

BYTES AND BEATS

An Introduction to Programming with MATLAB

Instructor Guide

Module 16: Music Mixer App and Performance

Prerequisite Domain Knowledge: Importing and editing sound files, Vector manipulation

Expected Completion Time: 50 minutes

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Play with the Music Mixer App

Expected Duration: 20 minutes

Learning Objectives

- Students will use the Music Mixer app to create music
- They can experiment with different notes, percussion instruments, and rhythms

Motivation

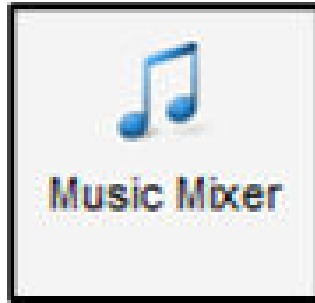
Students will be able to play with an app provided, the Music Mixer, to gain a better understanding of the concept of combining sounds by adding and concatenating.

Materials

- MATLAB®
- Handout “Using the Music Mixer App”

Steps

- On the **APPS** tab, click on the “Music Mixer” icon.



- This will open the app shown below. Ask the students to refer to the handout “Using the Music Mixer App” which contains instruction sheet for the all the buttons in the app.

TLAB App

Music Mixer

Tempo: 88 BPM
▼

Play
Lead Instrument
banjo ▼

Play
First Percussion
Chinese cym... ▼

Play
Second Percussion
Chinese cym... ▼

Play
Third Percussion
Chinese cym... ▼

Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
C3 ▼	D3 ▼	E3 ▼	F3 ▼	G3 ▼	A3 ▼	B3 ▼	C4 ▼
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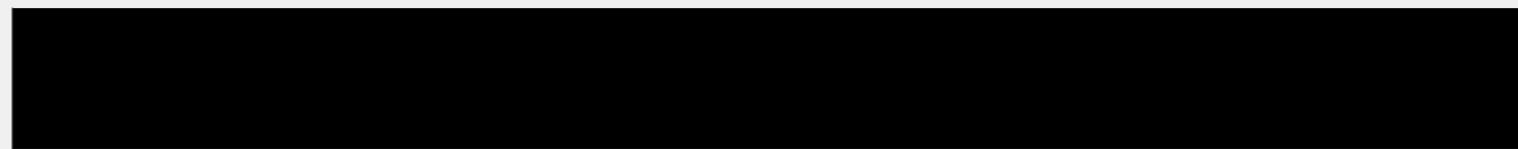
Loops 1 ▲ ▼

Play All Instruments

Save Song to File

- Ask the students to follow along with you at this stage. Use the dropdowns to select "clarinet" and play the following notes using the green play button next to "**Lead Instrument**":
- **NOTE:** If you see the notes automatically changing when you select a new instrument, this is because there is adjustment needed to ensure the notes to be played are part of the instrument's range.

Music Mixer



Tempo: 88 BPM

Play

Lead Instrument clarinet ▼

Play

First Percussion cowbell ▼

Play

Second Percussion bass drum ▼

Play

Third Percussion sizzle cymbal ▼

Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
B4 ▼	A4 ▼	G4 ▼	% ▼	B4 ▼	A4 ▼	G4 ▼	% ▼
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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Loops 1

Play All Instruments

Save Song to File

- Notes can be edited by clicking the musical note in the top row of the table, which populates a dropdown menu of note options. "%" refers to a rest.

Music Mixer



Tempo: 88 BPM

Play

Lead Instrument guitar

Play

First Percussion agogo bells

Play

Second Percussion bass drum

Play

Third Percussion sizzle cymbal

Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
B4	A4	G4	%	B4	A4	G4	%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	C3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	D3
							E3
							F3
							G3
							A3
							B3
							C4
							D4
							E4

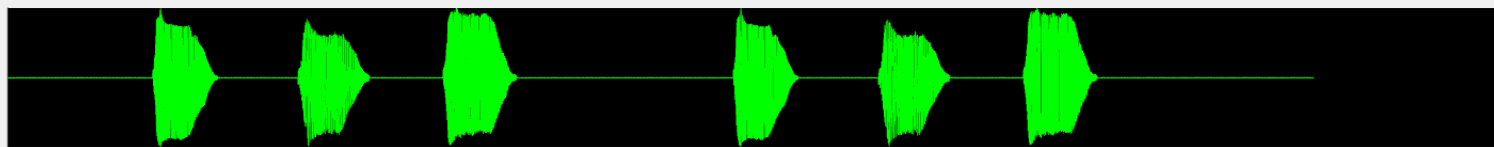
Loops 1

Play All Instruments

Save Song to File

- The notes should play using the **clarinet** notes from the **audio_files** music library and a plot of the notes should appear. This is **concatenating** the four notes.

