

DrumKid product specification

DrumKid aims to be a portable, low-cost drum machine with an emphasis on creating dynamic, unpredictable rhythms.

Overview

Problem

- Live musicians are increasingly using drum machines or laptops to provide their rhythms instead of a real drummer. This opens up interesting sonic possibilities, but can result in a static, lifeless performance. When playing with a drum machine, it is difficult to add variation to a beat in real time, beyond switching between preset patterns. When using a laptop, the entire song is often pre-programmed, acting as little more than a “backing track”, which some would argue runs counter to the spirit and energy of live music.
- Drum machines (and electronic musical instruments more generally) do not usually employ open source design principles, making it difficult to modify them to suit a musician’s exact needs. This can also result in a generic “identikit” sound proliferating when a drum machine gets popular (e.g. the Roland TR-808).

Goals

- Design and build a drum machine where the emphasis is on altering a drum pattern’s underlying parameters, rather than simply switching between preset patterns
- Use random numbers to variation and unpredictability
- Make the design as open and hackable as possible, so that the drum machine can be modified by musicians to suit their needs
- Make the drum machine available to buy, both as a kit and as a fully assembled, ready-to-play instrument

People and roles

- Matt Bradshaw - design, coding, and assembly (this is a relatively small project and should be possible to see through to completion without any other collaborators besides testers)

Context

Use cases

- Live performance
 - A musician plays DrumKid as part of a multi-person band

- A musician uses DrumKid as part of a “one man band” setup
- A musician uses DrumKid as a solo instrument
- Studio/home recording
 - A musician performs a whole track “as live” using DrumKid
 - A musician records snippets of DrumKid’s output to use as loops or sections of a track
 - A musician uses DrumKid as a placeholder to “demo” a track before an actual drummer is used later in the process
- Recreational/casual/practice
 - A user treats DrumKid as a fun toy, enjoying the process of composing beats without ever intending to share their creations
 - A musician composes (and saves) beats for later use while travelling, commuting, etc

Other relevant/similar products

- Teenage Engineering Pocket Operator series - small, battery-powered instruments with a “toy” aesthetic and lo-fi sound (although generating beats in the traditional, pattern-based way)
- Boss DR220A - a sort of anti-inspiration, I owned this 80s drum machine in the 90s, and while it was fun and interesting to play with, it encouraged very static songs because of the way you switched between rigid patterns
- Pibow Raspberry Pi case - not a drum machine, obviously, but a useful inspiration on how to make an attractive enclosure using a laser cutter and therefore not requiring injection moulding

Assumptions

- Final product will (at least initially) be hand-soldered and assembled by me at home
- Aiming to sell 50+ machines to make the project financially viable
- Product will be marketed mainly in the UK but, depending on conformance laws etc, will hopefully also be available in Europe and possibly worldwide

Proposal

Underlying technology

- DrumKid will make use of the Arduino platform, because it is easy to develop for and can be implemented in a final product very cheaply
- DrumKid will use the Mozzi library, at least initially, because it is a mature, popular library for generating audio on the Arduino platform

Design outline

- DrumKid will feature several knobs/potentiometers to allow continuous adjustment of a drum beat's parameters
- DrumKid will feature several buttons to execute and/or switch between different functions
- DrumKid will feature several LEDs to give visual feedback
- DrumKid will be powered by batteries
- DrumKid will have an on/off switch
- DrumKid will have an audio output which can be used either as a headphone output or a line output
- DrumKid's circuit board will be designed to be as "hackable" as possible, by employing clear layout and giving easy access to any potentially useful points in the circuit
- DrumKid will aim to be repairable, by using standard parts, through-hole components, and placing all integrated circuits in sockets to allow them to be replaced

Method of construction/manufacture

- The main front panel of DrumKid will be a printed circuit board (PCB), which contains all the components and doubles as the user interface
- All components for the initial version of DrumKid will be through-hole, to enable easier soldering
- Besides the PCB, DrumKid's enclosure/case will consist of an open-sided design using a combination of laser-cut parts, standoffs, and screws, to allow for easy and cheap construction

Tasks

- Design initial breadboard prototype
- Iterate breadboard prototype until happy with design
- Design initial PCB layout
- Design initial case/enclosure
- Iterate PCB and enclosure designs
- When happy with design, distribute to musicians for testing
- Update design based on feedback from musicians
- Create final version
- Sell DrumKid online