Assignment 5

Lo-Fi Prototype

Amy Bearman, Kevin Coelho, Hieu Minh Pham

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1. INTRODUCTION

1 (a) Mission Statement / Value Proposition

allegro

Compose anywhere.

Our mission is to make composing fast, mobile, and intuitive for experienced composers. We want to provide a highly portable mobile app that can serve as a replacement for carrying around music paper for composition and contribute to the compositional process in ways that paper cannot.

1 (b) Problem / Solution Overview

Different composers have different needs. From our previous interviews, we found that some composers require playback of what they are composing while others do not. Some composers have more abstract concepts for pieces they are composing while others stick to more concrete musical ideas as a starting point. All composers we talked about described certain moments in their life when they would be struck by inspiration either by searching for it or naturally coming across it. It is these moments we'd like to capitalize on and create a tool allowing composers to document quickly their ideas while their inspiration is fresh.

To tackle this problem, we brainstormed different design ideas to address various aspects of the composition process and compositional thinking. Our three designs divide based on the types of input and output they generate:

1. **Audio-centric prototype:** Audio recording input to looping, layering, and playback manipulation.
2. **Tactile gestures prototype:** Tactile gestures translating to musical scores and arrangements.
3. **3D physical gestures prototype:** Physical gestures with iPhone accelerometer translating to musical visualization.

