

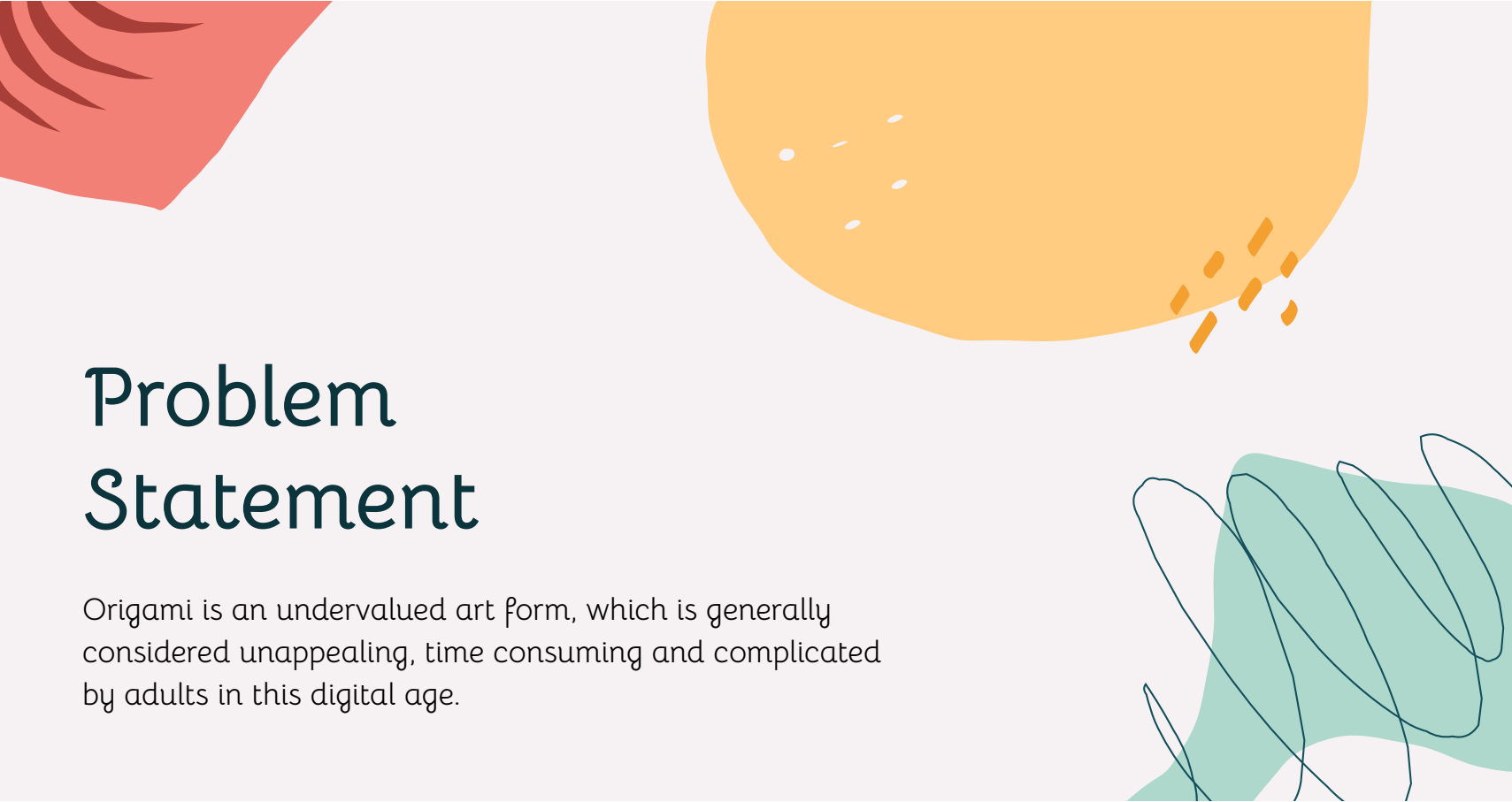
The background is a light gray rectangle. In the top-left corner, there is a dark teal shape with curved lines and a red shape with thin red scribbles. In the top-right corner, there is an orange leaf-like shape with a small red dot and a red spiral. In the bottom-left corner, there is a yellow flower with a thin stem and several dark teal leaves. In the bottom-right corner, there is a large, light teal circle with small white dots. In the center, the text 'tsuru' is written in a dark teal, lowercase, sans-serif font, followed by the Japanese character '鶴' in a bold, dark teal, sans-serif font.

tsuru 鶴



What is Tsuru?

