

110 Parkway Drive, Truro Heights
Nova Scotia, Canada, B6L 1NB
support@oceansonics.com
www.OceanSonics.com

Coda Plugin User Guide

Version 1.0



OCEAN SONICS
Giving Our Oceans A Voice

Table of Contents

1. Introduction	2
2. Getting Started	2
System Requirements	2
Licensing Setup	2
Enabling Click Detection	4
Logging Clicks	5
Logging Click Trains	7
Interpreting the Click Detection Chart	7
How Click Detection Works	9

1. Introduction

The Coda Click Detection plugin is designed to identify potential porpoise clicks within a stream of acoustic pressure measurements. The algorithm works by calculating the spectral energy within the porpoise click frequency band, which is around 130 kHz. This energy is then compared with the energy in the neighbouring frequency bands. The ratio of these two values is referred to as the *click strength* and serves as one of the metrics for identifying clicks.

In addition to spectral analysis, the algorithm uses a signal envelope function, and a standardized porpoise click template to further refine its detection capabilities.

2. Getting Started

System Requirements

The hydrophone must be streaming WAV data, and the sampling rate must be set to 512 kilo samples per second (as per Nyquist theorem for 130 kHz clicks).

Licensing Setup

To check if the user has a valid license to use this plugin, click on *Program Setup* in Lucy II (Figure 1) on the main menu and then select *Program Init*. This would open a new pop up (Figure 2), click on *Plugin License* on the bottom left.