2. SKETCHES

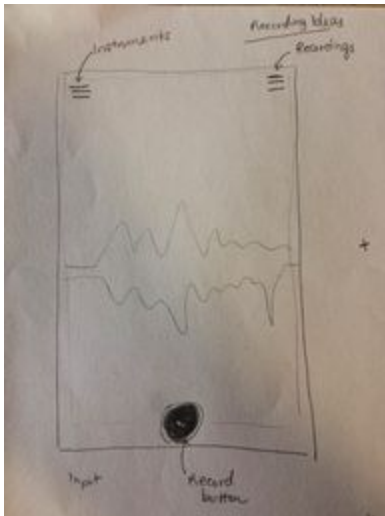## 2 (a) Concept Sketches

Audio-centric Prototype

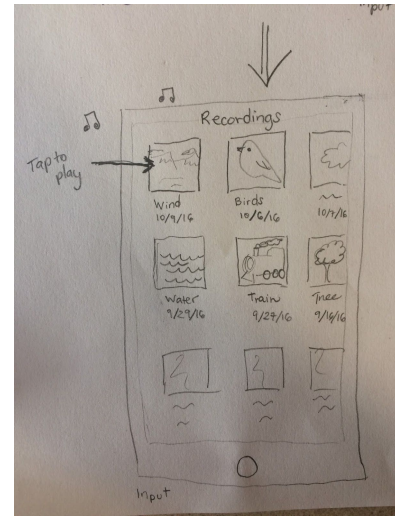**Fig. 2.1**: Record sound

Fig. 2.2: Take picture to associate
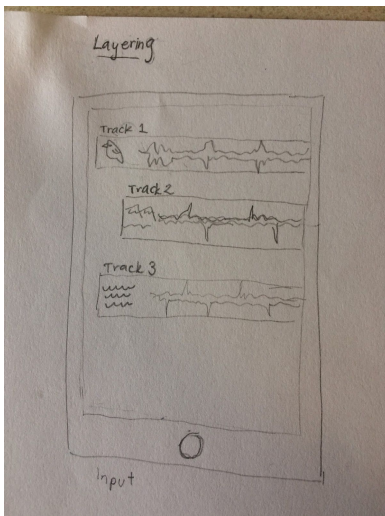

Fig. 2.3: Bank of recordings
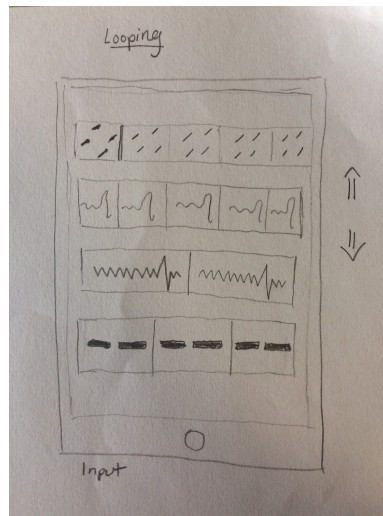

Fig. 2.4: Layer tracks

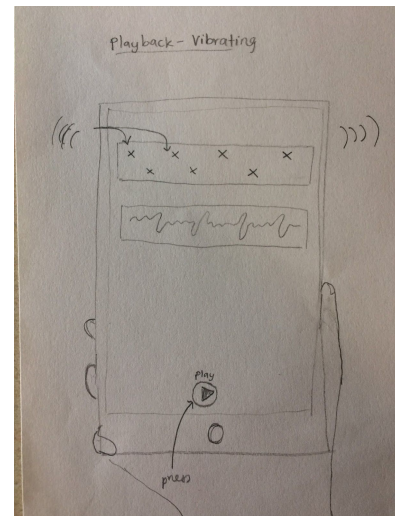
Fig. 2.5: Loop tracks

Fig. 2.6: Playback with vibrations

Tactile gestures prototype
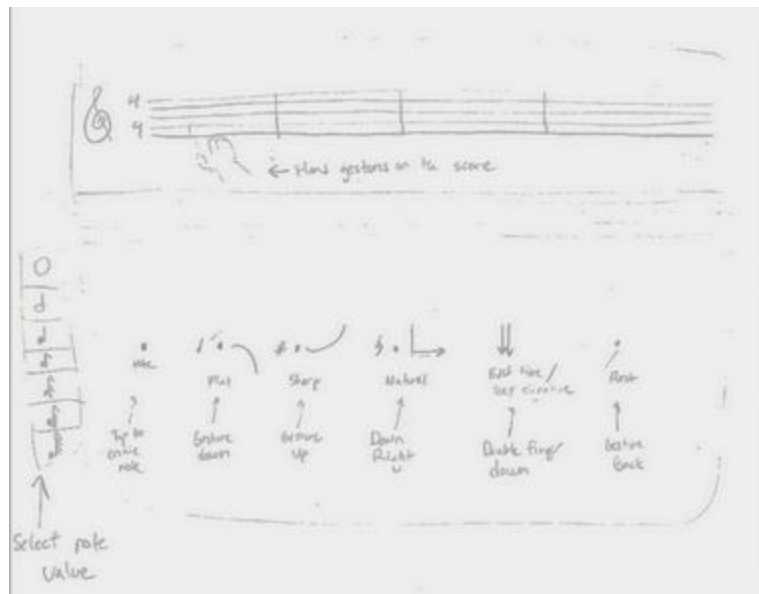

Fig. 2.7: Bank of gestures

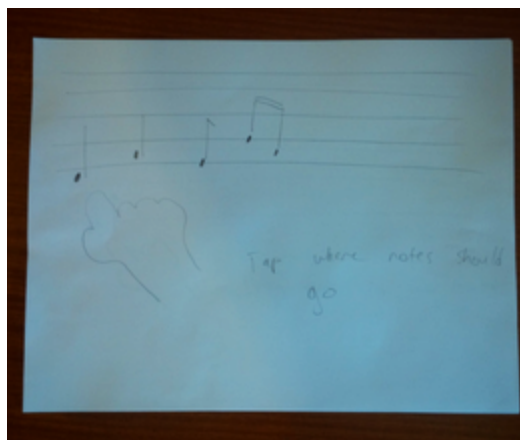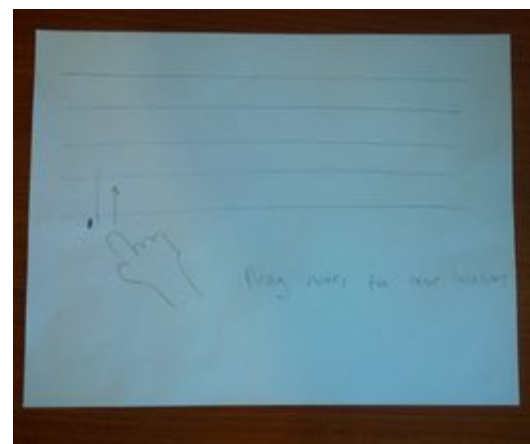**Fig. 2.8**: Gesture to add single notes

Fig. 2.9: Gesture to drag existing note
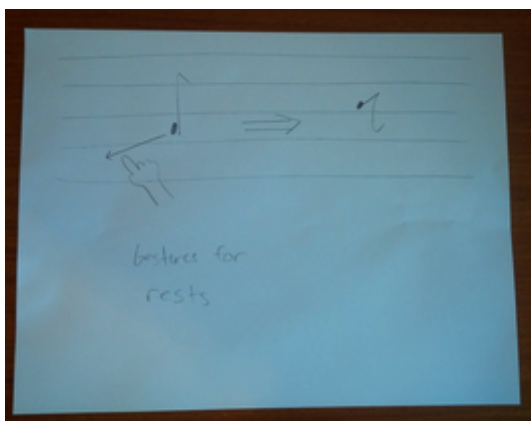
Fig. 2.10: Gesture for rests
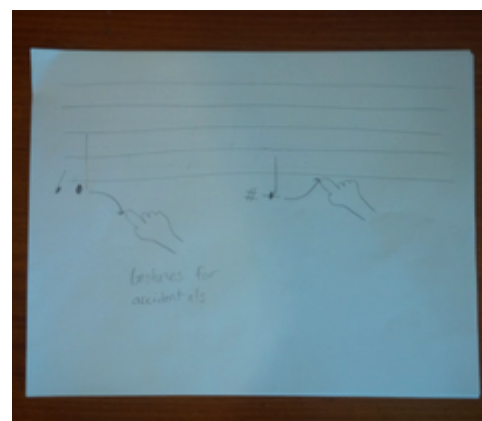
Fig. 2.11: Gestures for accidentals

3D physical gestures prototype

Fig. 2.12: Throw gesture (compose piece)

Fig. 2.13: Throw gesture (press and hold on iPhone)

Fig. 2.14: Throw gesture ("throw" phone toward computer)

Fig. 2.15: Throw gesture (release iPhone)

