MONGOL ULUS DUU

DDM30005: Digital Media Design New Technologies - Brief I

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CONCEPT

"Mongol Ulus Duu" (Mongolia Song) is an iPad sound module / application based around and inspired by the instruments found within traditional Mongolian music culture.

During early ideation we considered approaching this from various angles including:

* Combining of a variety of traditional Mongolian instruments into a single amalgamated instrument whilst trying to maintain their distinct traditional appearance.
* Embed the traditional sounds of the instruments into a single modernized interactive mixing/synthesizer interface.
* Present instruments individually with the ability to switch between them.

Appearance
Many of the traditional Mongolian instruments are quite ornate. These decorations were alway going to feature in the design of our application even if we decided on very modernized outcome.

Possible Interactions
Depending on which direction we took the interactions in using the application would be quiet different. Being an iPad application it's no real surprise that touch events would likely feature prominently.

* **Tapping & Swiping**: Playing / toggling instruments, buttons and switches.
* **Gyroscope** (Shaking): Playing percussion instrument such as the "Rattle". Our adjusting the appearance of objects.
* **Blowing Air**: Using the microphone to detect breath for wind instruments.

Diez Albums Armed Riders I (14th century)
Mounted warriors pursue enemies. Illustration of Rashid-ad-Din's Gami' at-tawarih. Tabriz (?), 1st quarter of 14th century. Water colours on paper. Original size: 21.2 cm x 26.2 cm. Staatsbibliothek Berlin, Orientabteilung, Diez A fol. 70, p. 58. Probably a conflict between Mongols.

Source: https://commons.wikimedia.org/wiki/File:DiezAlbumsArmedRiders_I.jpg

MONGOL INSTRUMENTS

Mongolian culture hosts an array of traditional instruments. Many instruments may feel familiar to or appear as variations of other instruments found in the Asia / Middle East region.

Strings

- Morin Khuur (Horse-head)
- KhunTovshuur (Swan-head)
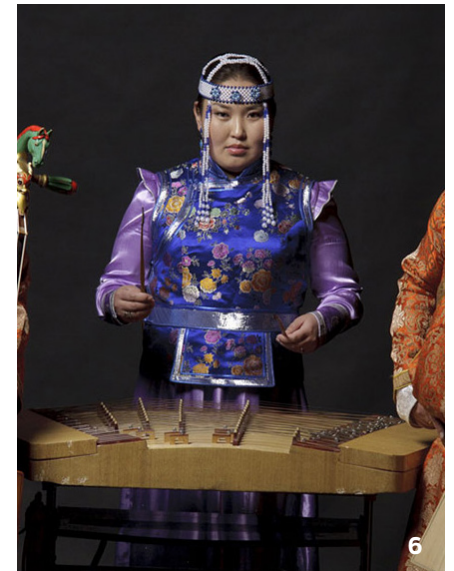- Yoochin
- Yatga
- Khel Khuur

Wind

- Limbe
- Bishgüür
- Surnai
- Lavai / Tsagaan Buree

Percussion

- Tuur (Drum)
- Tsan (Cymbals)
- Rattle
- Denshig (Small Bells)
- Damar

See reference page for "Mongol Instrument" image sources.

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MONGOL
PERFORMANCES

Traditional Mongolian Music & Dance "My Beloved Country Mongolia" Song
https://www.youtube.com/watch?v=g5elKXPWzSY

Mongol Bishgüür
https://www.youtube.com/watch?v=YppnxqbGqpl

DESIGN

After seeing the "horse-head" fiddle (Morin Khuur) and sibling string instrument the Kuhn Tovshuur with a swan head I instantly wanted to include both of them in the design of our application.

Below: The first rough and crude sketch of the "Mongol Ulus Duu" application. Including three string instruments the Khun Tovshuur left, Morin Khuur right and Yatga in the middle.

