

CSEE 4840 Embedded Systems Project Proposal (Spring 2022)

Audio Sampler

Driven by our interest in all things that go beep-boop, we plan to implement a musical sampler that allows us to sample live audio and produce musically interesting sounds. A sampler is a device that captures chunks of audio, or uses stored audio, to allow the user to manipulate these 'samples' and play them back in real-time.

Our hardware implementation will consist of the DE1-SOC board for the computation, storage, and physical interface using either a real MIDI keyboard or a USB keyboard. On a button press, a sample will be captured using an external microphone and the on-board ADC. This sampled audio will be saved in memory. When a key press event on the keyboard is captured, the sample will be played back after applying various transformations or modulations to it. These transformations could include pitch shifting, reverse playback and amplitude modulation.

We hope that our algorithm will be able to generate sounds that are pleasing to the human ear, thus allowing the user to produce music.

Key milestones:

1. Audio Sampling implementation using the ADC
2. Audio Playback implementation using DAC
3. MIDI interface or USB keyboard interface to 'play' the sampler
4. Sampler parameter control (For example pitch shifting, reverse playback, amplitude modulation etc)