2 (b) Storyboards

Top Prototype #1: Tactile gestures prototype
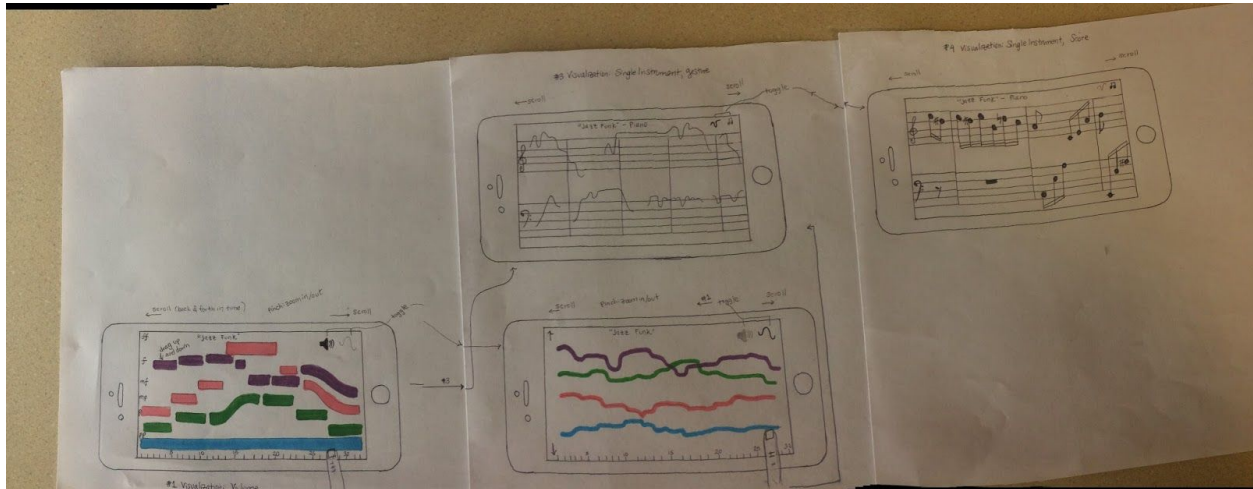
Fig. 2.16: Tactile gestures storyboard for visualizing a composition:
multi-part volume view and pitch view; single-part note view and gesture view.
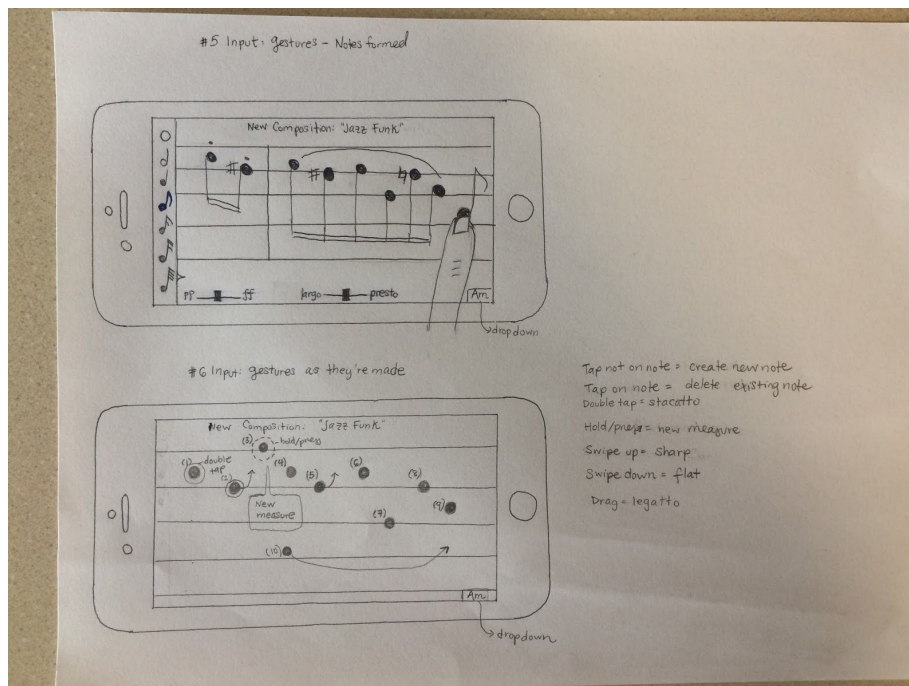
Fig. 2.17: Tactile gestures storyboard for inputting a composition:
visualization of several types of gestures and their results.
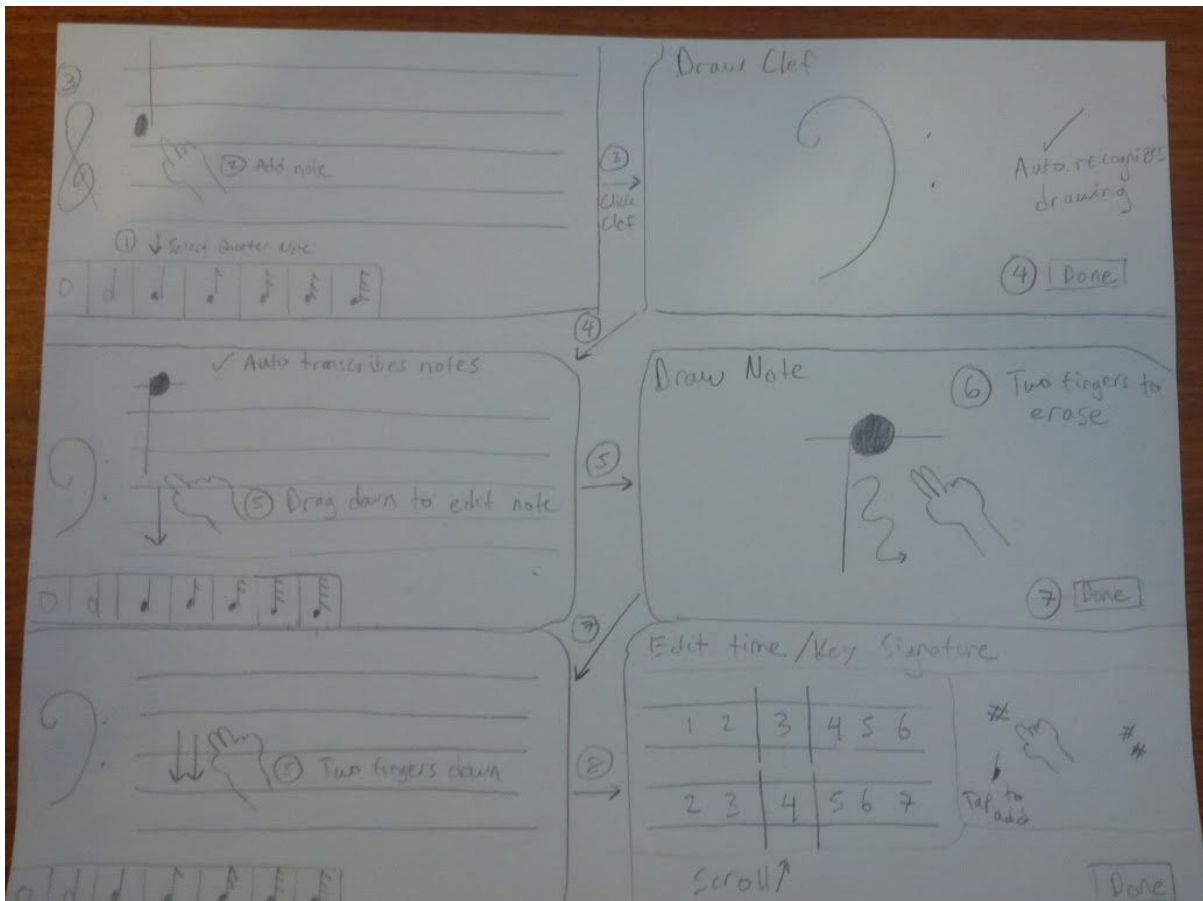
Fig. 2.18: Tactile gestures storyboard for inputting a composition (adding notes, editing notes, drawing clef, drawing notes, time signature, and key signature).