This is sketch also included a wind instrument in the form of a Bishgüür.
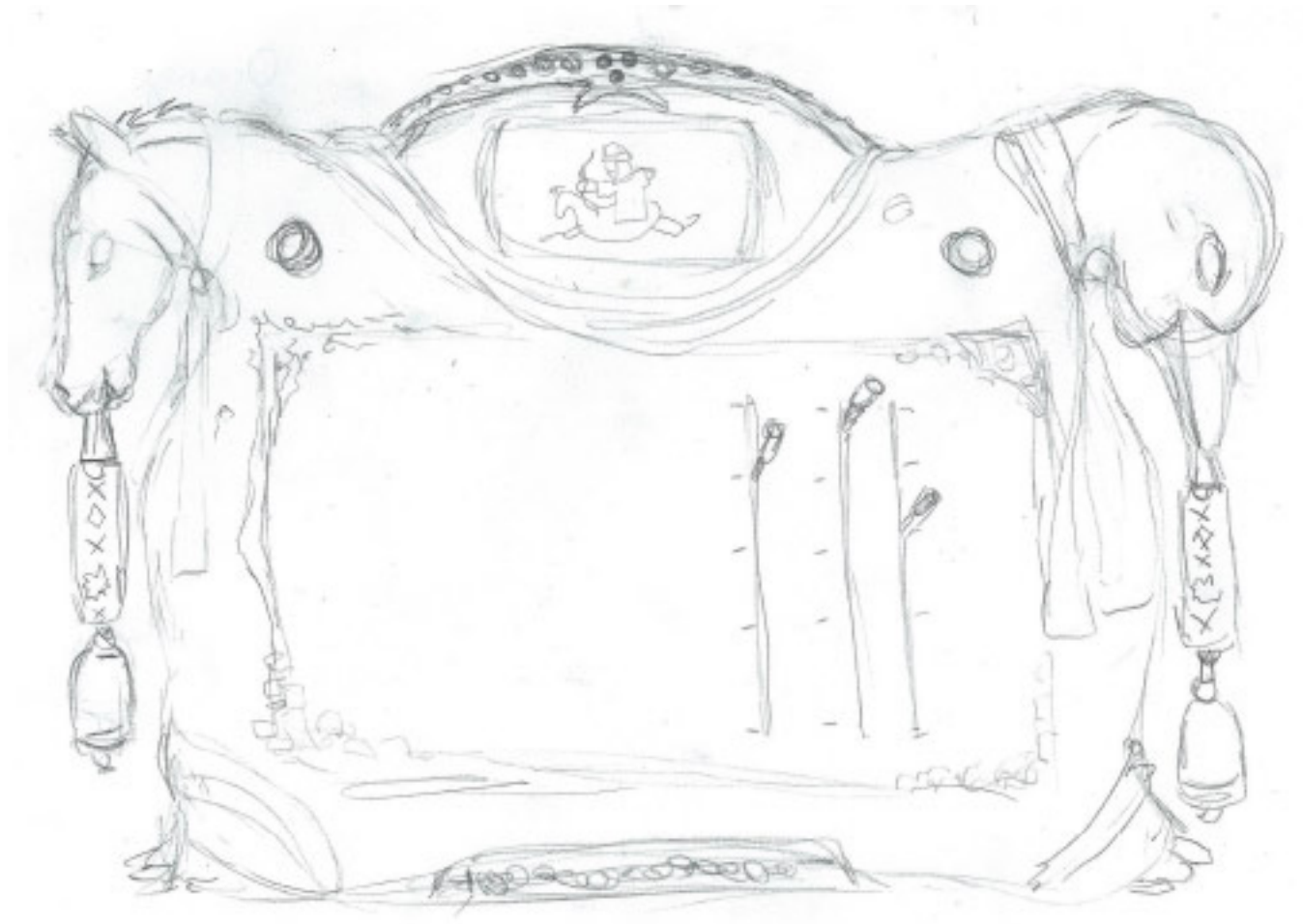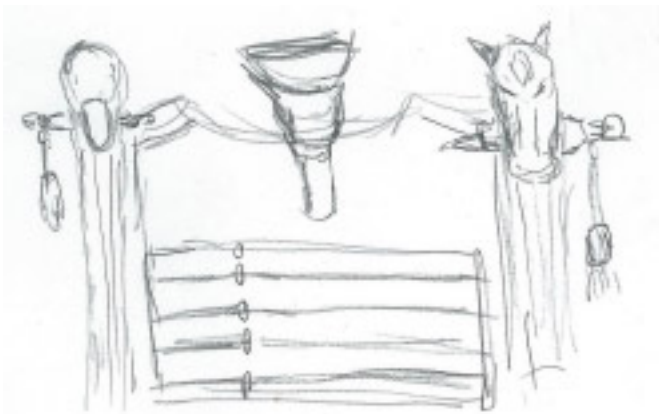
Above: A second iteration of the application's design and layout. This version of the interfaces moves away from just replicating the instruments and heads down the direction of a some what modern mixing interface. However it still maintains the ornate feel of Mongolian