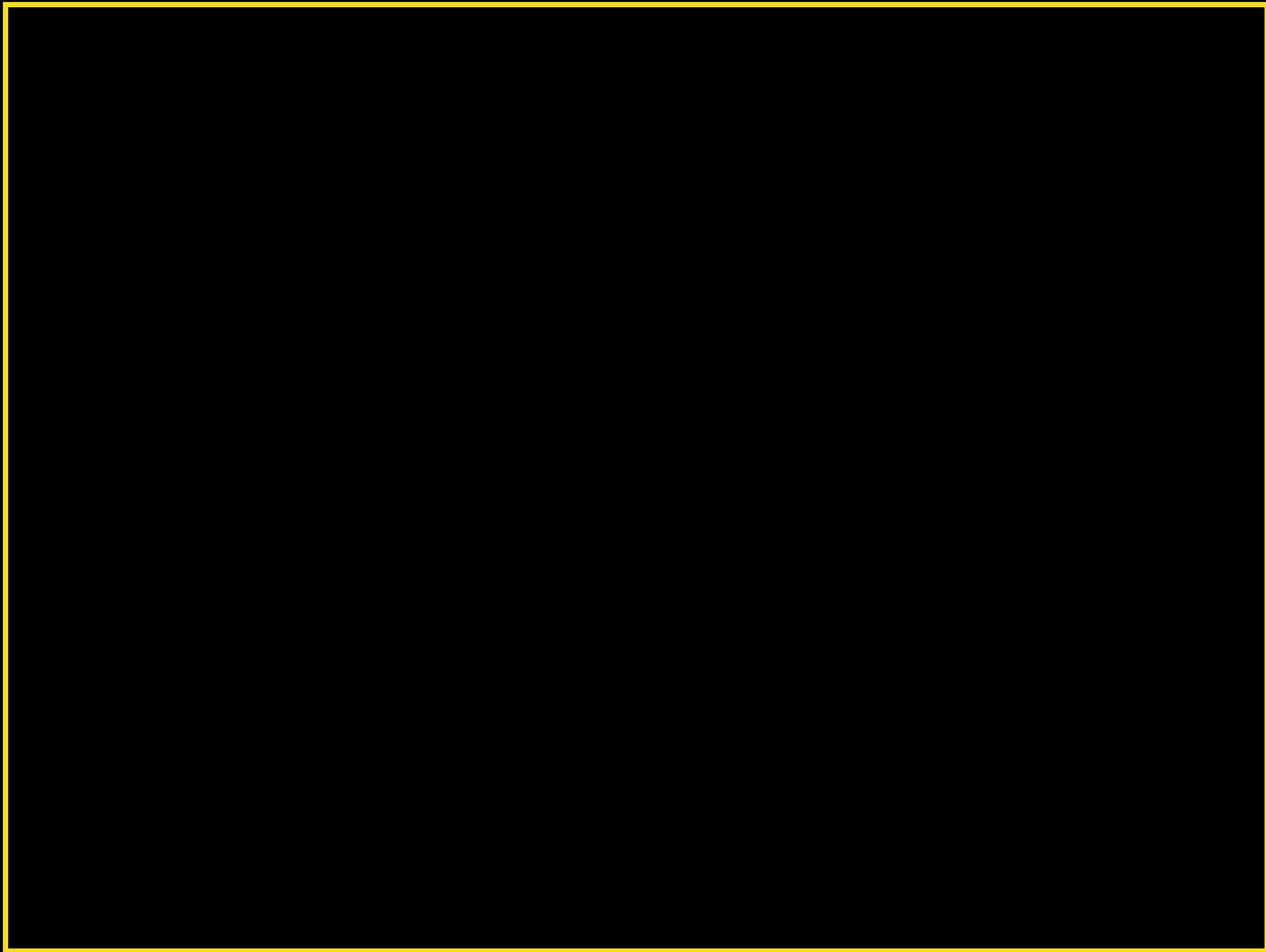




# JIS

**Roland**<sup>®</sup>






















# DIFFERENT DRUMMER

We don't call the TR-909 a drum machine for some very good reasons. True, it's a machine that makes drum sounds, but that's the end of any similarities between run-of-the-mill drum machines and the **TR-909 Rhythm Composer**. In fact, playing with the TR-909 is more like playing with a real drummer than anything else. Here's why. **The Best Sounds.** We start with digital recordings of real drums, then through a 3-D waveform analysis, re-create the sounds through a hybrid digital/analog process. Not only does this provide the best drum sounds, but also the most flexible. Change the snap of the snare, the decay of the bass, you call it. The sounds you get are the sounds you really want. Even better—in addition to the 11 internal drum sounds, add up to 16 more drum sounds (digital and analog) through external sound modules. That means 27 drum sounds with no major surgery. **The Best Programming.** Program a roll on most drum machines and you'll see why they're called machines. That's why the TR-909 gives you the choice of Step Programming (highly visual and accurate) PLUS the additional spontaneity of Real-time Programming. The TR-909 also gives the most expressive and easily programmed dynamics. **The Most Flexibility.** Think of any way to interface, and you'll find it on the TR-909. MIDI, Sync-24, Tape Memory Save/Load, RAM-Pak Program storage, they're all here. So what does this mean? It means that years from now, when other drum machines are sitting in the closet gathering dust, your TR-909 will still be on the job. Hook up the TR-909 through MIDI to a personal computer (like the Apple II or IBM PC). Only Roland has the Hardware and the Software to make it possible. **The Most Expression.** Compare the results you get from the TR-909 Rhythm Composer with any drum machine. Because why would you want a machine, when you can have a Rhythm Composer? RolandCorp US, 7200 Dominion Circle, LA, CA 90040. 