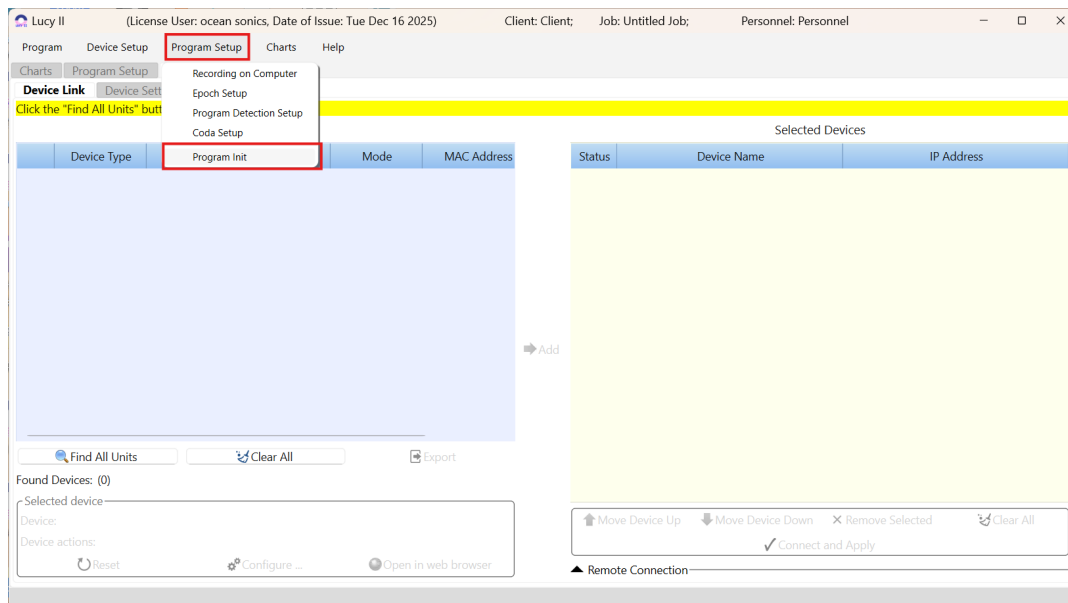


Figure 1

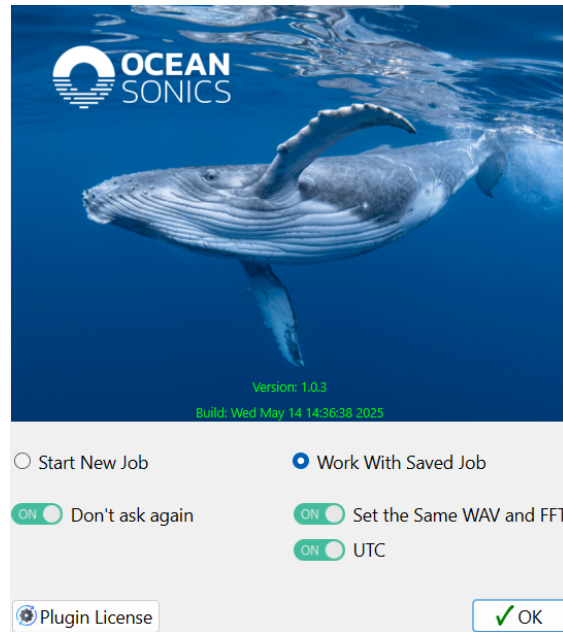


Figure 2

This will open the licensing tool (Figure 3). Users should see two tabs **Write License** and **Read License**. Make sure you click on **Write License**. Then click **Load License File** on the bottom right. This should open the File explorer. Find the license txt file that you received from the company after you bought the license. When you load the license file then you can see the licenses you currently have access to. If you see Coda option ticked that means you have access to the plugin. If not, send us an email support@oceansonics.com.

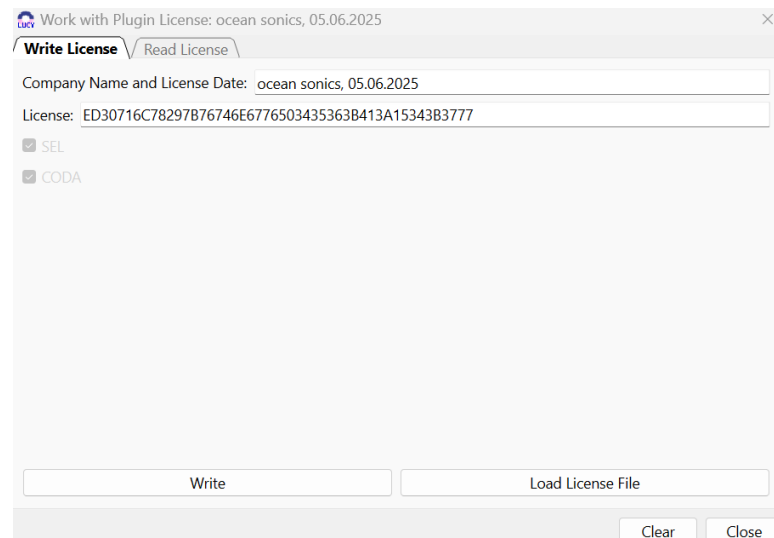


Figure 3

If this is your first time, loading this license, don't forget to click on **Write** option on the left of **Load license file**. This will write the license to the registry, and you can access the plugin. App will ask to be restarted to do this.

Enabling Click Detection

Once you have loaded the plugin successfully. You should see an option called *Coda* in the **Show Spectrum** dropdown in the Charts tab. Alternatively, you should see the *Coda* option added to the Charts>Display>Show Spectrum in the main menu on the top (Figure 4).