instruments with the Horse and Swan heads featuring strongly. The idea of the top-central pieces at this stage was to include a scrolling / flip-book style animation of an Mongolian Horse Archer riding along to the music.
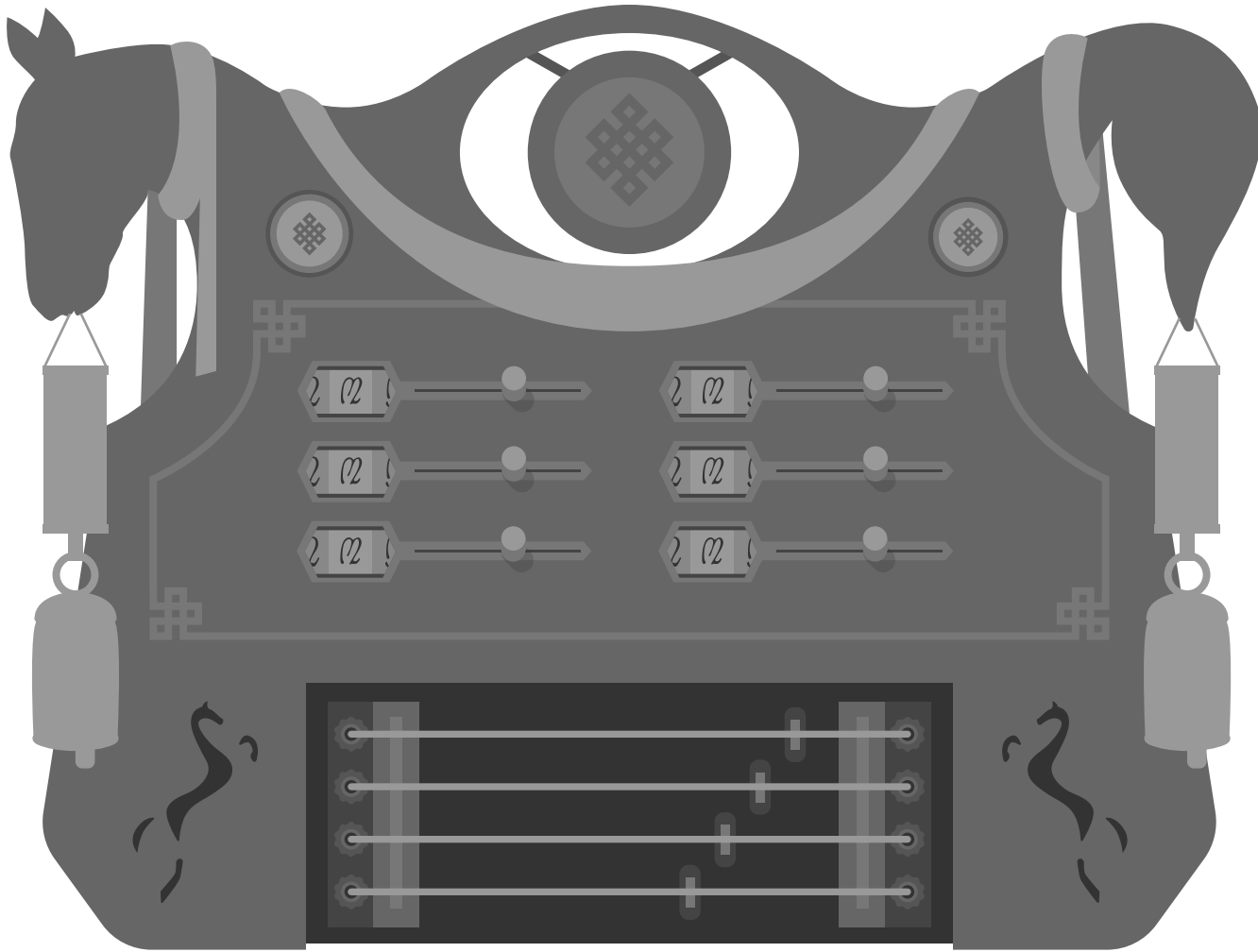
Above: Shaping of the horse and swan heads followed by their flow into the rest of the interface was a major factor in getting everything to look right.