Top Prototype #2: Audio-centric prototype

Fig. 2.19: Take photo

Fig. 2.20: Record sound

Fig. 2.21: Play sound

Fig. 2.22: Layer tracks

4. SELECTED INTERFACE DESIGN

We decided to implement the **tactile gestures prototype**, rather than the audio-centric prototype. Below are our pros and cons list for the two best prototypes:

Tactile gestures prototype

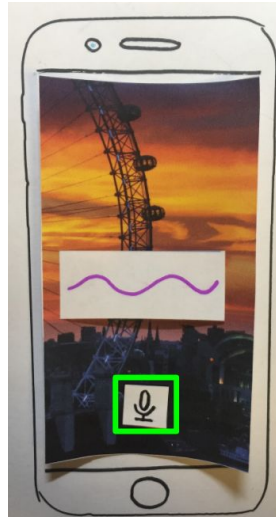| Pros	Cons
Intuitive interface and gestures, especially for musicians/composers	Difficult to capture the large number of details needed to compose -- potentially will need to pare down functionality → frustrating for composers?
Lots of functionality packed into a deceptively simple interface	Need to clearly demonstrate comparable or improved experience as composing on paper
Endless possible features to add	

Audio-centric prototype

Pros	Cons
Simple and sleek UI with 4 icons	Users got into endless loop of actions → indicates sparse functionality?
Users liked the idea of associating sounds with a scene, in order to better remember the scene	Users thought it was an "immersive photos" app → the composition aspect didn't come through
Potential use case for composers to record their own voices/instruments and loop/layer them additively	Limited functionality, and not a lot of room for extra features

4 (a) Task Storyboards

Task 1: Compose

Create notes and chords using simple, intuitive gestures.

Fig 2.23: Change time signature	**Fig 2.24**: Change key signature
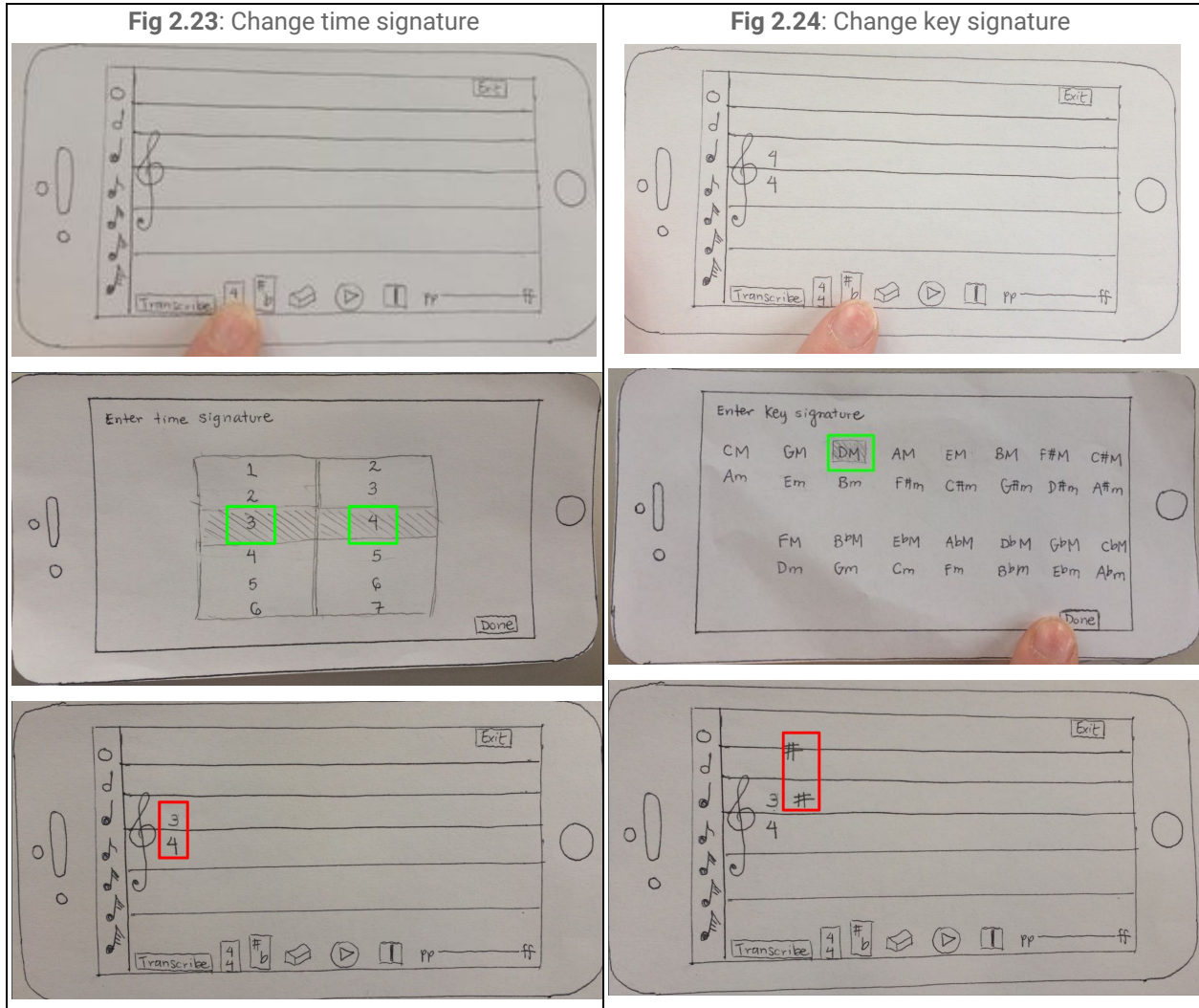
Fig 2.25: Add single notes	**Fig 2.26**: Add accidental