Music Mixer



Tempo: 88 BPM

Play

Lead Instrument clarinet

Play

First Percussion cowbell

Play

Second Percussion bass drum

Play

Third Percussion sizzle cymbal

Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
B4	A4	G4	%	B4	A4	G4	%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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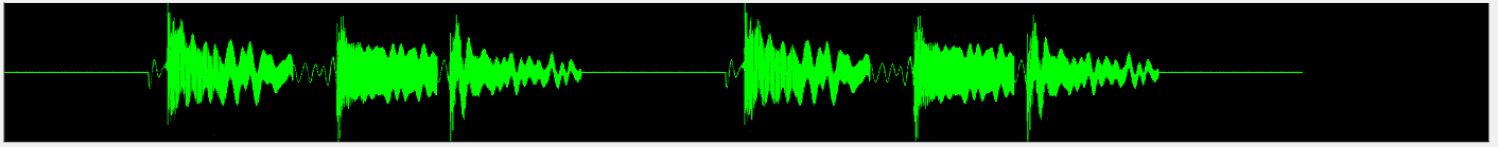
Loops 1

Play All Instruments

Save Song to File

- Ask the students to Select **guitar** from the “Select Instrument” dropdown and press the green play button again.

Music Mixer



Tempo: 88 BPM

Play

Lead Instrument

Play

First Percussion

Play

Second Percussion

Play

Third Percussion

Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
B4 ▾	A4 ▾	G4 ▾	% ▾	B4 ▾	A4 ▾	G4 ▾	% ▾
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

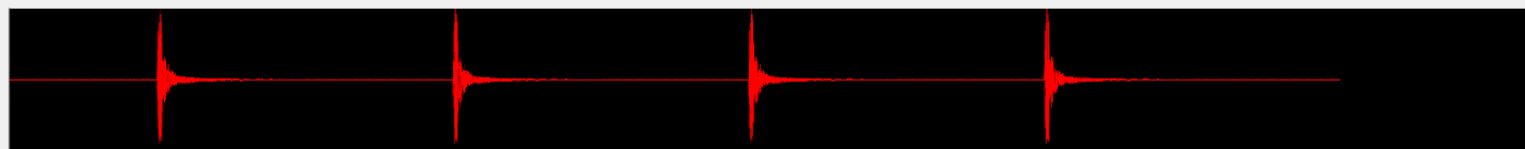
Loops

Play All Instruments

Save Song to File

- It should now play the same tune using guitar notes from the **audio_files** music library and update the plot.
- Now ask the students to select the '**agogo_bells**' percussion from the **First Percussion** dropdown, and use the checkboxes in the second row of the table to edit which beats the bells play on. They can then press the red play button next to "**First Percussion**"

Music Mixer



Tempo: 88 BPM

Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
B4 ▾	A4 ▾	G4 ▾	% ▾	B4 ▾	A4 ▾	G4 ▾	% ▾
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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Play

Lead Instrument guitar ▾

Play

First Percussion agogo bells ▾

Play

Second Percussion bass drum ▾

Play

Third Percussion sizzle cymbal ▾

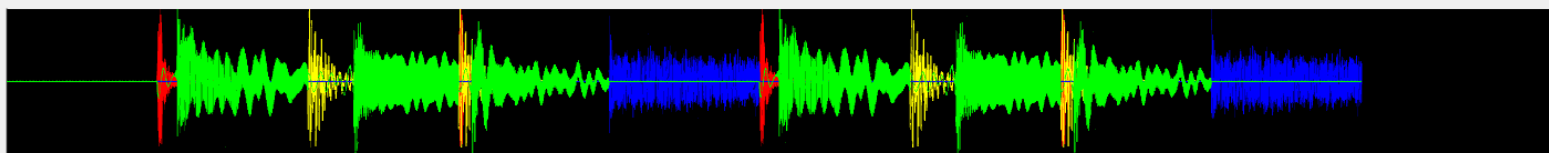
Loops 1 ▴ ▾

Play All Instruments

Save Song to File

- Since percussion instruments do not have different notes like the guitar or clarinet— just one beat – students are able to add percussion using the check boxes on each beat, instead of a dropdown of notes.
- Now that we have concatenated and played the instrument and percussion beats individually, it's time to **add** the instrument and percussion beats. Click on the "Play all Instruments" button to play them together and note the plot. The different colors correspond to different instruments being added one on top of the other.