Tsuru is Japanese for crane, one of the most prominent origami designs (the art of folding paper). The legend goes that if a person folds a thousand origami cranes, then the gods will grant any wish they have.

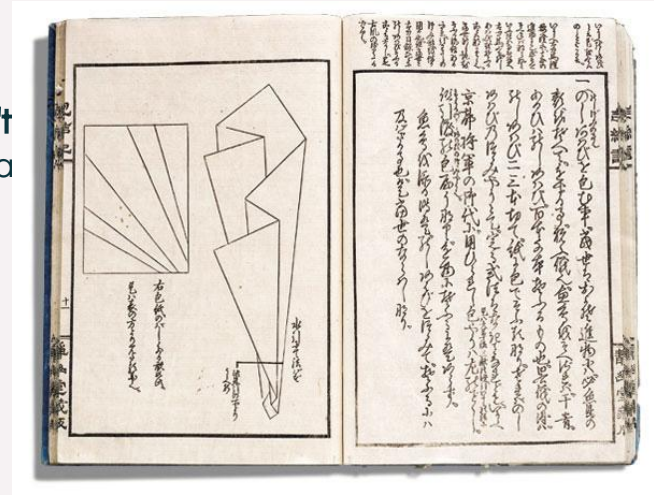


Problem Statement

Origami is an undervalued art form, which is generally considered unappealing, time consuming and complicated by adults in this digital age.

What is Origami

Origami is commonly known word in Japanese. “**ori**” means “**fold**”, and “**kami**” means “**paper**”. Generally origami is known a Japanese art of paper folding. The more precise definition was done in 1999 by **Joseph Wu** who was an origami designer; he defined origami as a “form of visual / sculptural representation that is defined primarily by the folding of the medium – usually paper. In literature, origami and paper folding used interchangeable.



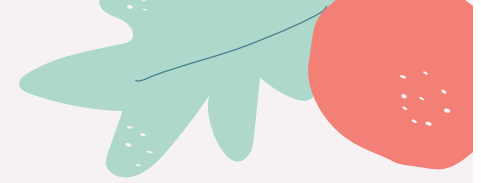
"Tsutsumi-no Ki" by Sadatake Ise (1764).



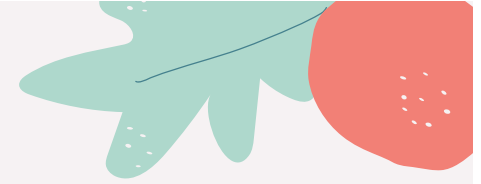
Solution Statement

Educating students origami through augmented reality to make the learning process more engaging, convenient ,efficient and fun.

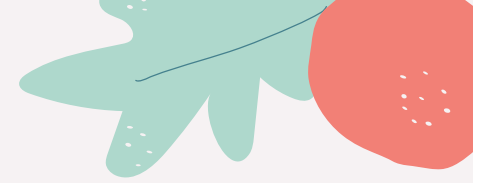
Features of tsuru



1. Digital Guides
2. Learn Mode
3. Timed Mode
4. Self Evaluation
5. My Designs
6. Steady Learning (Levels)
7. Narrative
8. Incentivisation



- ❖ **Virtual Guides :** The AR application shows virtual guides in the form of dotted lines and arrows which overlay on the origami paper in order to let the user know what to do in each step without having to look at a different set of instructions.
- ❖ **Learn Mode:** The Learn Mode is the basic mode of the application, which allows the user to place their origami paper in front of them, then follow the virtual guides in order to learn a new origami design
- ❖ **Timed Mode:** The test mode is a design mode in the app, which in addition to the learn mode, has a timer in order to time how much time it takes for the user to make the design.
- ❖ **Self evaluation:** This self evaluation is an added feature to the test mode; It gives the user the average time taken to complete the design so that the user can compare it to their own time and self evaluate their skills.