Fig 2.27: Automatically add bar line

Fig 2.28: Adjust volume

Fig 2.29: Erase notes, automatically add rest	Fig 2.30: Create chord
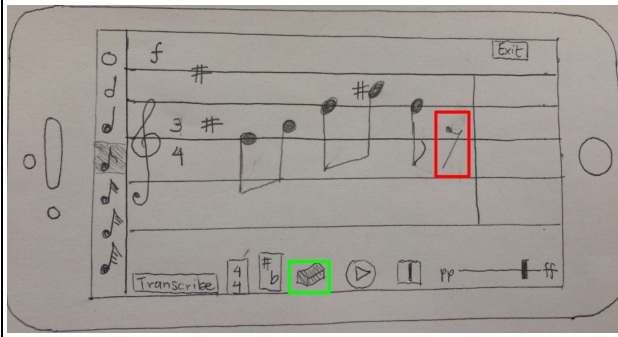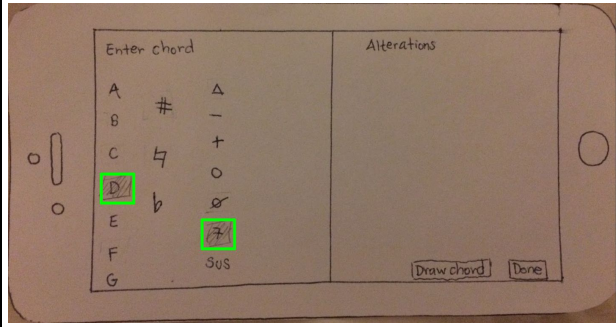
Task 2: Arrange

Combine multiple ideas and instruments into a single composition.

Fig 2.31: Volume view, single part	Fig 2.32: Pitch view, single part

Fig 2.33: Compose new part
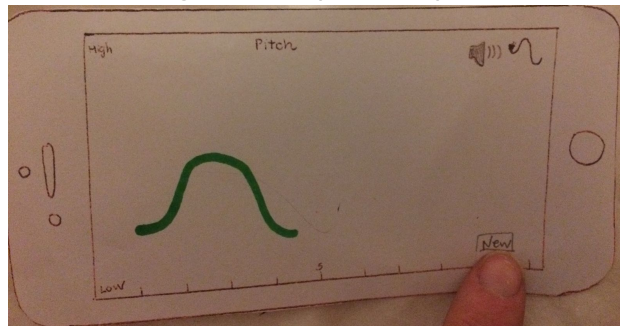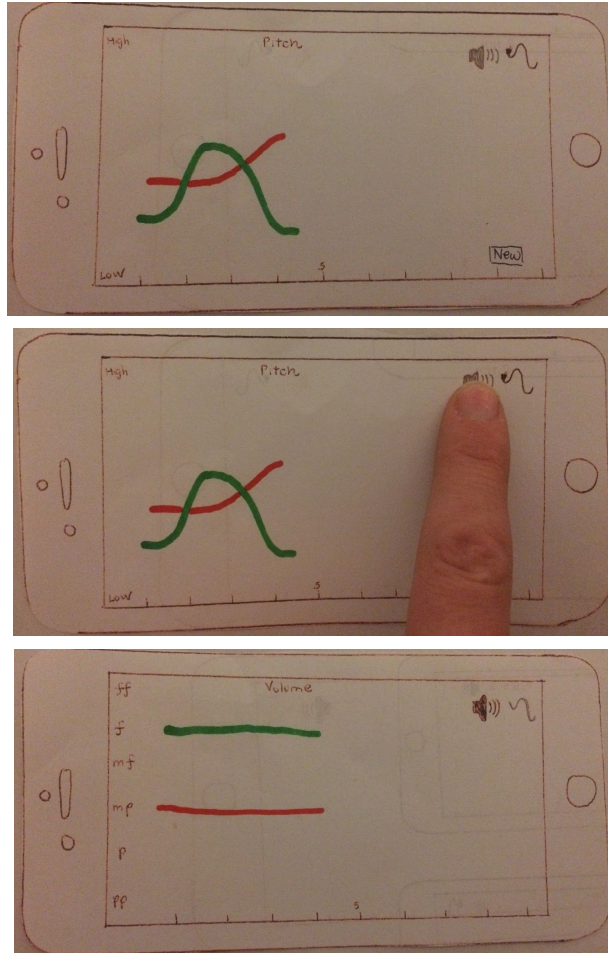
Task 3: Share

Transcribe the composition to a PDF score to give to a musician.

Fig 2.34: Transcribe composition to PDF
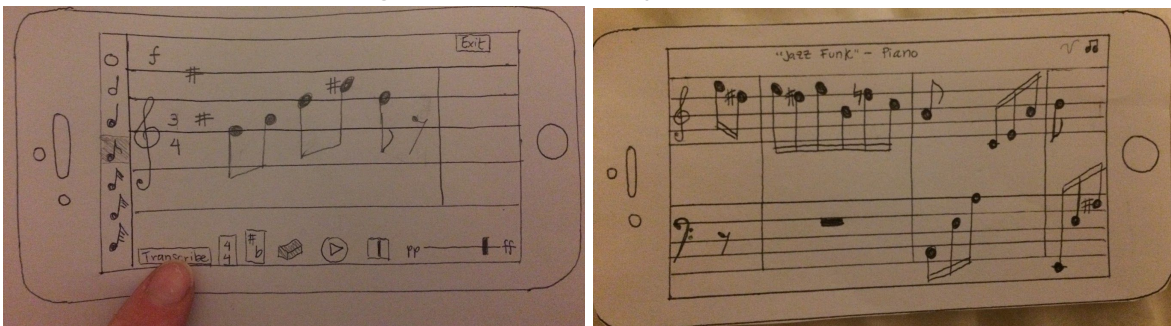
5. METHOD

Participants

We interviewed **Byron**, a composer and a recent Stanford graduate in Music, Science, and Technology. He has been involved in research through CCRMA (Center for Computer Research in Music and Acoustics).

