#### **Overview**

The implementation of a Bird detector that can correctly identify several NZ birds; on an android device had two key purposes.

- 1. To allow end-users access to a highly flexible and versatile Neural Network, in a short period of time.
- 2. To determine whether a Neural Network, implemented in MATLAB could be converted into a format to access on an Android Device.

Both of these goals were ultimately achieved using MATLAB coder to help create an interface between the Neural Network and Android Applications.

- On an Android device this runs at approximately 2.5 seconds with 6 birds, and takes up 18.52 MB of on device file space.
- This is an entirely reasonable amount of time for this neural network.
- This allows the user to get near instantaneous feedback of which birds are in the environment.

#### 11:29 🖬 🗘 🖬



A small songbird with greyish head, white eyebrows, brown back and rump, cinnamon breast and belly, white and black bands across the upper breast, and a long black and white tail.

Some of them have a white spot over each ear.

#### https://bit.ly/2TbFbDY

11:30 🖾 👽 🖾

## K GREY WARBLER RIRORIRO

#### UNDETECTED

A tiny slim songbird that is olive-grey above with a grey face and off-white underparts, with a darker grey tail getting darker towards the tip.

The finely pointed bill and slender legs are black, the eye is bright red, and birds often glean insects from the outside of the canopy while hovering.

https://bit.ly/3jdCAUx

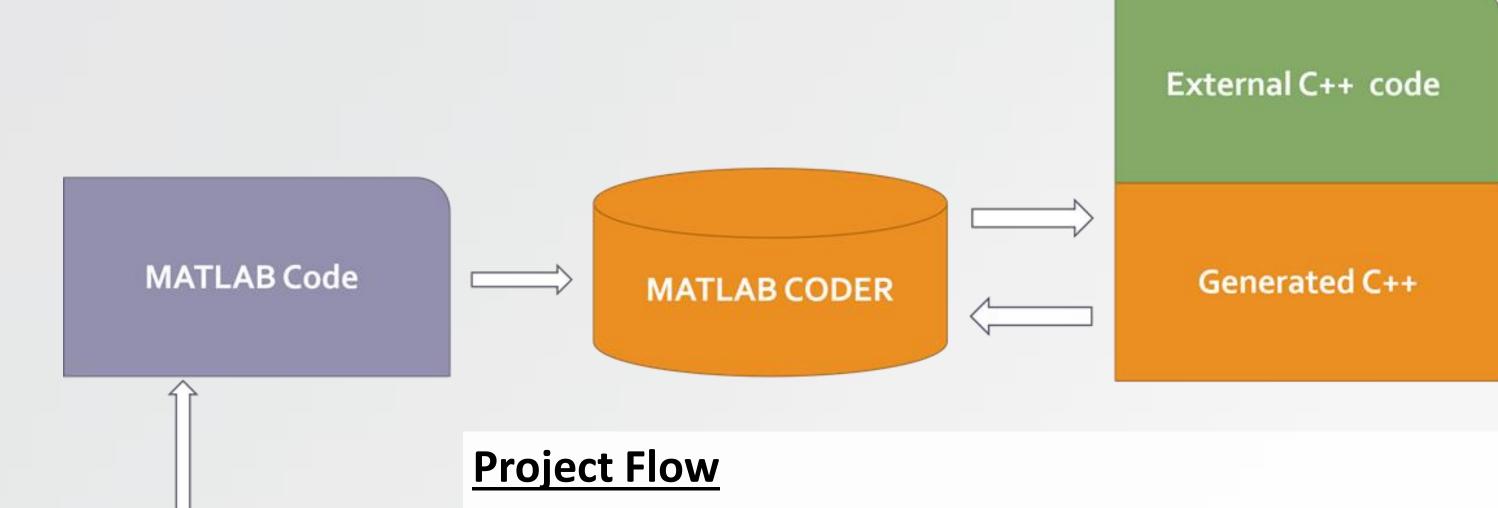


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# **Real-time implementation of an NZ bird detector** Sean MacFarlane(15898067) – Mechatronics Engineering



- within MATLAB.
- The code is then run through MATLAB coder to generate C++ source code. • This source code is interfaced via Java Native Implementation C++ code written in Android Studio to ensure compatibility with Android Java.
- Java code is written for the GUI and as an interface for the C++ Neural Network
- If any changes are required in the NN, this must be done in the MATLAB code, and C++ source code regenerated.