- ❖ **My Designs** : Tsuru provides the user with an inventory of the designs they have explored in every level. This helps them keep a track of their progress.
- ❖ **Steady Learning (Levels)** : The learning experience is divided into different levels. These levels are based on the difficulty of the origami designs. They follow a theme in form of a composition and get unraveled as the user keeps completing the designs.
- ❖ **Narrative** : The whole learning process has been narrativised. The user has to complete compositions with a narrative attached to them to make them interesting. This makes one learn with stories.
- ❖ **Incentivisation** : The user gets a congratulatory message on completing every design. Their design gets to life and starts moving around as a reward to their efforts!

Interactions - 1

After the app is opened, this below screen will be overlay on the image target along with 3 buttons that will seem to be popping out of the screen. This is the effect that augmented reality creates

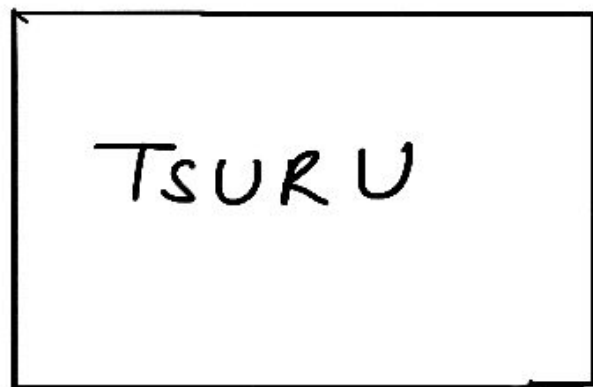
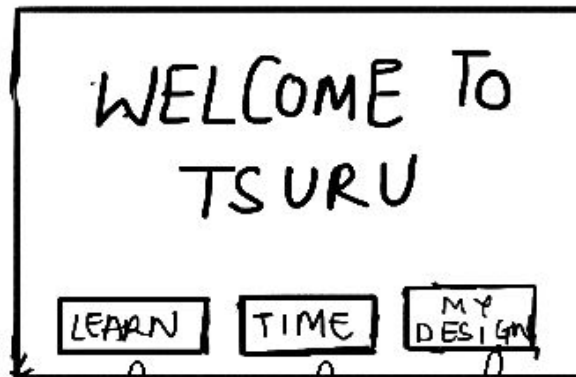


Image Target

This is the image target as it will be viewed by the application, in order to project the screens



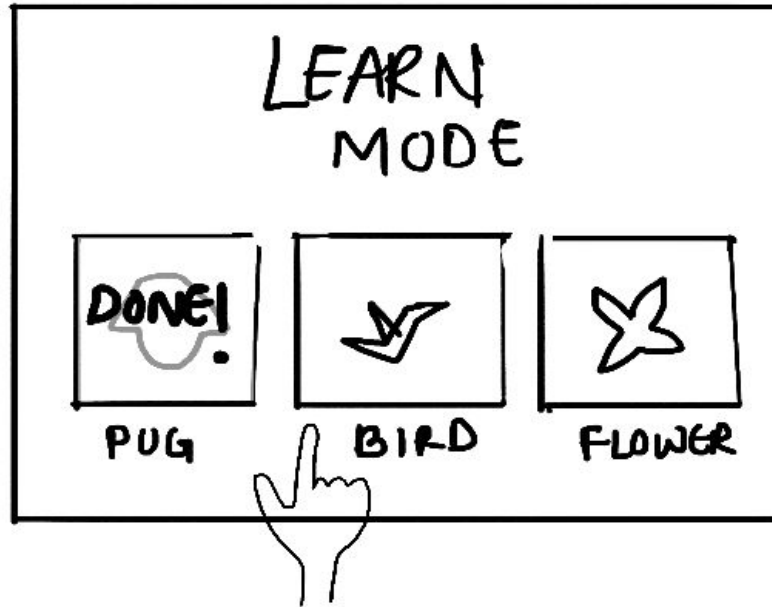
There are three buttons to interact with in this landing/home page. These are -> Learn, Time, My Designs. They will be further explained in the following interactions.