*Roland Makes It Happen!*



## Different Drummer

We don't call the TR-909 a drum machine for some very good reasons. True, it's a machine that makes drum sounds, but that's the end of any similarities between run-of-the-mill drum machines and the **TR-909 Rhythm Composer**. In fact, playing with the TR-909 is more like playing with a real drummer than anything else. Here's why. **The Best Sounds**. We start with digital recordings of real drums, then through a 3-D waveform analysis, re-create the sounds through a hybrid digital/analog process. Not only does this provide the best drum sounds, but also the most flexible. Change the snap of the snare, the decay of the bass, you call it. The sounds you get are the sounds you really want. Even better-in addition to the 11 internal drum sounds, add up to 16 more drum sounds (digital and analog) through external sound modules. That means 27 drum sounds with no major surgery. **The Best Programming**.

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**Roland Makes It Happen!**



Program a roll on most drum machines and you'll see why they're called machines. That's why the TR-909 gives you the choice of Step Programming (highly visual and accurate) PLUS the additional spontaneity of Real-time Programming. The TR-909 also gives the most expressive and easily programmed dynamics. The Most Flexibility. Think of any way to interface, and you'll find it on the TR-909. MIDI, Sync-24, Tape Memory Save/Load, RAM-Pak Program storage, they're all here. So what does this mean? **It means that years from now, when other drum machines are sitting in the closet gathering dust, your TR-909 will still be on the job.** Hook up the TR-909 through MIDI to a personal computer (like the Apple II or IBM PC). Only Roland has the Hardware and the Software to make it possible. The Most Expression. Compare the results you get from the TR-909 Rhythm Composer with any drum machine. Because why would you want a machine, when you can have a Rhythm Composer?

**Roland Makes It Happen!**

**@rowdyrabouw**





Beats in the Browser

@rowdyrabout

























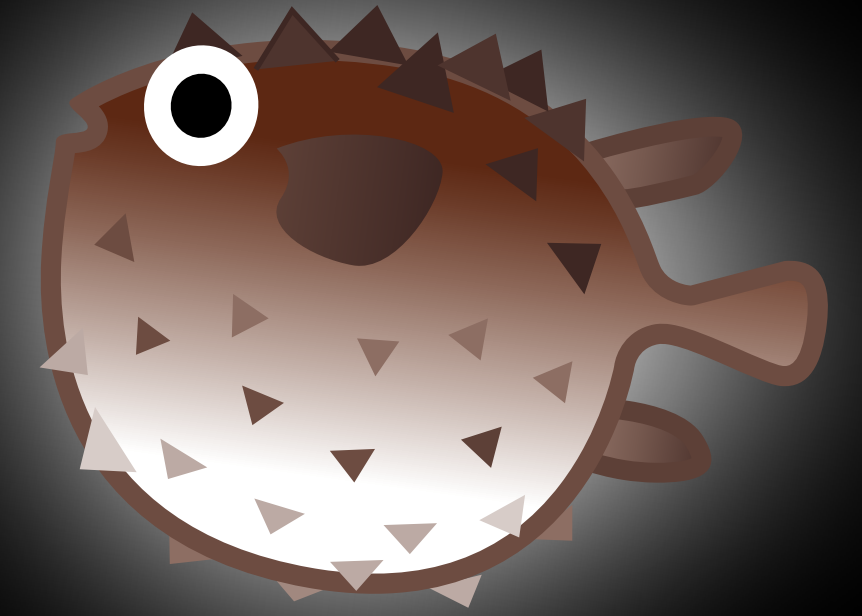
Beats in the Browser

@rowdyrabouw



**PWA**

# **ROWDY RABOUW**



**Used to be a Club DJ in the late 80's and early 90's**

**Build my first website in 1996**

**Front-End Focused Senior DevOps Engineer**

**Google Developer Expert in Web Technologies**



# WEB AUDIO API

The Web Audio API is a JavaScript API that provides a set of audio-related functionalities for creating and manipulating audio content in web applications.





# AUDIOCONTEXT

The `AudioContext` represents an audio-processing graph containing audio sources, nodes, and audio destinations.



```
const ctx = new AudioContext();
```



# OSCILLATORNODE

The `OscillatorNode` generates periodic waveforms for creating sounds in real-time.



```
const ctx = new AudioContext();  
const osc = new OscillatorNode(ctx, {  
  
});
```



# FREQUENCY

The frequency property of the `OscillatorNode` determines the pitch of the generated sound. It represents the number of cycles per second, measured in Hertz (Hz).



```
const ctx = new AudioContext();  
const osc = new OscillatorNode(ctx, {  
  frequency: 440,  
  
});
```

