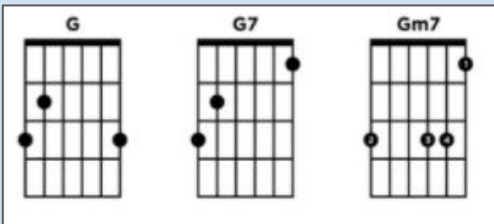


# aChord - Generating Chord Voicings for User-Defined String Instruments

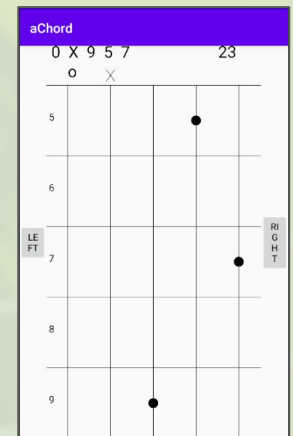
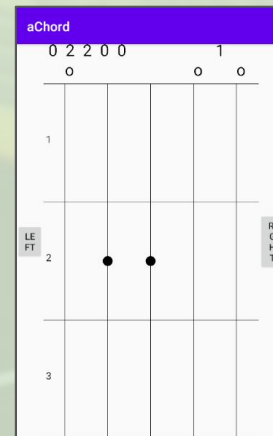
*Ben Bingham, Caleb Braddick, Jackson Reed, James Stratton*  
**Advisor:** Martin Gagne

## Introduction

Fretboard diagrams show string instrument players where they should put their fingers on which strings in order to produce a given chord. These diagrams are usually pulled from a library of diagrams, meaning if a musician wants to learn a new chord without getting into the music theory, they're limited by what's already been made available unless they want to figure it out for themselves. If they play a unique instrument, existing chord diagrams do little to help them.



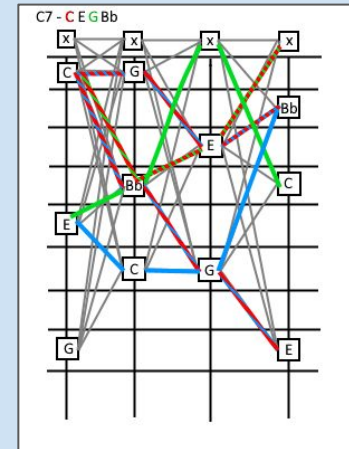
We propose a solution - an app that, given a chord name, generates fretboard diagrams for every possible voicing of that chord on any possible instrument in any tuning.

The 'Cool Demo Inst.' screen of the aChord app. It features a 'TUNE STRINGS' button and a section to 'Enter the tuning of your strings below' with fields for E2, A2, D3, G3, and C4. At the bottom, there is a 'SAVE NEW INSTRUMENT' button and a 'HOME' button.The 'Select an Instrument' screen of the aChord app. It shows 'Maximum Fret: 10' and a checked 'Allow String Omission' option. There are fields for 'cool inst2' and 'inst3', and a 'Cool Demo Inst.' button. A 'NEW INSTRUMENT' button is also present. Below, there are 'Enter a Chord:' fields with 'TYPE CHORD' and 'PICK NOTES' buttons. A 'Cmaj7' chord is entered, and there are checkboxes for 'Root is Bass Note' and 'Allow Dropping fifth'. At the bottom, there is a 'GENERATE VOICINGS FOR COOL DEMO INST.' button and a 'Selected Cool Demo Inst.' label.

## Searching for chord voicings

aChord uses a recursive algorithm to traverse the tree of possible combinations of fret positions that match chord members, keeping only the ones that form the complete chord and satisfy criteria specified by the user.

The user can choose e.g. to enforce a specific lowest/bass note (red), omit the fifth of the chord, or allow the omission of strings (green). Tweaking these options results in a wider or narrower set of voicings to choose from. This diagram shows a few valid voicings of C7 in the tree for the first 7 frets of a viola.



## Dynamic Instrument Comprehension

aChord can work with and remember any string instrument so long as it has 3 to 12 strings and a chromatic fretboard. Pre-loaded into the app are specifications for Guitar, Viola, and Ukulele. User-input instruments are fully supported.

Install App

