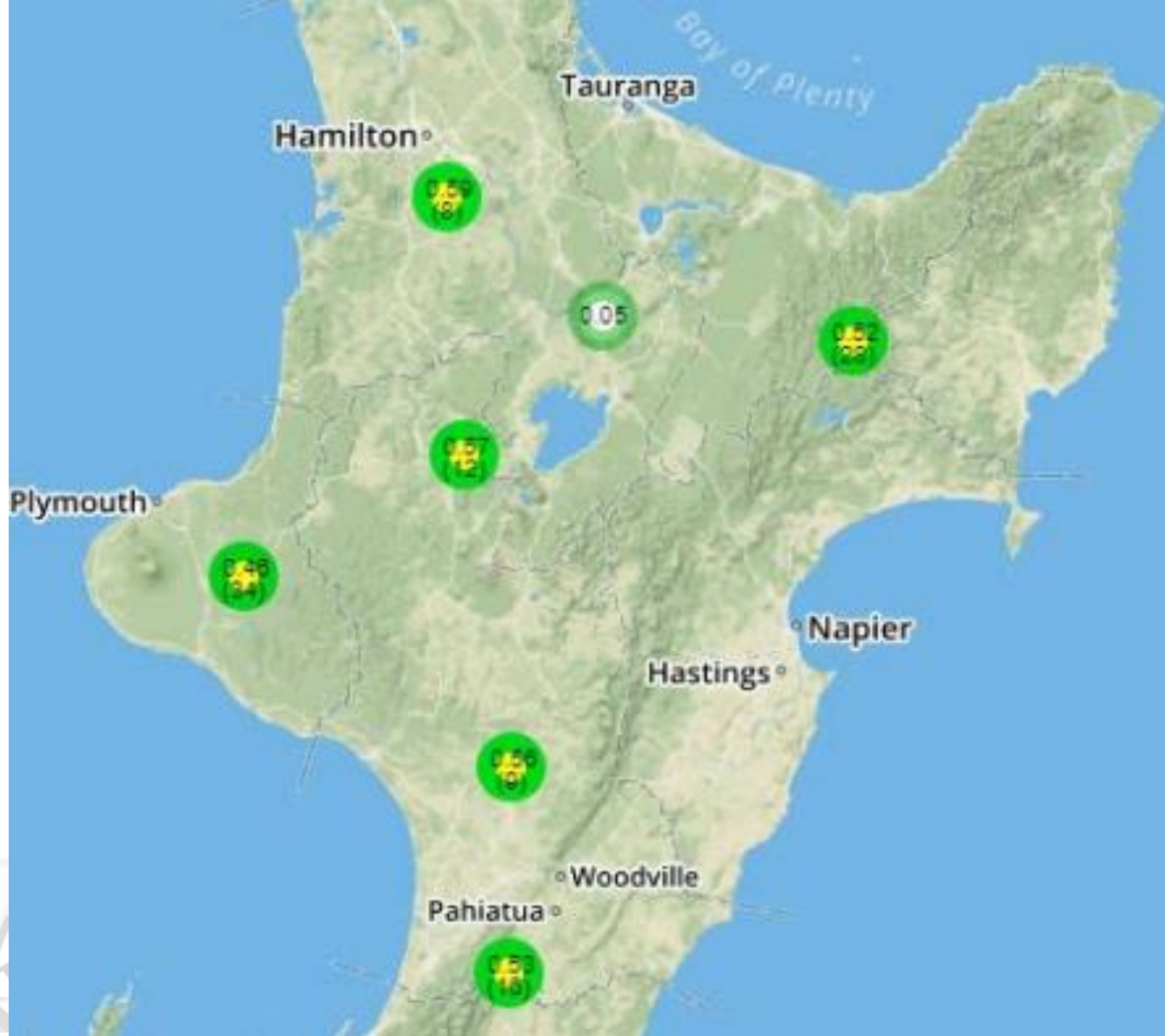
Future Work

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 Cacophony Project is nothing without its community of designers, developers, researchers, supporters, and friends. This is where we recognise people who have given us the benefit of their time and expertise!

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 Nijs - System administration
- Sara Coutinho - User experience
- Jimmy Kirkus-Lamont - Software development & graphic design
- Jessica Lyons - Social media (Concentrate Ltd)
- Finn Maunsell - Cacophony 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 Haley - Supporter
- Paul Campbell - Electronics design
- Tim Sjoberg (DOC) - Animal behaviour and field testing
- Mark Nikoria (Wintec) - Data visualisation
- Michael Busby - Website design and development
- Max Johns - Content
- Matt Kavermann - Digital lures
- Nigel Sharplin 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/