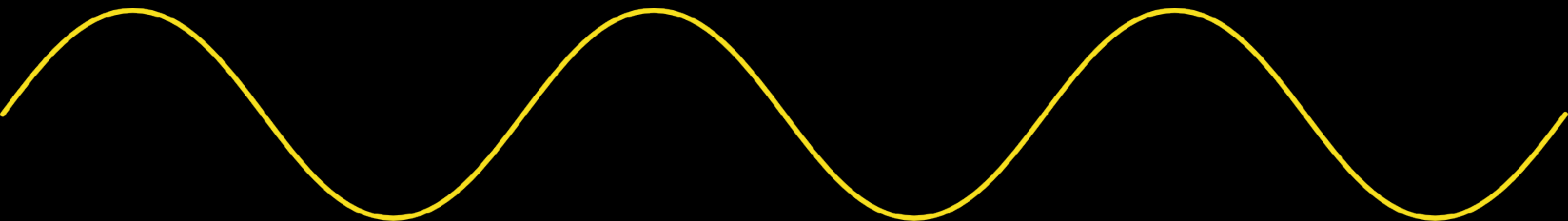


# WAVEFORM

**The OscillatorNode can generate different types of waveforms.  
Each waveform has a distinct timbre and harmonic content.**



# SINE

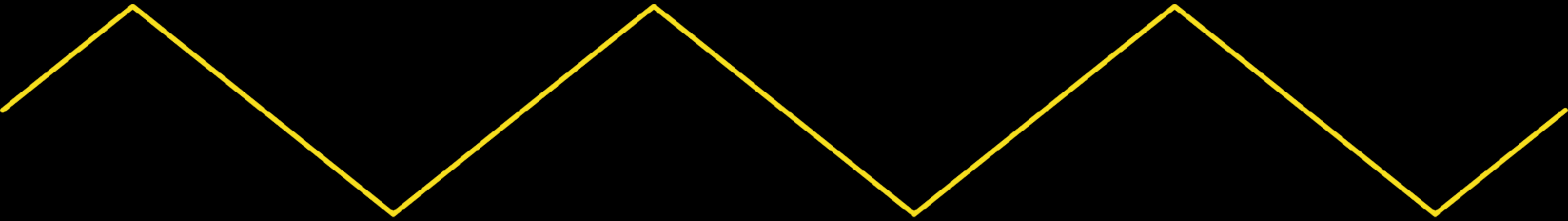








# TRIANGLE









# SQUARE

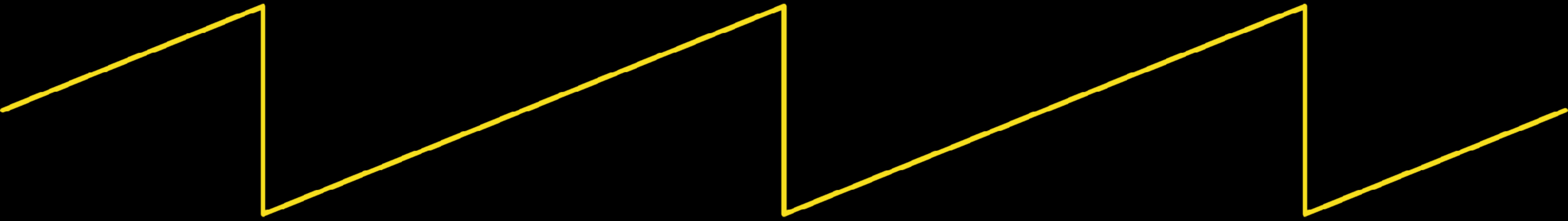








# SAWTOOTH









```
const ctx = new AudioContext();  
const osc = new OscillatorNode(ctx, {  
  frequency: 440,  
  type: "sine",  
});
```



```
const ctx = new AudioContext();
const osc = new OscillatorNode(ctx, {
  frequency: 440,
  type: "sine",
});

osc.connect(ctx.destination);
osc.start(ctx.currentTime);
osc.stop(ctx.currentTime + 2);
```



















# WAV (WAVEFORM AUDIO FILE FORMAT)

**A WAV file is used for storing uncompressed audio data, resulting in high-quality audio reproduction. It was developed by Microsoft and IBM in 1991.**







```
<button class="pad" data-note="40" data-wav="909-kick"></button>  
<button class="pad" data-note="41" data-wav="909-clap"></button>  
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>  
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```



```
<button class="pad" data-note="16" data-wav="909-kick"></button>  
<button class="pad" data-note="41" data-wav="909-clap"></button>  
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>  
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```

```
const pads = document.querySelectorAll(".pad");
```

```
<button class="pad" data-note="16" data-wav="909-kick"></button>  
<button class="pad" data-note="41" data-wav="909-clap"></button>  
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>  
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```

```
const pads = document.querySelectorAll(".pad");  
pads.forEach((pad) => {  
  
});
```



```
<button class="pad" data-note="16" data-wav="909-kick"></button>
<button class="pad" data-note="41" data-wav="909-clap"></button>
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```

```
const pads = document.querySelectorAll(".pad");
pads.forEach((pad) => {
  pad.addEventListener("click", () => {

  });
});
```

```
<button class="pad" data-note="16" data-wav="909-kick"></button>
<button class="pad" data-note="41" data-wav="909-clap"></button>
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```

```
const pads = document.querySelectorAll(".pad");
pads.forEach((pad) => {
  pad.addEventListener("click", async () => {
    const sample = await loadFile(`${pad.dataset.wav}.wav`);

