

ARganic Molecule

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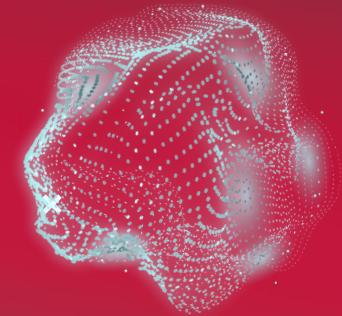
Each member has equally contributed to this project. Names are in alphabetical order.





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01

Introduction



Augmented Reality

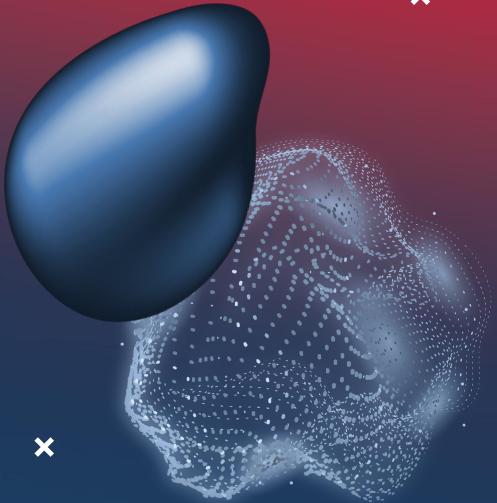
Augmented Reality technology will transform how we teach and learn art and science in the future.

Organic Chemistry is full of important concepts and materials, but it is mostly taught and learned through textbooks and 2D images.

Interactive AR models can help students and chemists understand the molecular structure property relationship better.

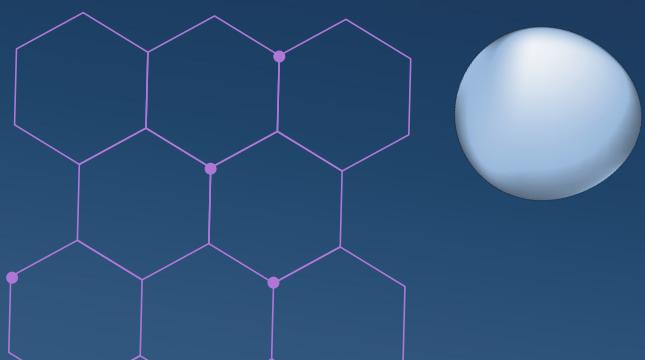


x



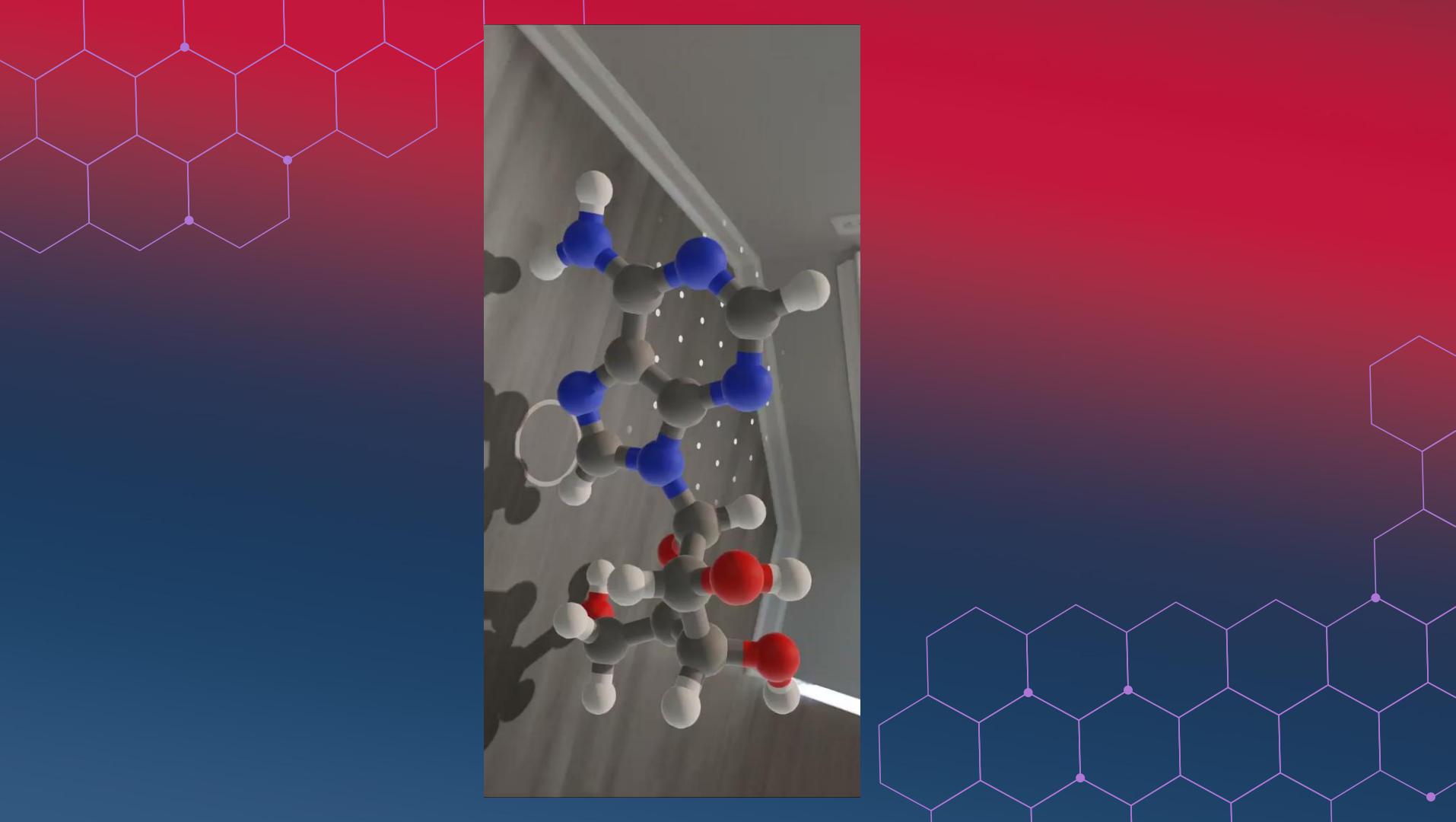
“An interactive AR application
is worth a thousand images”