	File	Average	Арр	6	Timing ar		
	Size(MB)	Time(s)	Size(MB)	0			
1 Birds	13.7	1.1686	5.17	5			
I DIIUS	13.7	1.1000	J.17	4			
2 Birds	14.72	1.4982	6.14	3			
3 Birds	15.09	1.7008	7.09	2			
4 Birds	16.65	1.8666	8.08	1	0.97		
5 Birds	17.58	2.1394	9.04	0	0.3296		
6 Birds	18.52	2.3835	10.03		1-2		

Neural

Network,

Trained in

MATLAB

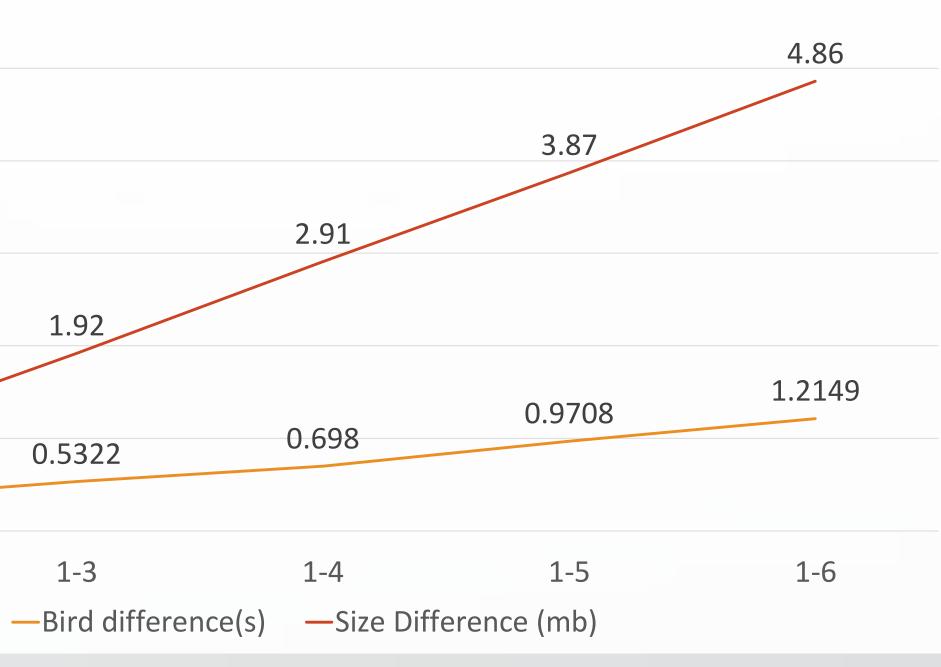
	1	2	3	4	5	6	7	8	9	10	Average
Colour(initial											
Map)	50	34	15	13	13	13	27	13	14	12	20.4
Colour Button	11	23	18	18	23	18	18	22	20	18	18.9
Input Function	372	134	99	86	91	98	97	96	83	87	124.3
<b>Output Function</b>	76	48	58	46	46	46	71	47	45	45	52.8
Spectrogram	1601	1290	1241	1153	1201	1298	1322	1165	1082	1196	1254.9
Total	2110	1529	1431	1316	1374	1473	1535	1343	1244	1358	1335.5