  });
});
```



```
<button class="pad" data-note="16" data-wav="909-kick"></button>
<button class="pad" data-note="41" data-wav="909-clap"></button>
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```

```
const pads = document.querySelectorAll(".pad");
pads.forEach((pad) => {
  pad.addEventListener("click", async () => {
    const sample = await loadFile(`${pad.dataset.wav}.wav`);
    playWav(sample);
  });
});
```

```
const loadFile = (wav) => {
```

```
};
```

```
const playWav = (audioBuffer) => {
```

```
};
```



```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  
};
```

```
const playWav = (audioBuffer) => {  
  
};
```

```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  
};
```

```
const playWav = (audioBuffer) => {  
  
};
```



```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  const audioBuffer = await ctx.decodeAudioData(arrayBuffer);  
  
};
```

```
const playWav = (audioBuffer) => {  
  
  
};
```

```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  const audioBuffer = await ctx.decodeAudioData(arrayBuffer);  
  return audioBuffer;  
};
```

```
const playWav = (audioBuffer) => {
```

```
};
```





```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  const audioBuffer = await ctx.decodeAudioData(arrayBuffer);  
  return audioBuffer;  
};
```

```
const playWav = (audioBuffer) => {  
  const wav = new AudioBufferSourceNode(ctx, { buffer: audioBuffer });  
  
};
```



```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  const audioBuffer = await ctx.decodeAudioData(arrayBuffer);  
  return audioBuffer;  
};
```

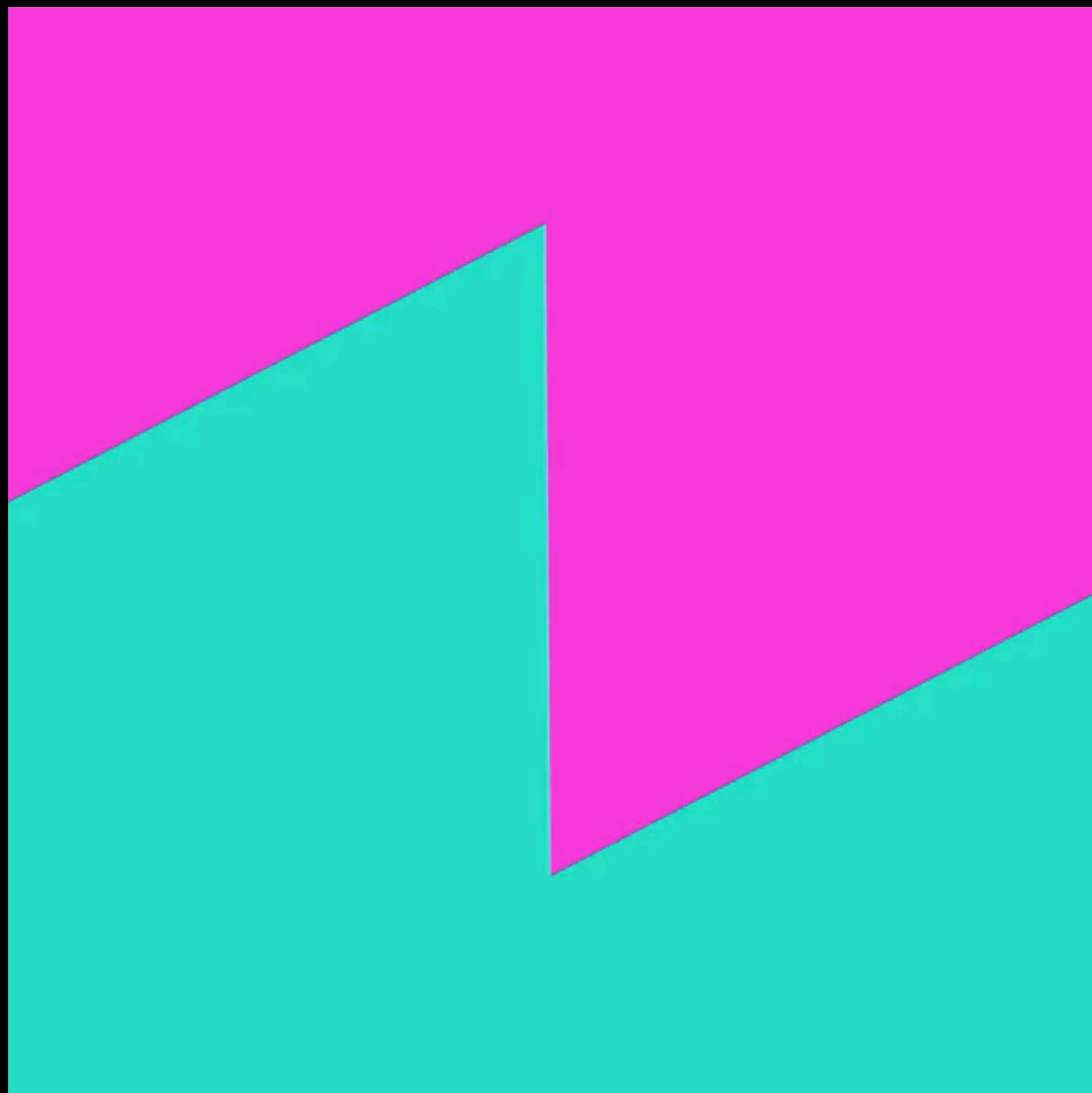
```
const playWav = (audioBuffer) => {  
  const wav = new AudioBufferSourceNode(ctx, { buffer: audioBuffer });  
  wav.connect(ctx.destination);  
  
};
```

```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  const audioBuffer = await ctx.decodeAudioData(arrayBuffer);  
  return audioBuffer;  
};
```

```
const playWav = (audioBuffer) => {  
  const wav = new AudioBufferSourceNode(ctx, { buffer: audioBuffer });  
  wav.connect(ctx.destination);  
  wav.start();  
};
```