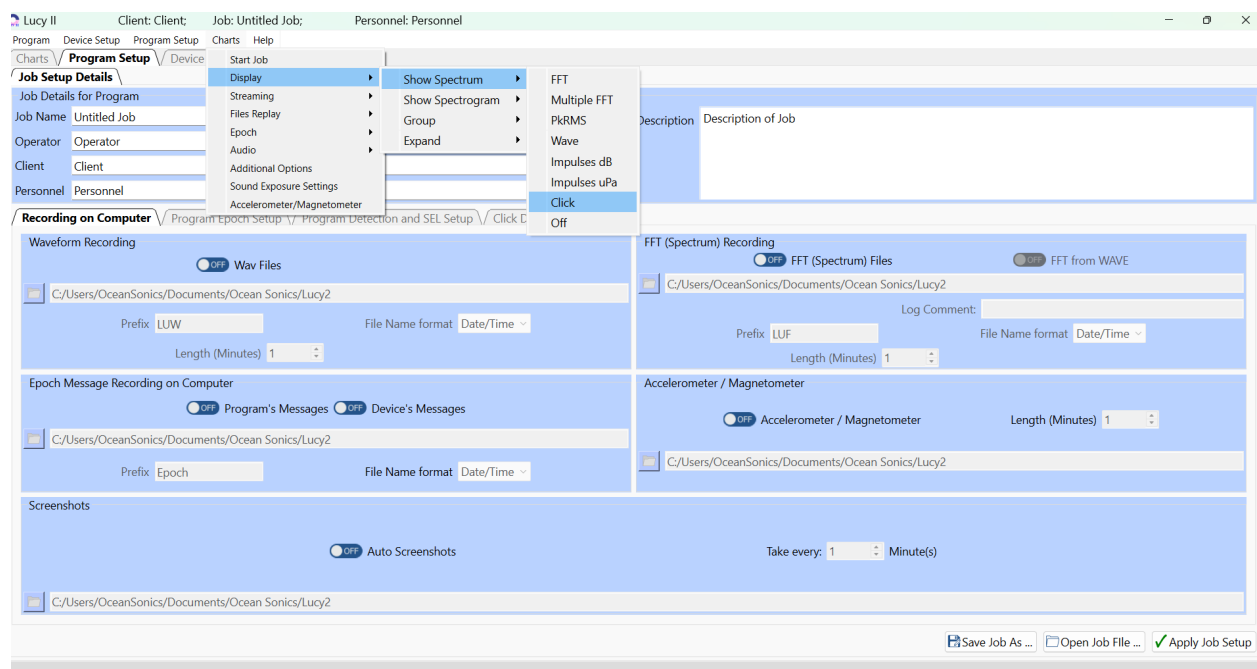


Figure 4



Figure 5

Once you see the chart, you can start playing it by clicking on the **Play** button to see real time click detection. To interpret the chart, move to the Interpreting the **Click Detection Chart** section below.

Logging Clicks

Users also get the option to log the detected clicks to a txt file. In the Program Setup you should see a tab titled **Coda Detection** which has the option to start logging, select directory to save the clicks and select the prefix for file naming (Figure 6).

Alternatively, you can open this tab by going to **Program Setup** in main menu on the top and then selecting the **Click Detection Setup** option in the drop-down menu (Figure 7). It will directly open the Click detection menu.