Android Studio Java Code

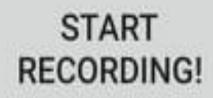
• Neural Network(NN) code, and subsequent MATLAB execution code is adjusted

nd Size variance with increase in number of birds



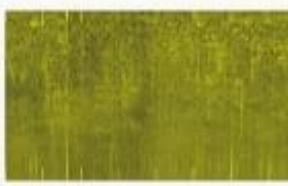
### **Further Work**

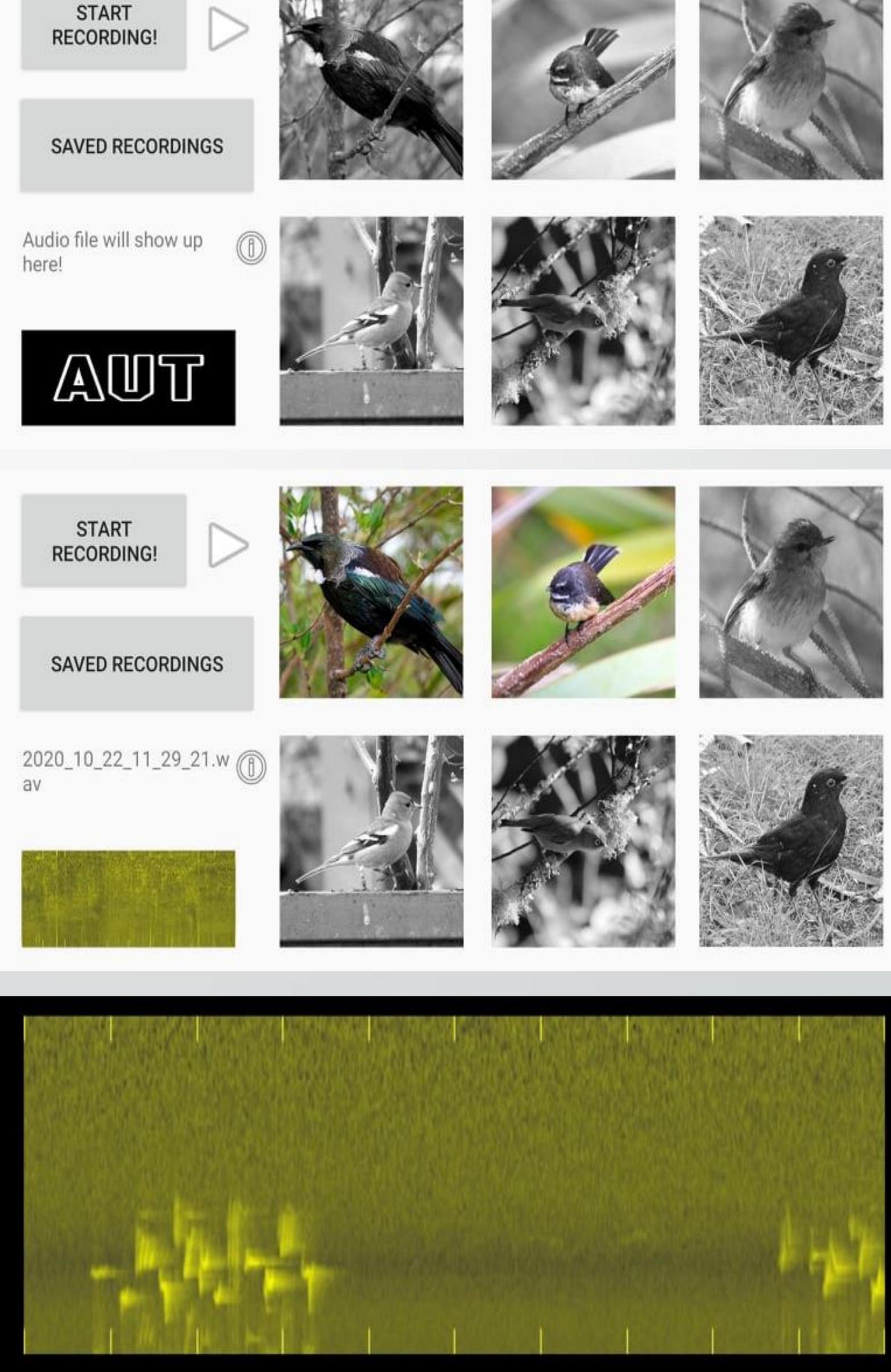
- Compatibility with all Android Devices
- Re-training of NN for Urban Environment
- Speed and size comparisons for more birds





## START





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