Left: Vectorized layout of the interface. Some additional instrument representations return in the form of a Gong and the simplified Yatga (or similar) string instrument along the bottom.

A track mixing interface takes centre stage, however care has been taken to make it not feel out of place among the more traditional elements of the interface.

See next page for final resolved interface.
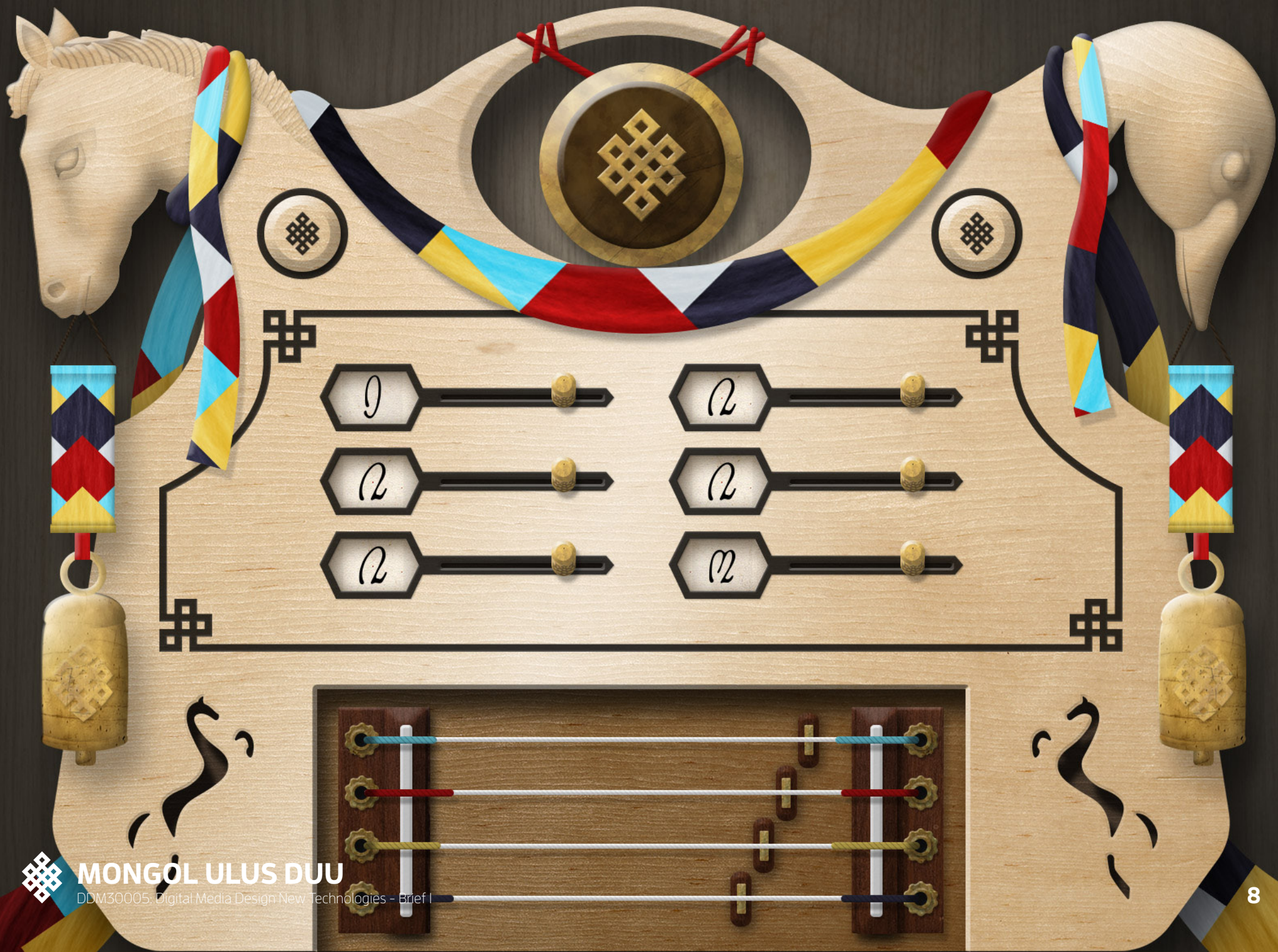
AUDIO