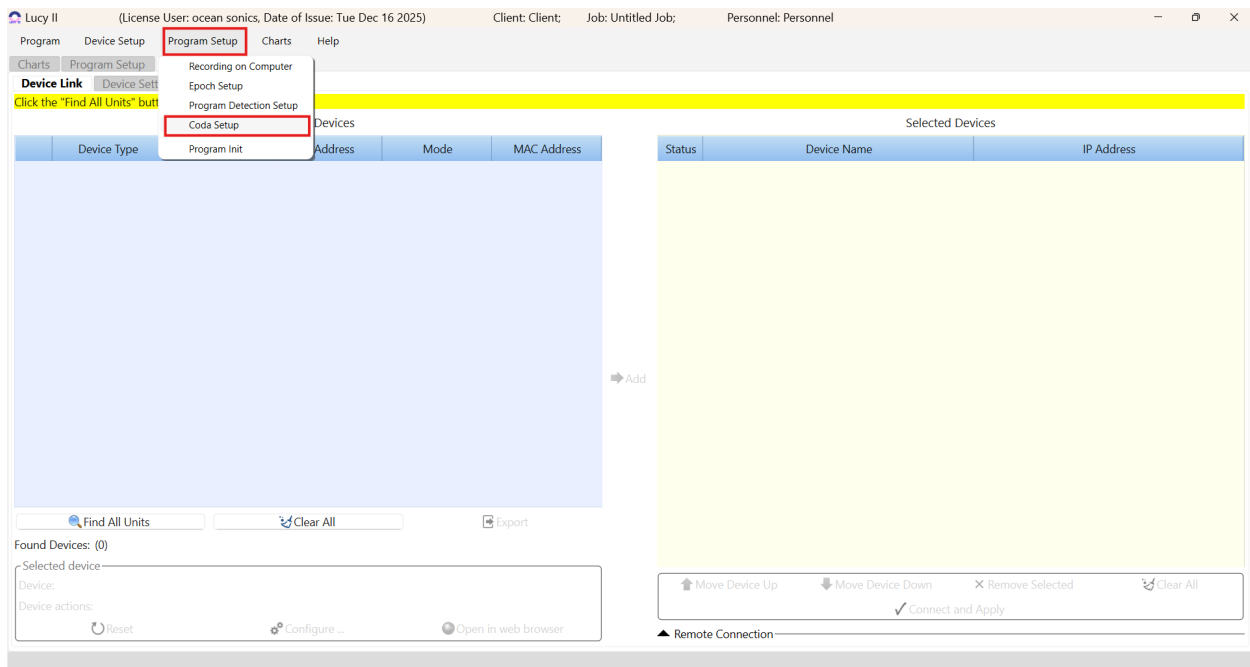


Figure 6

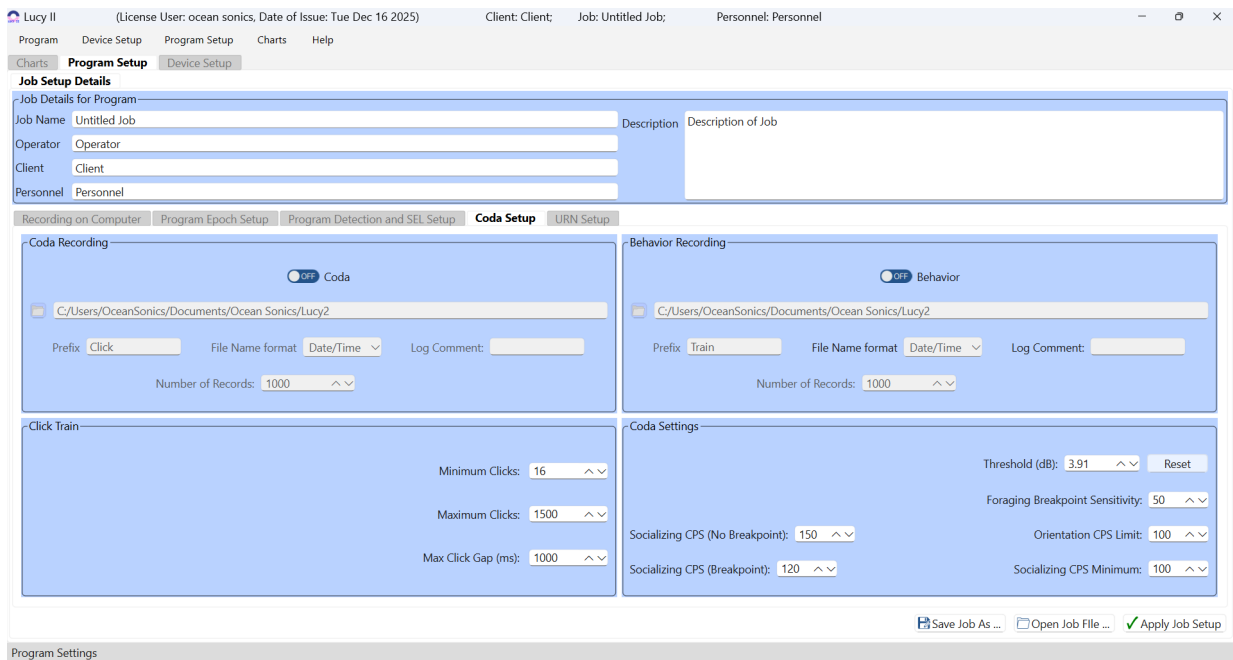


Figure 7

Do not forget to select **Apply job Setup** when you make any changes to logging.

Logging Click Trains

Coda can also infer click train behaviour from detected clicks. This behaviour classification is based on the recent work done on porpoises.