The buttons can be 'clicked' by keeping your hand above where you see the buttons. This will result in the hiding of the image targets below the button, and hence will be detected.

Interactions - 2

This is the landing page for the learn mode. This mode is essentially created for the users to learn origami virtually.

The designs which have been already done by the user will be marked DONE! to indicate their progress on the current level. The user can choose to revise this design nonetheless.

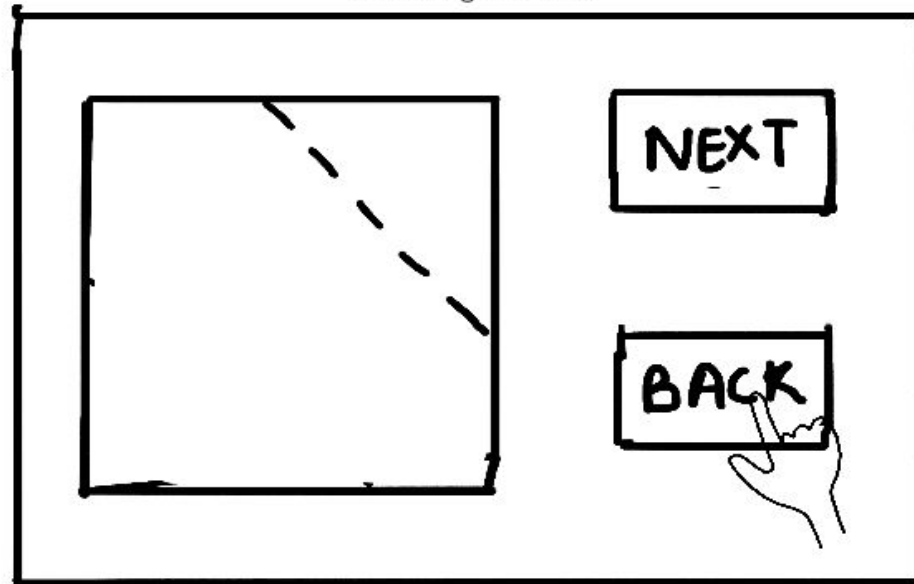


Any of the design options can be selected by just keeping your hand above where the particular design is visible, this will hide the image target and proceed to the following screen.

We can see here are three origami design options to learn from. The user can select any one, and can go through the process of making the origami.

Interactions - 3

After selecting a particular design, we move on to this screen where we begin to see the steps of what to do in each step with the help of virtual guides which will overlay over the user's origami sheet.



The user will be asked to place the paper in a particular area and The virtual guides in the form of dotted lines and arrows on the paper will appear to let the user know to fold where and in which direction.

The next and back buttons can be used to move to the next or previous step, in case they want to speed up or repeat a step respectively. This will make sure that the learning is complete and there is no confusion.