# TONE.JS

**Tone.js is an open-source JavaScript library that provides a framework for creating interactive and dynamic music and sound in web applications.**

```
const kick = new Tone.Player('909-kick.wav').toDestination();
```



```
const kick = new Tone.Player('909-kick.wav').toDestination();  
kick.start();
```

```
<button class="pad" data-note="40" data-wav="909-kick"></button>
<button class="pad" data-note="41" data-wav="909-clap"></button>
<button class="pad" data-note="42" data-wav="909-closed-hat"></button>
<button class="pad" data-note="43" data-wav="909-open-hat"></button>
```

```
const pads = document.querySelectorAll(".pad");
pads.forEach((pad) => {
  pad.addEventListener("click", async () => {
    const sample = await loadFile(`${pad.dataset.wav}.wav`);
    playWav(sample);
  });
});
```



```
const loadFile = async (wav) => {  
  const response = await fetch(wav);  
  const arrayBuffer = await response.arrayBuffer();  
  const audioBuffer = await ctx.decodeAudioData(arrayBuffer);  
  return audioBuffer;  
};
```

```
const playWav = (audioBuffer) => {  
  const wav = new AudioBufferSourceNode(ctx, { buffer: audioBuffer });  
  wav.connect(ctx.destination);  
  wav.start();  
};
```

```
<button class="pad" data-note="40"></button>  
<button class="pad" data-note="41"></button>  
<button class="pad" data-note="42"></button>  
<button class="pad" data-note="43"></button>
```



```
<button class="pad" data-note="40"></button>  
<button class="pad" data-note="41"></button>  
<button class="pad" data-note="42"></button>  
<button class="pad" data-note="43"></button>
```

```
const kick = new Tone.Player('909-kick.wav').toDestination();  
const clap = new Tone.Player('909-clap.wav').toDestination();  
const closed = new Tone.Player('909-closed-hat.wav').toDestination();  
const open = new Tone.Player('909-open-hat.wav').toDestination();
```

```
<button class="pad" data-note="40"></button>
<button class="pad" data-note="41"></button>
<button class="pad" data-note="42"></button>
<button class="pad" data-note="43"></button>
```

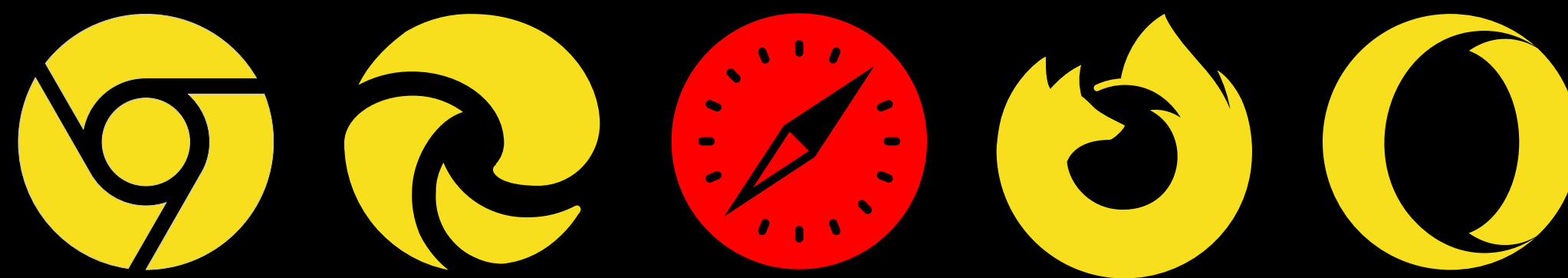
```
const kick = new Tone.Player('909-kick.wav').toDestination();
const clap = new Tone.Player('909-clap.wav').toDestination();
const closed = new Tone.Player('909-closed-hat.wav').toDestination();
const open = new Tone.Player('909-open-hat.wav').toDestination();
```

```
const pads = document.querySelectorAll(".pad");
pads.forEach((pad) => {
  pad.addEventListener("click", async () => {
    switch (pad.dataset.note) {
      case "40": kick.start(); break;
      case "41": clap.start(); break;
      case "42": closed.start(); break;
      case "43": open.start(); break;
    }
  });
});
```



# WEB MIDI API

The Web MIDI API is a JavaScript API that allows web applications to communicate and interact with MIDI (Musical Instrument Digital Interface) devices connected to a user's computer or device.







```
if (navigator.requestMIDIAccess) {  
  navigator.requestMIDIAccess().then(sucess, failure);  
}
```

```
if (navigator.requestMIDIAccess) {  
  navigator.requestMIDIAccess().then(succes, failure);  
}
```

```
const succes = (midiAccess) => {
```