Music Mixer



Tempo: 88 BPM

Play Lead Instrument guitar

Play First Percussion agogo bells

Play Second Percussion bass drum

Play Third Percussion sizzle cymbal

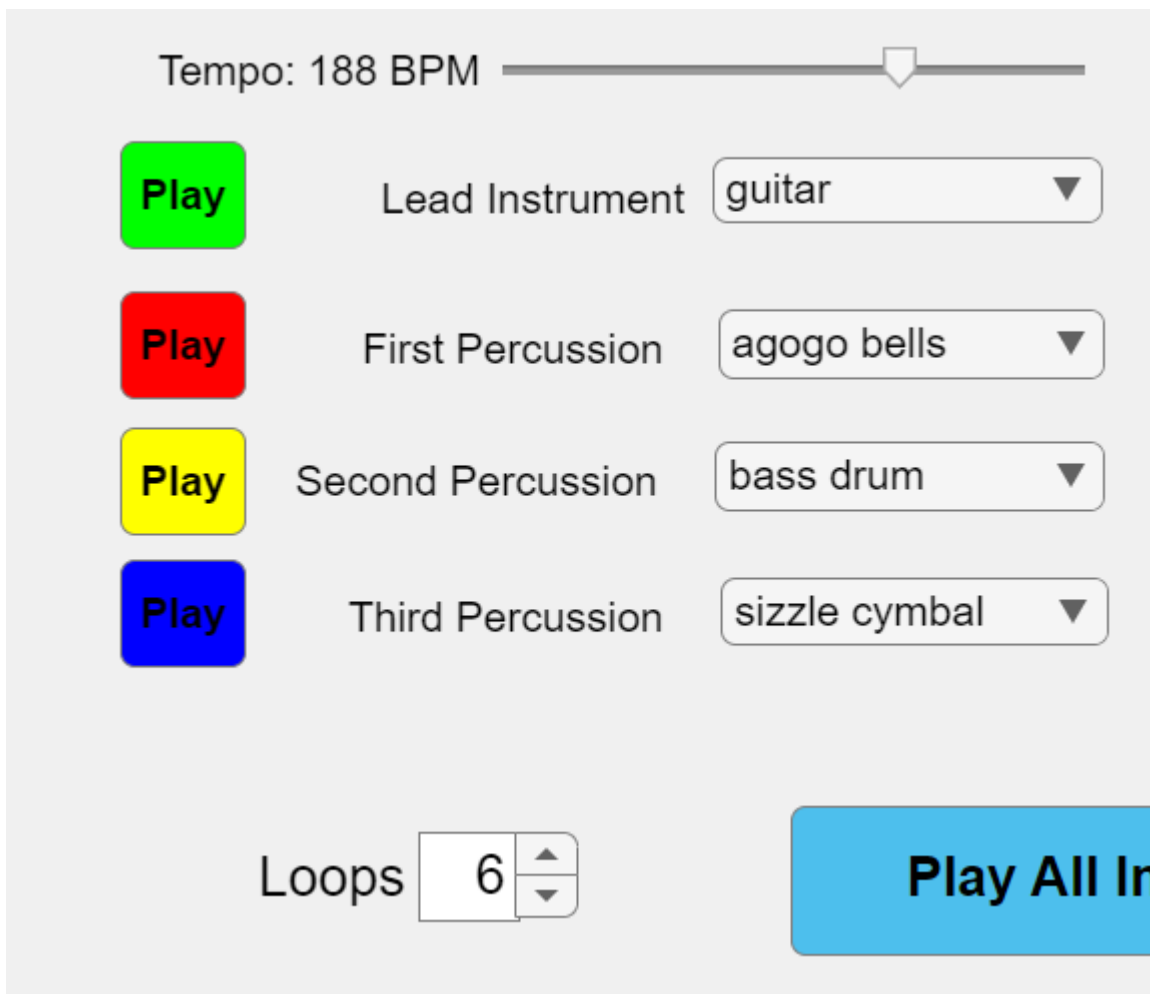
Beat 1	Beat 2	Beat 3	Beat 4	Beat 5	Beat 6	Beat 7	Beat 8
B4	A4	G4	%	B4	A4	G4	%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Loops 1

Play All Instruments

Save Song to File

- You can also adjust the playback speed using the tempo slider, as well as loop/repeat the song by using the "Loops" interactive spinner.



- Give the students a few minutes to gain familiarity with the app, and play around with different notes and beats!
- When they are satisfied with their creation, they can click "Save Song to File" and save it to their MATLAB Drive as "mySong.wav"

Perform as a Band

Expected Duration: 30 minutes

Learning Objectives

- Work in a team to create music

Motivation

This is a group activity for students to come together to create their own composition and play like a band.

Materials

- MATLAB
- Worksheet "Creating a Melody"

Steps

- Ask students to form groups of three or four students. They will use the Music Mixer app to form a musical band.
- Each student will be responsible for one musical instrument. Students can use the worksheet "Creating a Melody of Your Own" to fill in notes they want to play.
- One student will enter the music notes for the instrument.
- Other students (2 – 3) will produce a sequence of beats for a percussion of their choice (example: cabasa, bass drum, cymbals, etc.). So, everyone in the group is responsible for playing one instrument each
- They should fill out the worksheet "Creating a Melody" with their melody
- Once everyone in the group is ready, they will hit '**Play**' in each of their apps to play all the sounds together as a band!

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