The sound modual is based on the more gentle sounds like "My Beloved Country, Mongolia", with lots of strings and flutes.

Each of the 18 unique loops was created in GarageBand from a combination of preset loops and user defined patterns. Most of the percussion is layered from a variety of instruments to make a full sound.

The aim was to emulate a sound that was inspired by the Mongolian instruments. GarageBand has limited "Middle Eastern" presets, so many of the loops were synthesised using edited western instruments, then layered together to create each individual clip for Unity.

We worked in an 8 bar loop, with most of the single loops being 2 or 4 bars. This meant that when the sounds were grouped before export, some interesting effects and fills could be achieved. This helped to make a more authentic sounding module.

Individual Stings
Each string plays a different note from the same GarageBand instrument. Blue is a D, red is C, yellow is G and purple is F.

Above: A screen shot of the GarageBand workspace, showing one of each loop clip included in the final app. The blue tracks are uneditable, although the instrument settings can be adjusted to build the desired sound. The green tracks were able to individually move notes, so changing preset loops to have accents and sustains was much easier. It gave far better control and was the foundation of many of the more complex sounds.

DEVELOPMENT / UNITY

2D Physics - Bells

The hanging bells have been setup to swing when touched. While only a small amount of coding was required to achieve this, it took some configuration in the Unity editor to get them to work correctly.

The Bell Game Objects include:
* 2D Rigid Body
* Large Box Collider
* 2D Hinge Joint

The Hinge Joint is the key component and has been configured to restrict the angle of available movement. Without this the bell would be able to rotate around the designated pivot 360 degrees.

With each tap of the Game Object a force it applied to the rotation simulating a swinging motion.

Lagging Audio

Once the app had been pushed to the iPad for testing, we noticed that the audio clips on the buttons was lagging and it became difficult to time the gong and chimes to the beats of the loops. To overcome this problem, we assigned the clip for the buttons to a collider and only used Unity's button module for the animation.

Track Loop Counters

The track loop counters are a graphical element which change in correspondence with the Loop Controllers to indicate which loop is currently active.

We also wanted the transition to happen over time in an animated slide which helps maintain a more traditional appearance.

As this functionality needs to be in sync with the Loop Controller it was integrated into ScrollClips.js.