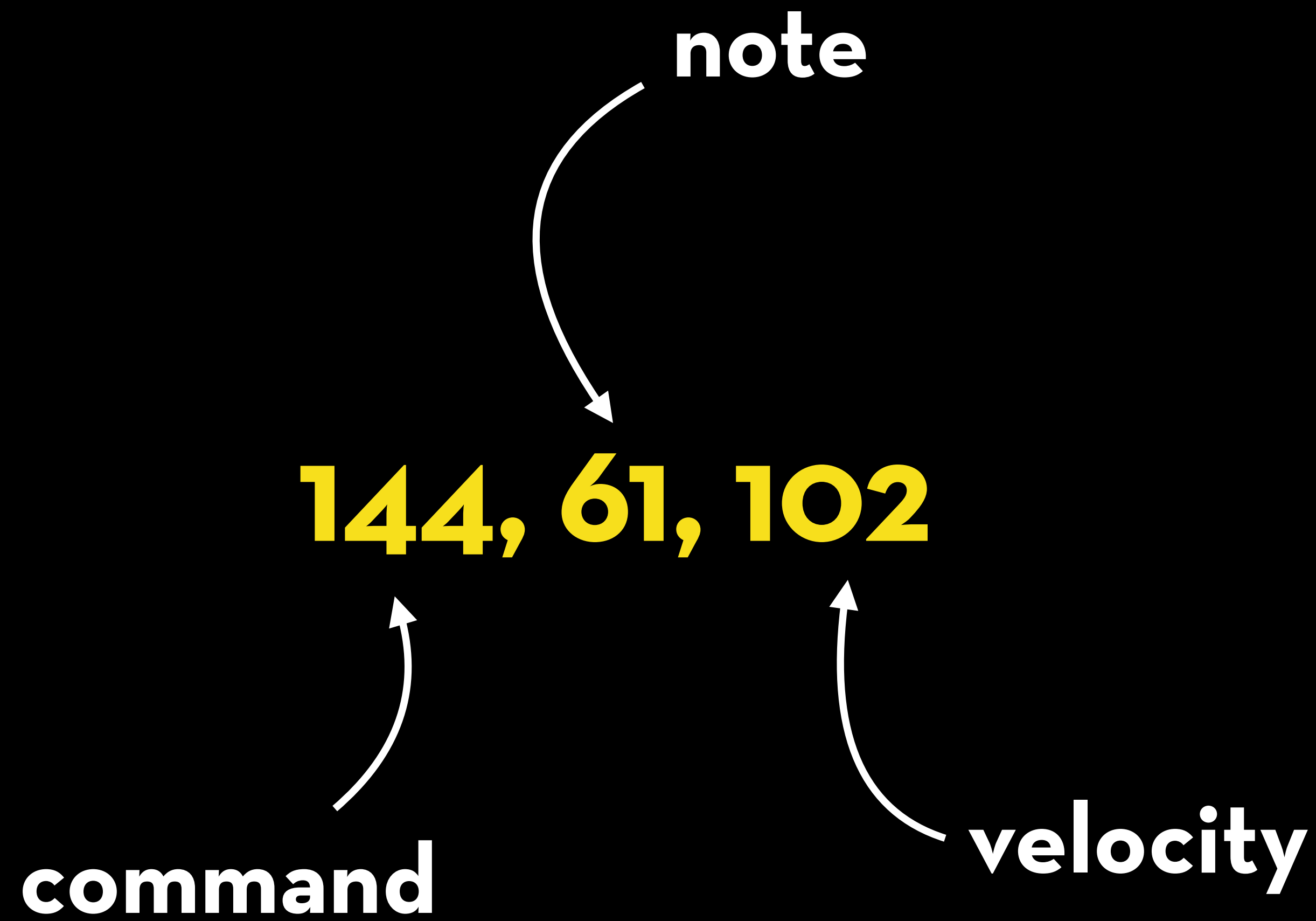
```
}
```



```
if (navigator.requestMIDIAccess) {  
  navigator.requestMIDIAccess().then(succes, failure);  
}  
  
const succes = (midiAccess) => {  
  const inputs = midiAccess.inputs;  
  
  
}
```

```
if (navigator.requestMIDIAccess) {  
  navigator.requestMIDIAccess().then(succes, failure);  
}  
  
const succes = (midiAccess) => {  
  const inputs = midiAccess.inputs;  
  
  inputs.forEach((input) => {  
    input.addEventListener("midimessage", handleInput);  
  });  
}
```











```
<button class="pad" data-note="40"></button>  
<button class="pad" data-note="41"></button>  
<button class="pad" data-note="42"></button>  
<button class="pad" data-note="43"></button>
```



```
<button class="pad" data-note="40"></button>  
<button class="pad" data-note="41"></button>  
<button class="pad" data-note="42"></button>  
<button class="pad" data-note="43"></button>
```

```
const handleInput = (input) => {
```

```
};
```

```
<button class="pad" data-note="40"></button>  
<button class="pad" data-note="41"></button>  
<button class="pad" data-note="42"></button>  
<button class="pad" data-note="43"></button>
```

```
const handleInput = (input) => {
```

```
  const note = input.data[1];  
  const velocity = input.data[2];
```

```
};
```



```
<button class="pad" data-note="40"></button>
<button class="pad" data-note="41"></button>
<button class="pad" data-note="42"></button>
<button class="pad" data-note="43"></button>
```

```
const handleInput = (input) => {
  const note = input.data[1];
  const velocity = input.data[2];

  if(velocity > 0) {
    const pad = document.querySelector(` [data-note="${note}"] `);
    pad.click();
  }
};
```









# SEQUENCER

**A sequencer is a device or software application used in music production to create, edit, and arrange musical sequences or patterns. It is a fundamental tool in electronic music production.**