Interactions - 4

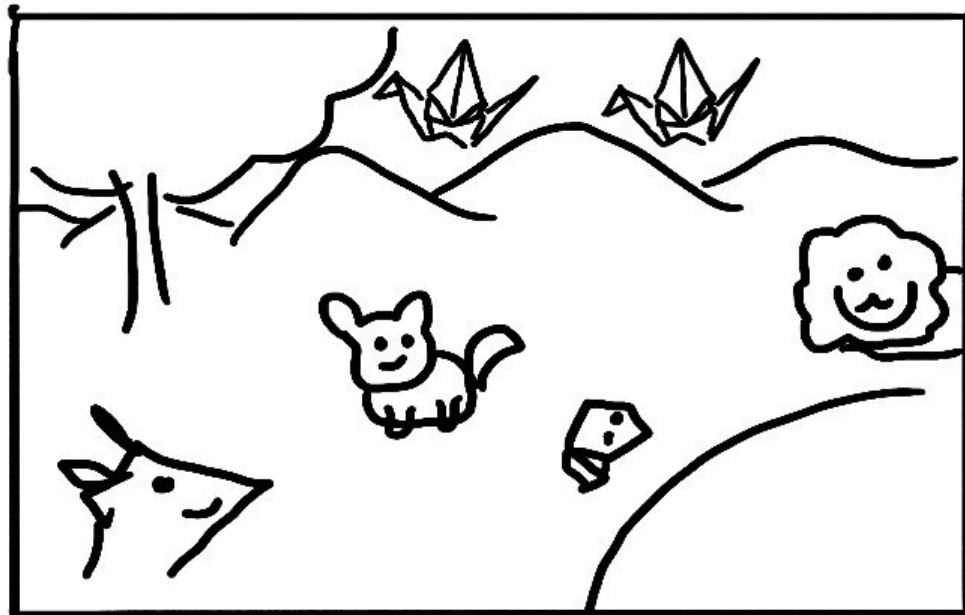


After all the steps have been completed, the screen will appear to show that the user has completed their learning of the origami design

after making a design, the design will come to life in the form of an animated 3d model which will feel like its right there in front of us on the screen

Interactions - 5

The designs that havent been completed, are black and white in nature and when they are completed by the user, then they turn into color and indicate life in them. This kind of a narrative incentivises the user.



This is the page that appears when we click on my designs. The steady learning process has been created, not in the form of levels but rather in the form of compositions. For eg. Here is the first composition, which consists of 4 designs: lion, dog, mouse and a bird indicating the designs to be learnt in order to move on to the next composition

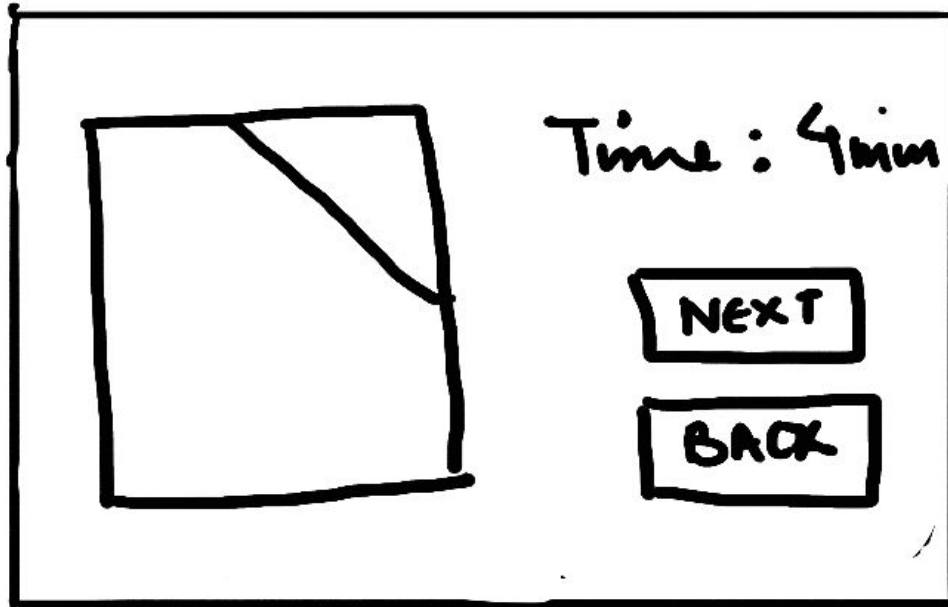
Interactions - 6



If we move on the next composition we will see that it is locked and we cannot learn any of the origami designs till we have learnt the ones in the previous level or composition.