Our second interviewee was **Alexander**, also a composer. He has played cello, bassoon, and sung for many years. He is a music director and arranger for *a cappel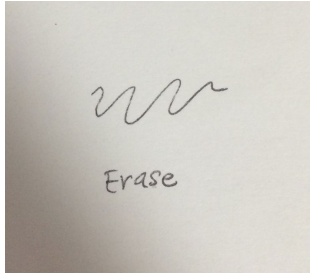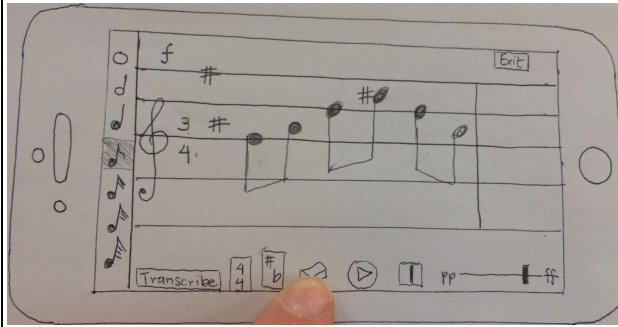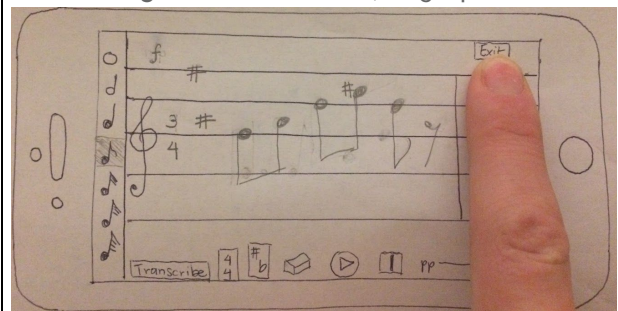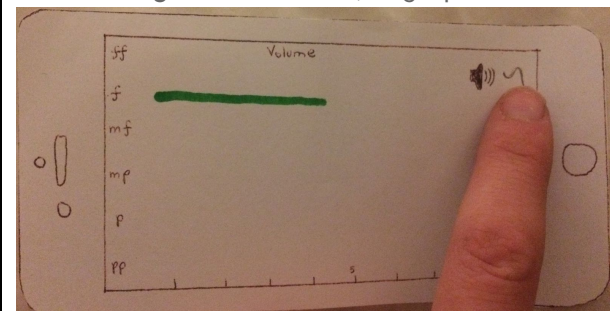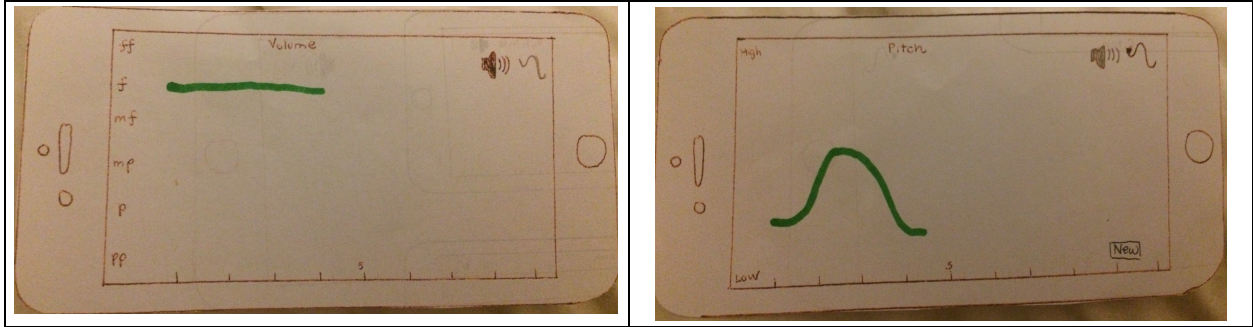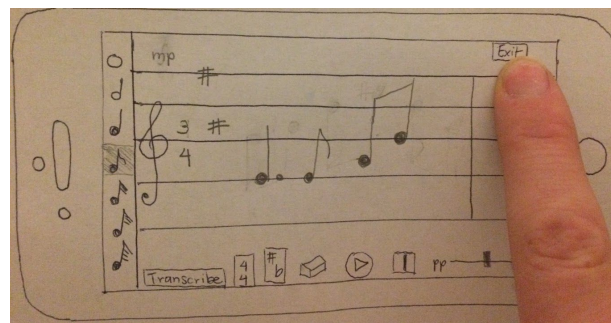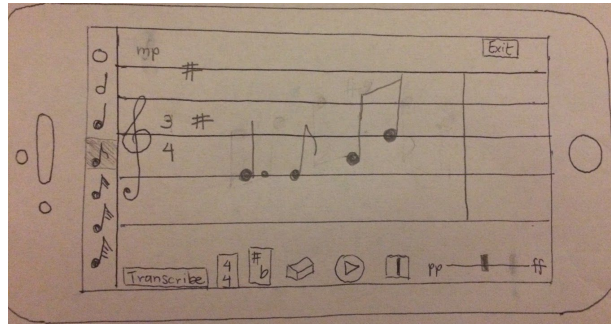la* and musical theater. He is also an ear training instructor for the music department. He is a senior studying Music, Science, and Technology.

Our last interviewee was **Joss**, who is also a composer and is a freshman. He is a prolific user of music composition apps (such as Sibelius, Finale, MuseScore, Notion, and Logic), and had a lot of opinions about them. He is also a member of Stanford chamber chorale.

We tried to select participants who had an interest and experience in composition, who varied in age, played different instruments, and came from different musical backgrounds (e.g., classical, jazz, experimental).

Recruiting and Compensation

We selected experienced composers/musicians from a group of applicants. We advertised primarily via Stanford's music mailing list, and also directly contacted various professors, faculty, and staff in the music department. We actually received responses from some of the professors we contacted, but due to the short time frame will not be able to meet with them until next week.

Incentive

We offered each participant $20 for a 30 minute - 1 hour interview, which incentivized enough responses that we were able to select from a wider pool of applicants. We met with each participant in a public place.

Tasks

Our tasks were, as above, for the user to **compose a piece** using our interface, **arrange and view multiple parts**, and **share their piece** with a musician.