FIRE

- CHANNEL
- MIXER
- USER 1
- USER 2

MUTE SOLO

STEP ACCENT

NOTE SNAP

DRUM TAP

PERFORM OVERVIEW

SHIFT

ALT

AKAI PROFESSIONAL

FL STUDIO

PATTERN

BROWSER

SELECT

PATTERN/SONG METRONOME

WAIT

COUNTDOWN

LOOP REC

RESONANCE

FILTER

VOLUME

P

GRID



# SEQUENCER

pan low pan high pitch bpm

120 bpm

Init

hbpm

Midi

5 empty square buttons

1 empty square button

1 empty square button

4 rows of 15 buttons each, with a yellow highlight on the top row.



```
<div class="kick">
  <label><input type="checkbox" data-mute="kick" /> </label>
  <label><input type="checkbox" data-note="54" /> </label>
  <label><input type="checkbox" data-note="55" /> </label>
  <label><input type="checkbox" data-note="56" /> </label>
  <label><input type="checkbox" data-note="57" /> </label>
  <label><input type="checkbox" data-note="58" /> </label>
  <label><input type="checkbox" data-note="59" /> </label>
  <label><input type="checkbox" data-note="60" /> </label>
  <label><input type="checkbox" data-note="61" /> </label>
  <label><input type="checkbox" data-note="62" /> </label>
  <label><input type="checkbox" data-note="63" /> </label>
  <label><input type="checkbox" data-note="64" /> </label>
  <label><input type="checkbox" data-note="65" /> </label>
  <label><input type="checkbox" data-note="66" /> </label>
  <label><input type="checkbox" data-note="67" /> </label>
  <label><input type="checkbox" data-note="68" /> </label>
  <label><input type="checkbox" data-note="69" /> </label>
</div>
```

```
const handleInput = (input) => {  
  const note = input[1];  
  const velocity = input[2];  
  
  if (velocity > 0) {  
    if (note ≥ 54 && note ≤ 117) {  
      document.querySelector(` [data-note="${note}"] `).click();  
    }  
  }  
}
```



```
const initSequencer = () => {  
  Tone.Transport.scheduleRepeat((time) => {  
    repeat(time);  
  }, 16);  
}
```

```
let index = 0;
const steps = 16;

const repeat = (time) => {

  // simplified, only showing kicks

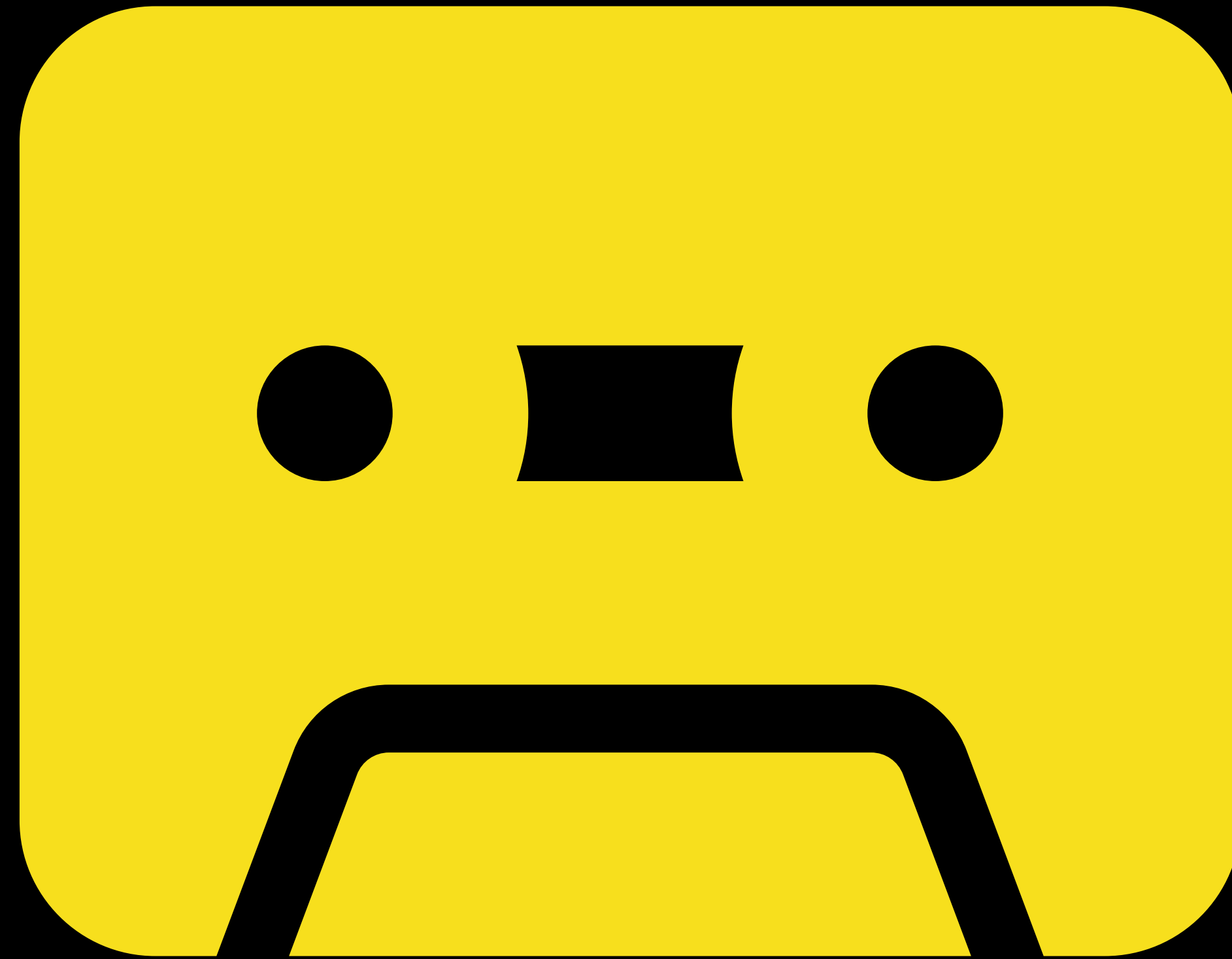
  let step = index % 16;

  const muteKicks = document.querySelector('.kick [data-mute]');
  const kicks =
    document.querySelector(`.kick label:nth-child(${step + 2}) input`);

  if (!muteKicks.checked && kicks.checked) {
    kick.start(time);
  }

  index++;
}
```





```
const recorder = new Tone.Recorder();
```



```
const recorder = new Tone.Recorder();
```

```
const record = async () => {  
  await recorder.start();  
}
```

```
const recorder = new Tone.Recorder();
```

```
const record = async () => {  
  await recorder.start();  
}
```

```
const stop = async () => {  
  const recording = await recorder.stop();
```

```
}
```



```
const recorder = new Tone.Recorder();

const record = async () => {
  await recorder.start();
}

const stop = async () => {
  const recording = await recorder.stop();

  const url = URL.createObjectURL(recording);
  const audio = document.createElement('audio');
  audio.controls = true;
  audio.src = url;

}
```

```
const recorder = new Tone.Recorder();

const record = async () => {
  await recorder.start();
}

const stop = async () => {
  const recording = await recorder.stop();

  const url = URL.createObjectURL(recording);
  const audio = document.createElement('audio');
  audio.controls = true;
  audio.src = url;

  document.querySelector('#recordings').append(audio);
}
```