Interactions - 7

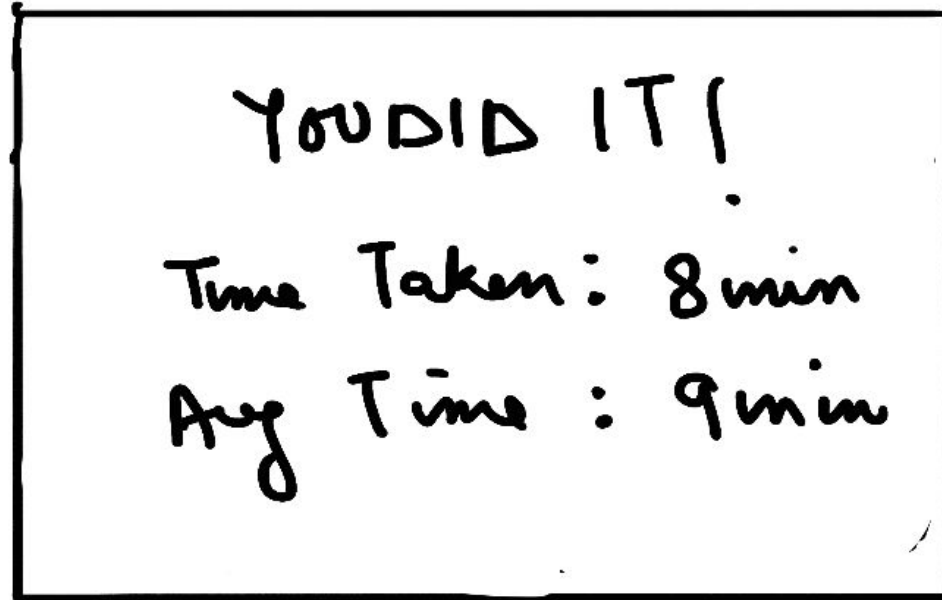
A live stopwatch will run which will enable the user to see their time whilst making the origami design



The next and back buttons can be used to move to the next or previous step, in case they want to speed up or repeat a step respectively. This will make sure that the learning is complete and there is no confusion.

This is what we get as a screen when we go into the time mode. It allows the user to time themselves to see how long they take to complete an origami design. They can keep checking their progress at each step and keep clicking next

Interactions - 8



To encourage self evaluation, and to motivate the user they also get to view the average time taken to complete a design in order to judge their skills. This screen is shown after the completion of the origami in the time mode.