Procedure

We purposefully did not give our users instructions or walk them through the application. The

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only information they received prior to using the app was a sheet of gestures and their actions, similar to this one:
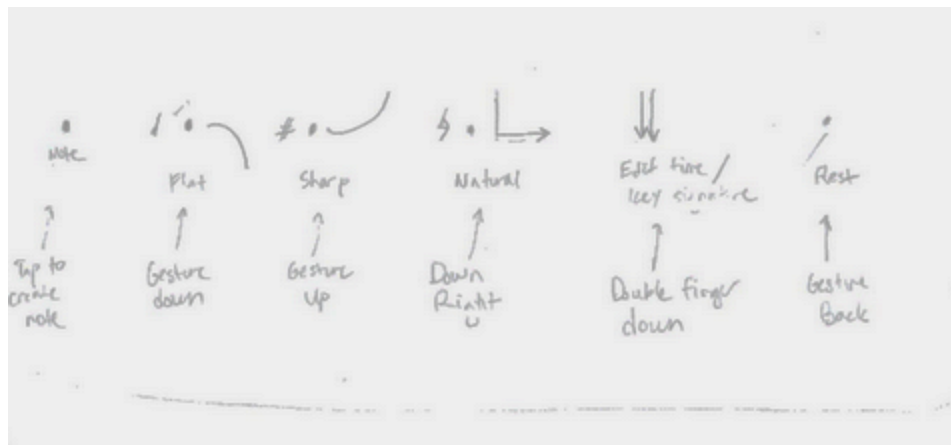
We wanted to know if these diagrams were not descriptive enough, so we did not explain the gestures further than this. We also wanted to know if all screens would be accessed by the user, which would tell us if our navigation design was intuitive and accessible.

We asked the users to compose a piece, and updated the "UI" accordingly. We did this by switching out screen snapshots, shading in buttons when they were "selected," and drawing musical notation and visualizations as they were created. We only added a note, chord, or other marking if one would legitimately appear in the app given the user's actions.

One person filmed the interaction, another person took notes, and the last person acted as the "computer," switching the paper prototype screens and updating the UI.

6. RESULTS

Positives

- Users remembered the gestures, and all found them intuitive!
- Had fun playing with the app and found it useful.
- Were pleasantly surprised by all of functionality packed into a deceptively simple interface.

Negatives

- Users were all confused by the "chord drawing" screen, and drew different things depending on their backgrounds.
- Hated the "insert bar line" button, and wanted automatic bar lines.
- Ambiguity about creating chords, e.g., what octave? What duration? What notation

(jazz or classical)? Closed or open position?

- Everyone was confused by the "Exit" button and never got to the visualization screens.

Desired Features

- Copy and paste: ability to duplicate notes, chords, and phrases
- Tied notes (including across bar lines)
- Tempo: (in beats per minute, for playback)
- Click and drag notes to change their pitch
- Chord inversions
- Notes should change color when selected
- Articulation mode (e.g., accents, staccato, legato, crescendo)
- Select all to make multi-note changes
- General menu or "welcome" screen to go back to
- Clear all and undo buttons
- Ability to stack multiple notes (even if they're not a chord)

7. DISCUSSION

We encountered some cultural differences when testing our application. Users expect different outcomes for similar interactions based on what devices they are used to. For example, for iPhone vs. Android devices, "swipe up" could either make the text go up or down. Users were also influenced by prior use of desktop composition software, such as Finale or Sibelius, and were disappointed when similar actions for those tools did not generate the same response in our app.

As well, there are cultural differences resulting from composers' musical backgrounds (e.g., whether they have backgrounds in classical, jazz, etc). This made their mapping of symbols to gestures varied. We anticipate that some composers will find gestures intuitive while others will not. We must be mindful when we design new gestures and their instructions.

Over and over again, we heard that this application must be quicker and easier to use than composing on paper (which is what composers do when they think of an idea on-the-go), or else have additional features that make its use more compelling that paper and pencil. Our users were especially worried about the "fat finger" scenario, especially on smartphones--in other words, that it would be difficult to input a single note because the screen real estate is so small. This is something we will need to pay attention to in the implementation stage, and consider shifting to an iPad implementation if it is intractable on an iPhone.

We also need to hone our gestures so they remain intuitive and natural, even as we add more features. Music is complex, and we see that in the long list of desired features the composers

wanted to see added. It will be crucial to make sure that our interface doesn't get cluttered and that the users can remember all of the different gesture mappings.

The composers also complained about the lack of "automatic" features. They wanted to see automatic rests, automatic bar lines, and automatic chord suggestions. Professional artists are "lazy," meaning that they don't want to write out simple things that should be obvious, and they don't want the ability to make silly mistakes (like adding a bar line where there shouldn't be one, based on the defined time signature they chose earlier). Adding these "automatic" features will be important for our future prototypes.

One additional minor thing: in our prototype, we only focused on one direction of interaction (focusing only in creating entry modes), and we forgot to create their ways back. We will remedy this in the medium-fi prototypes next week.

8. APPENDICES

Byron Interview
3D physical gestures prototype
- Tried to zoom in but couldn't on sound wave
- Didn't know what to do with photo
- Thought play button was to swipe down
- Got into endless loop of actions
- How do i get back to original screen?
- Usually looking for a description of an app, so kind of biased
- "Take pictures of a scene, and associate sounds with it. Idea being that you can take more immersive photos." The composition aspect didn't come through. "Nice to have that." Another option besides a video.
- How do I associate a recording with a picture? Should be "do you want to keep this recording, yes or no?" Should save into bank of recordings.
- Took some time to find out to get back to original menu
- Would be nice if it prompted you for a recording when you take a photo. Like have the app built into the surrounding OS.
- 4 icons was really easy interface. Menu is nicely refined down to icons. "If I was a 10 year-old, I would understand it."
- discoverability in 1 direction - didn't think how users go back.
- functions seem to tie together - overlap.

Tactile gestures prototype
- "moving up to the note" - for the gesture REST
- seems to understand the gestural instruction fast and well.
- ambiguity with X and double # -> need to find universal instructions.