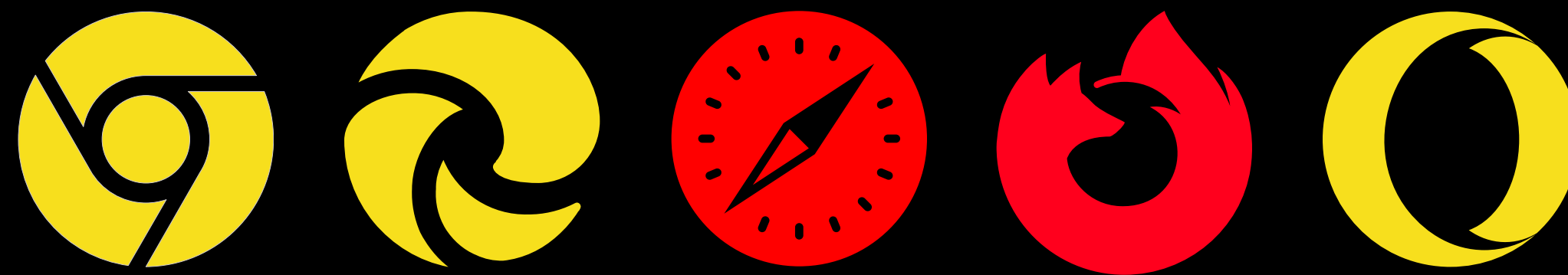






# WEB BLUETOOTH API

**The Web Bluetooth API allows web applications to interact with Bluetooth devices. It provides a way for websites to discover nearby devices, establish connections with them, and exchange data.**





```
const device = await navigator.bluetooth.requestDevice({
  filters: [
    { namePrefix: 'Bluetooth-Device' } // which device?
  ],
  optionalServices: [0xffe5] // what service(s)? → uuid
});
```

```
const device = await navigator.bluetooth.requestDevice({
  filters: [
    { namePrefix: 'Bluetooth-Device' } // which device?
  ],
  optionalServices: [0xffe5] // what service(s)? → uuid
});

// 'array of objects'
const server = await device.gatt.connect();
```

```
const device = await navigator.bluetooth.requestDevice({
  filters: [
    { namePrefix: 'Bluetooth-Device' } // which device?
  ],
  optionalServices: [0xffe5] // what service(s)? → uuid
});

// 'array of objects'
const server = await device.gatt.connect();

// 'object'
const service = await server.getPrimaryService(0xffe5);
```



```
const device = await navigator.bluetooth.requestDevice({
  filters: [
    { namePrefix: 'Bluetooth-Device' } // which device?
  ],
  optionalServices: [0xffe5] // what service(s)? → uuid
});

// 'array of objects'
const server = await device.gatt.connect();

// 'object'
const service = await server.getPrimaryService(0xffe5);

// 'property'
const characteristic = await service.getCharacteristic(0xffe9);
```

```
const device = await navigator.bluetooth.requestDevice({
  filters: [
    { namePrefix: 'Bluetooth-Device' } // which device?
  ],
  optionalServices: [0xffe5] // what service(s)? → uuid
});

// 'array of objects'
const server = await device.gatt.connect();

// 'object'
const service = await server.getPrimaryService(0xffe5);

// 'property'
const characteristic = await service.getCharacteristic(0xffe9);

await characteristic.startNotifications();
```





```
characteristic.addEventListener("characteristicvaluechanged", (event) => {  
  
});
```

```
characteristic.addEventListener("characteristicvaluechanged", (event) => {  
    const hbpm = event.target.value.getUint8(1);  
  
});
```

```
characteristic.addEventListener("characteristicvaluechanged", (event) => {  
    const hbpm = event.target.value.getUint8(1);  
    Tone.Transport.bpm.value = hbpm;  
});
```











# CHEERS MATES !

[rowdy.codes/ndc](https://rowdy.codes/ndc)