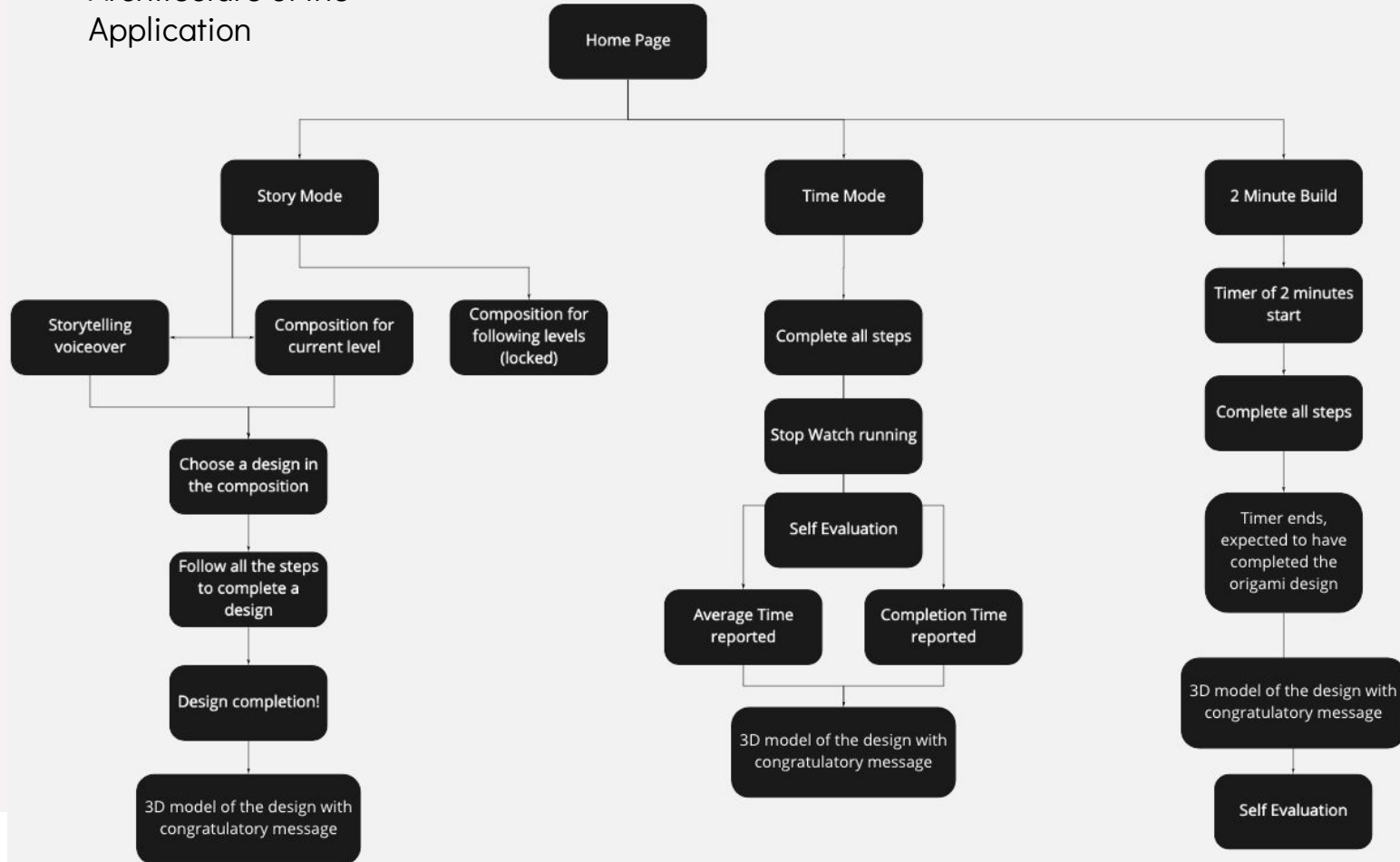
Language & Library

We will be using Unity Version: 2020.3.2f1 to make this project. Unity is a cross-platform game engine developed by Unity Technologies and is widely used to make 3D and 2D games by many creators.

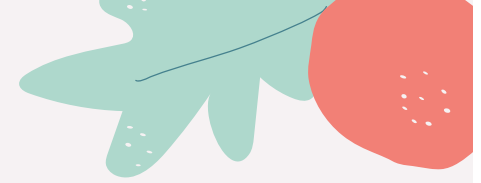
Along with this we will be using Vuforia for the AR aspect of the project. Vuforia is an augmented reality software development kit (SDK) for mobile devices that enables the creation of augmented reality applications. Through this we are able to allow the application to recognise the board and place objects relative to it.



Architecture of the Application



Link to the mobile app (apk)



<https://drive.google.com/file/d/1uvVuibHQLQMNQe3ODWH0lfg8TLwXkhj5/view?usp=sharing>

Google Drive link to the project source code

https://drive.google.com/drive/folders/1eucGuAWoVPRP3_qWuP4LsZydS7kOPSHi?usp=sharing

Youtube link to the hack demo

<https://youtu.be/B1r1Vi5VuUE>

Youtube link to the product demo

https://youtu.be/RmjOgI3G_0Q





Resources

- <https://images.google.com/>
- <https://freepik.com/>
- Kanade, Takeo. "A theory of origami world." Artificial intelligence 13, no. 3 (1980): 279-311.
- Cakmak, Sedanur. "An investigation of the effect of origami-based instruction on elementary students' spatial ability in mathematics." Master's thesis, 2009.
- <https://www.edutopia.org/blog/why-origami-improves-students-skills-ainissa-ramirez>
- <https://trends.google.com/trends/>
- <https://scholar.google.com/>
- The Complete Book Of Origami - Robert K Lang
- <https://www.smithsonianmag.com/innovation/theres-origami-revolution-industrial-design-180972019/>
- <https://docs.google.com/forms/>
- <https://www.origami-resource-center.com/health-benefits.html>
- <https://medium.com/@DeepakSinghanwal/origami-the-art-we-are-losing-179ce52c206e>
- <https://www.nytimes.com/2019/11/22/arts/design/modern-origami-art.html>
- <https://whitmanwire.com/arts/2010/10/28/ben-wu-and-joseph-wu-work-to-challenge-perceptions-of-origami/>
- <https://www.sciencenewsforstudents.org/article/cool-jobs-paper-folding-origami-inspiring-science>
- <http://www.herngyi.com/origami-research-and-applications.html>
- <https://journals.sagepub.com/doi/pdf/10.1177/0954406215597713>
- <https://www.motivistjapan.com/origami-and-architecture/>



Thank You

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