The custom "CounterModule" function is called when the Loop Controller is activated. Sets new target position and triggers animation in Update function.

```
function CounterModule () {
        distance = 0;
        currentPos = Vector2(trackCounter.
transform.localPosition.x, defaultY);
        var newX  = defaultX - currentSound * 96;
        newPos = Vector2(newX, defaultY);
}
```

The Update function animates the slide transition to the new target location each frame.

```
function Update(){
        soundSource.volume=soundVol.value;
        // If not at current location move there
        if (distance < 1) {
        distance += Time.deltaTime * speed;
         trackCounter.transform.localPosition =
Vector2.Lerp(currentPos, newPos, distance);
    }
}
```

Swipe Interaction

The swipe interaction proved to be one of the more challenging aspects of the project. We achieved a swipe function that played the stings with a line renderer and colliders as demonstrated with the DrawPhysicsLines.cs script. However, once built and pushed to the iPad, it failed. As soon as a string was touched, the app had a critical error and either exited or crashed the iPad. We found this too hard to remedy, and reverted to just a button function for the strings.

APPLICATION GUIDE

Gong
Single gong hit.

Chimes
Ascending and descending Chimes fill.

Loop Controllers
A selection of continuous looping tracks. Each controller has three different tracks assigned. Tap to switch the loop. Current track is indicated by a Mongolian numeric character.

- LI: Beats and Drums
- L2: Low Strings
- L3: Flutes and Wind
- RI: Plucked Strings
- R2: High Stings
- R3: Marimba-Style Percussion

Loop Volume Sliders
Controls the volume of the corresponding loop controller.

Bells
Single bell hit. Enjoy the swinging physics!

String Instrument
Four individual and distinctive different notes from a single string instrument.

MONGOL ULUS DUU

ROLES SUMMARY

Initially we planned on working in tandem on all elements of the project (design, sound & unity), however we ended up naturally designating some elements of the project to individual team members.

Both members of the team contributed evenly in the development of the overall concept, including the generation of the original three concept themes (in week two) and from which there was an unanimous consensus on the chosen concept direction. Additionally, both team members regularly discussed the project areas they were working on to gather feedback from each other ensuring that the project remained on track.

SHELLEY BASSETT

Audio

- Sourced all audio ensuring it was an appropriate fit for the theme of the concept.
- Built loops / tracks in Garage Band.
- Exported audio and prepared it for Unity.

Development / Unity

- Embedded all audio.
- Configured and scripted all audio interactions within the application.
- Debugging
- Project Build and Xcode Compiled to iPad

Workbook

- Reviewed, edited and contributed.

ANDREW MURPHY

Design

- Initial concept sketches.
- Refined and vectorized interface design.
- Created final resolved interface design in Photoshop.
- Exported all imagery for use in Unity.

Development / Unity

- Imported image assets, setup Game Objects and layout in Unity ready for scripting.
- Scripting for "Track Loop Counters"
- Setup Bell Physics.
- Debugging

Workbook

- Created workbook layout and initial content.

REFERENCES

Mongol Intrument Image References

1. Morin Khuur: https://en.wikipedia.org/wiki/Morin_khuur
2. Morin Khuur: http://mongoliamusic.weebly.com/instruments.html
3. Morin Khuur: https://en.wikipedia.org/wiki/File:Morin_Khuur,_South_Mongolian_Style.jpg
4. Khun Tovshuur: http://www.face-music.ch/catalog/khanbogdvol_3songs_en.html
5. Khun Tovshuur: http://www.face-music.ch/instrum/mongolia_instrum.html
6. Yoochin: http://www.gmgyvai.lt/data/uploads/dokumentai/altai-khangai-_c_-guillaume-ducarme.jpg
7. Yatga: https://www.pinterest.com/pin/494621971549151465/
8. Limbe: http://loca4motion.com/tag/mongolian-musical-instruments/
9. Damar: http://www.face-music.ch/instrum/mongolia_instrum.html
10. Surnai: http://mongoliamusic.weebly.com/instruments.html
11. Tuur: http://www.face-music.ch/instrum/mongolia_instrum.html
12. Bishgüür: http://mongoliamusic.weebly.com/instruments.html