- automatic tie with notes (other apps) across bar lines
- instead of doing the 2 doubles pull, he just tap clef!
- Still cultural differences -> up/down or left/right.
- not sure how to make it play? Nice to have to have another bar of icons for functions.
- Playback is 8/9 on the scale of 10 -> play around with the notes - "put in random 16th notes and see what it sounds like"
- Would rather have as much screen real estate as possible — worried about fat fingers
- Gestures seem intuitive
- Chords: should be like Android password - "snapping." "Meh, seems cool." Logically it makes sense. Seems easy.
- He would prefer the chord menu, rather than drawing chords
- he tends to write on paper
- He hates having to fiddle with getting ONE note down — "hard to compete with paper." Has to be as fast or faster than paper. He would sacrifice a bit of speed if it would go to MIDI. Prefers MIDI over PDF. Playback would also make it worth it.
- Natural note should just be to swipe to the right
- He remembered most of the gestures
- There are some menu navigation things to be considered, like having a play button
- iPhone 7: press hard
- Delete mode
- Copy and paste: duplicate whole phrases. Should have whole own mode. Better to not have annoying slip-ups.
- Discrete means of entering tempo and volume.

Non-conventional music visualizations
- Makes sense for social means of composing together — don't see it anywhere else
- Having a mobile platform is perfect for being able to socially compose. Would be a plus for him — composing with friends. "Last summer, I was playing in a musical. I and another friend had to transcribe way too many songs that didn't make it in. So we had to listen to so many songs and write them down. I ended up just having paper and writing it. This would be great, if I could listen to it, and transcribe it, and hand it over to my friend, and he could write the guitar part, after I wrote the piano and voice parts." Collaborate.
- It's important to be able to abstract out. Important to have varying levels of abstraction. He would personally find it useful. Combination is pretty crucial.

Alexander Ronneburg
- Intuitive interface
- Not sure what the "add measure" button does -- called it the "slit" button
- Hopes he can click and drag notes (this wasn't implemented …)
- Not sure how to do rest - click the note once?
- Over bar line - the app doesn't have bar line?
- "Does it turn into a rest or a weird hole in the …? (when he erased the note)

- Doesn't do multiple notes at the same time?
- Draw chord? Symbols? Roman numeral?
- Assume it is still on the original key signature.
- Assume he can erase what he drew (like the eraser) - "Draw the chord"
- Is there a note selected?
- What octave for the chord? Where does it go? What duration is it? Is it Jazz or classical notation in draw chord?
- Expected "swipe up" to do something
- Will it distinguish between an uppercase or lowercase letter in draw chord? wouldn't work for like "C"
- Wondered how "draw chord" would work for major/minor.
- The chord would draw in close position but is it what he want?
- Chord notation like b7/ ## doesn't work
- He liked the "choose chord" interface rather than the "draw chord" interface -- found the latter very confusing
- Wanted a chord inversion option on the chord interface
- grab notes didn't work.
- change color when he clicked.
- always piano? not sure why the screen exist? Click on the (gesture button) doesn't know what the gestural interface was? assume it was pitch - don't know why use pitch diagram
- don't know how to exit transcribe view
- confused when "tap to exit"
- why wouldn't it enter bar line automatically
- how do he type things? Accent? Slur? Legato?
- hold the note and articulation appear -> what he wants
- He wants single notes articulation
- Articulations: accent, tie (automatically to next note, unless it was a rest), stacatto, legato. Accent and a staccato (multiple articulations at a time).
- Put the sharp, flat in the dialogue as well? if he can't figure it out.
- Doesn't have a clear preference between dialogue box and articulation mode. Maybe both?
- how to highlight multiple notes at the same time to do legato and slur. LAPTOP - control + click. Click and it has cursor. Want dialogue box.
- don't like to add his own bar line. But he want to change to repeat or double bar. The button is not helpful.
- Change key signature.
- Didn't get to pitch and volume screen. Never click exit? Expect a menu when he click exit, not a weird screen - save automatically. Changing to name - click on the text. Click on the screen thing. Why there's this pitch screen and there's also the other pitch screen. What does he do.
- volume screen . "hey that's cool." No use for pitch or volume screens if you can't edit it
- Doesn't appeal to him (the volume screen)

- how do he switch to different composition
- No Menu --> Can't do a lot of things
- Those volume and pitch screen are slightly helpful when he have multiple instruments.
- Like the play function that starts on the note of the app he uses
- Build the chord on his own not on the dialogue.

Joss Interview Notes
- Nice! When he sees the Key selection interface.
- Doesn't know what to do next ... when he first use the app.
- Try to erase the notes but can't -> Confused.
- Confused a lot with the gesture instruction
- Can't get anything done??????
- Seem to play with the eraser a lot?
- Still confused after a while
- Drew a score on draw note
- Barline button look confused
- Liked the automatic barline.
- Wants: crescendo, dimuendo, articulation.
- Erase (gesture) when he use eraser.
- What does transcribe mean? "When I hear transcribe, I imagine playing notes and having it transcribe them." Would change it to "Print PDF" or something.
- "How would I make a triplet?"
- Sibelius: fussy about how you put in triplets. You say "command 3" and it opens a dialogue. Often splits up triplets.
- Tried to draw eighth note rest exactly — on first glance. Most notes are one stroke (except for half notes and quarter notes).
- "cool that you have the modern composer in mind."
- When there is a defined meter, the bar lines should only make sense. If you try to drop a bar line where it shouldn't be, it shouldn't do anything, or otherwise fill in the rest of the measure with rests.
- Doesn't see why he would need a bar line button if there's a defined meter.
- Wants to be able to change the time signature for a score?
- If he change the time signature will the bar line shift?
- Undo button for last command.
- Clear all button (if the piece is really long, for example)
- Drew staff on draw chord
- Thought "draw chord" meant create chord
- want to duplicate note and chord. Repeat last thing.
- helpful to have bar line menu.
- put a note on top of another note -> what will it do? He want notes on top of each other - connect.
- Wants inversions on chord menu

- Wants to be able to drag notes into inversions
- Wants to be able to show ties to notate rhythm (for each individual note in the chord). Click and drag (a box) to highlight and then make the tie gesture.
- "Select all" to make multiple changes at once.
- Wants a slider for tempo. Wants in beats per minute not presto to andante. For playback purposes.
- Can't see how multiple parts line up
- Chuck (Ge Wang) - playback