Each train log entry includes (Figure 9)

- Start Time (HH:MM:SS): When the click train started
- End Time (HH:MM:SS): When the click train ended
- Duration: How long the train lasted
- Mean Inter-click interval (ICI): Mean of time difference between the current and previous click peaks. It is recorded in milliseconds.
- Clicks Per Second (CPS): CPS can be calculated from ICI values and is crucial in behavior classification algorithm
- Behavior: Classifies behavior. It can be either Foraging, Orientation, Socializing, or Unknown

Interpreting the Click Detection Chart

The click charts give a quick visual summary of what the detector is finding over time so users can understand activity immediately. The main click plot shows individual click levels and highlights trends as new clicks arrive, while supporting indicators in the legend (such as click count, mean inter-click interval, and behavior label) help interpret whether activity is sparse, regular, or changing. Detected click trains are also marked as colored regions with labels, making it easy to spot grouped events and their likely behavior category without digging into raw data.



Figure 8

When logging is enabled in the Click Detection settings, the plugin saves all detected clicks to a txt file in the specified directory.

Each log entry includes (Figure 9)

- Timestamp (HH:MM:SS.sss): When the click occurred
- Amplitude: Strength of the acoustic signal
- Click Strength: Spectral energy ratio of the click and background noise
- Inter-click interval (ICI): Time difference between the current and previous click peaks. It is recorded in milliseconds.

This provides a structured record for further review.

Data:

Time (HH:mm:ss.SSS),	Comment,	Amplitude (dB),	Signal-to-noise Ratio (click),	Inter-click Interval (ms),
13:00:00.100,	test,	126.98,	4.37,	0.00
13:00:00.325,	test,	127.83,	3.65,	224.57
13:00:00.325,	test,	122.36,	3.58,	0.03
13:00:00.713,	test,	135.52,	5.21,	387.71
13:00:00.872,	test,	124.39,	4.33,	158.92
13:00:01.061,	test,	141.79,	3.44,	189.69
13:00:01.274,	test,	142.78,	3.55,	212.30
13:00:01.480,	test,	129.92,	3.23,	206.16
13:00:02.774,	test,	117.00,	2.41,	1294.63
13:00:03.232,	test,	142.17,	3.97,	457.16
13:00:03.473,	test,	128.00,	2.89,	241.67
13:00:09.027,	test,	114.59,	3.36,	5553.99
13:00:09.284,	test,	128.61,	4.34,	256.98
13:00:09.534,	test,	142.62,	2.78,	249.47
13:00:10.118,	test,	136.53,	2.77,	583.98
13:00:10.381,	test,	128.08,	2.49,	263.37
13:00:10.659,	test,	135.53,	2.56,	277.47
13:00:10.839,	test,	133.61,	2.34,	180.44
13:00:11.258,	test,	142.51,	2.45,	419.39
13:00:11.484,	test,	141.85,	2.52,	225.70
13:00:11.684,	test,	142.58,	3.01,	199.96

Figure 9

File Details:

File Type

Coda Train Detection

File Version

6

Start Date

2016-10-07

Start Time

13:00:00

Time Zone

UTC

Author

Ocean Sonics' Lucy II

Computer

OSL-Sourabh

User

OceanSonics

Client

Client

Job

Untitled Job

Personnel

Personnel

Starting Sample

385024000

Device Details:

Device

WAV Bin File,

S/N

1239

Firmware

SBX-ETH, icListen HF R31.2

Model

R3

Setup:

Data:

Train #,	Start Time,	End Time,	Duration (ms),	Num Clicks,	Mean ICI (ms),	CPS,	Behavior,	Comment,
1,	13:00:09,	13:00:12,	3385.912,	17,	199.171,	5.021,	Foraging,	
2,	13:00:24,	13:00:28,	4106.047,	16,	256.628,	3.897,	Orientation,	
3,	13:00:35,	13:00:39,	3600.297,	23,	156.535,	6.388,	Foraging,	
4,	13:00:51,	13:00:55,	3610.682,	21,	171.937,	5.816,	Foraging,	

Figure 10

How Click Detection Works

The algorithm processes data in overlapping windows. A matched filter is applied to enhance click-like signals, and the envelope of the matched filter output is analyzed to identify peaks. The algorithm calculates signal-to-noise ratio of detected clicks and compares it against a predefined threshold to confirm valid detections. This approach ensures reliable detection and characterization of porpoise clicks in noisy underwater environments.