# Project Proposal:

# Using Google Sheets as a DAW / Piano Roll

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**Programming Platform:** Web Audio

**Product goal:**
By using a DAW built into Google Sheets Add-ons, this provides accessibility to users who don't have access to a dedicated DAW application. Google Sheets has the advantages of
1) being browser-based, so no additional applications are needed to be installed;
2) being cloud-saved and auto-saved, making it convenient by giving peace of mind of no lost data, as well as being accessible on different platforms; and
3) allowing for multiple concurrent editors and live collaborative editing.

All these reasons make Google Sheets accessible and convenient, and so turning it into a DAW is a novel idea that is available to a much wider audience, for the tradeoff of being limited in functionality and features. It serves as an introduction to digital musical sequencing using a piano-roll-esque UI.

**Anticipated result:**
We will be using Google's Add-ons feature and App Scripts to create an Add-on that can read from a Google Sheets file. From the data presented in the file, a sequence of notes and pitches will be played from the Add-on. As such, a user can mark cells in the sheet and expect to hear a musical sequence based on it.

The spreadsheet UI already features data-cells arranged in rows and columns. If we read the rows as musical pitches — lower numbered rows as higher pitches, and higher numbered rows as lower pitches, to make sense vertically and intuitively — and the columns as musical time — left-to-right, with each column as a specified note/beat duration — then the spreadsheet can act as a quantized piano roll. The Add-on will then read and play the notes sequentially left-to-right, column-by-column.

**User interaction:**
The user will be able to input an integer ranging from 0-127 in a data-cell, representing note velocity. A velocity of 0 is equivalent to the data-cell being empty; an empty/zero cell will not play a note. A non-zero velocity will play the note at that velocity, and any velocity greater than 127 will play at velocity 127. A cell with a non-zero velocity will be "marked" by a color with ranging shades relative to the velocity.

The Add-on will feature a sidebar with a text input field for BPM (where one beat is one column), pitch shift up/down buttons, and a play/stop button. These inputs will behave as expected: the BPM will control the speed of playback (that is, the note durations for each column), pitch shifting will control the pitches of all the rows, and the play/stop will control the playback of the musical sequence.

**Timeline:**

Week 7: Create an Add-On that can read from a Google Sheets file. Create the sidebar with inputs: BPM, pitch shift, and a play/stop button.

Week 8: Implement being able to mark cells in a row with velocity integers, and being able to play the sequence in that row only.

Week 9: Implement being able to play multiple notes (ie. multiple rows, same column) and creating chords/harmony.

Week 10: Dress up the UI by color/shade-coding the cells relative to the velocity.
Deliver a project presentation on Tuesday March 12 at 2:00 pm.

Finals Week: Deliver the finished product, with documentation, by Thursday March 21 at 3:30 pm.

Stretch goals:
- Having a range of instruments to choose from.
- Being able to read multiple sheets on the same file, to play multiple instrument parts at the same time.

**Essential knowledge:**
- Creating an Add-on using Google Apps Script
- Playing sound with Google Script

**Existing prior work:**
- https://youtu.be/To2JIXGoYzA
- https://youtu.be/RFdCM2kHL64

In these videos the creator turned Excel into first a Drum Machine, and then extended that project into a DAW.