—**Arganic Molecule Team**



Previous works





What we do differently is ...

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Android OS

Android OS is still the most dominant and convenient mobile platform in the future.

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AR sceneform

AR sceneform is an open-sourced platform for AR development on Android phones.

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Protein Data Bank

Public database for protein structures.



02

UX and UI DESIGN

Double diamond design process

Discovery

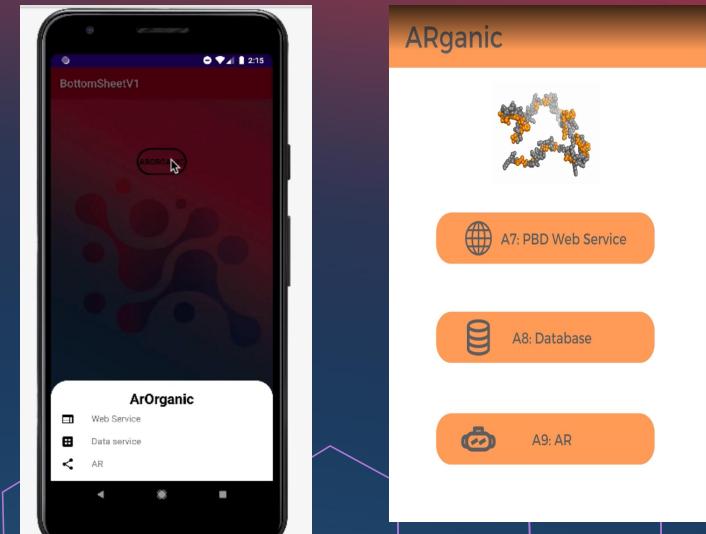
Qualitative data such as survey, user research

Quantitative data such as survey, user research

Define

Develop

Deliver



Firebase

Storage

Files Rules Usage

gs://organicmolecule2-66023.appspot.com

Name Size Type Last modified

- Amino Acids/
- Images/
- Actin Branching by Arp2_3 Complex.jpg 198.71 KB image/jpeg Nov 4, 2022
- Golgi Casein Kinase.jpg 144.05 KB image/jpeg Nov 4, 2022
- HER2_neu and Trastuzumab.jpg 110.78 KB image/jpeg Nov 4, 2022
- Nicotine Cancer and Addiction.jpg 132.12 KB image/jpeg Nov 4, 2022
- Non-Homologous End Joining Supercomplexes.jpg 116.72 KB image/jpeg Nov 4, 2022

Realtime Database

Data Rules Backups Usage

https://organicmolecule2-66023-default.firebaseio.com

https://organicmolecule2-66023-default-rtdb.firebaseio.com/

- Data
- History
- MoleculeSummary
- Notification
- Receiver
- user

Stick It To 'Em

Mobile Number

Password (Optional)

LOGIN

Don't have an account? [Register Now](#)

ARganic Molecule

Tap on any sticker above to Send

From user: 1

ABOUT HISTORY

ARganic Molecule

Sticker sent to:

1

Sun Nov 06 23:31:55 EST '22

Sticker sent to:

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Mon Nov 07 21:28:46 EST '22

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ARganic Molecule

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Note: Select the Category and then the Amino acid

Chart key, Category

Select Category

Amino acid*

Select Amino acid

CONFIRM

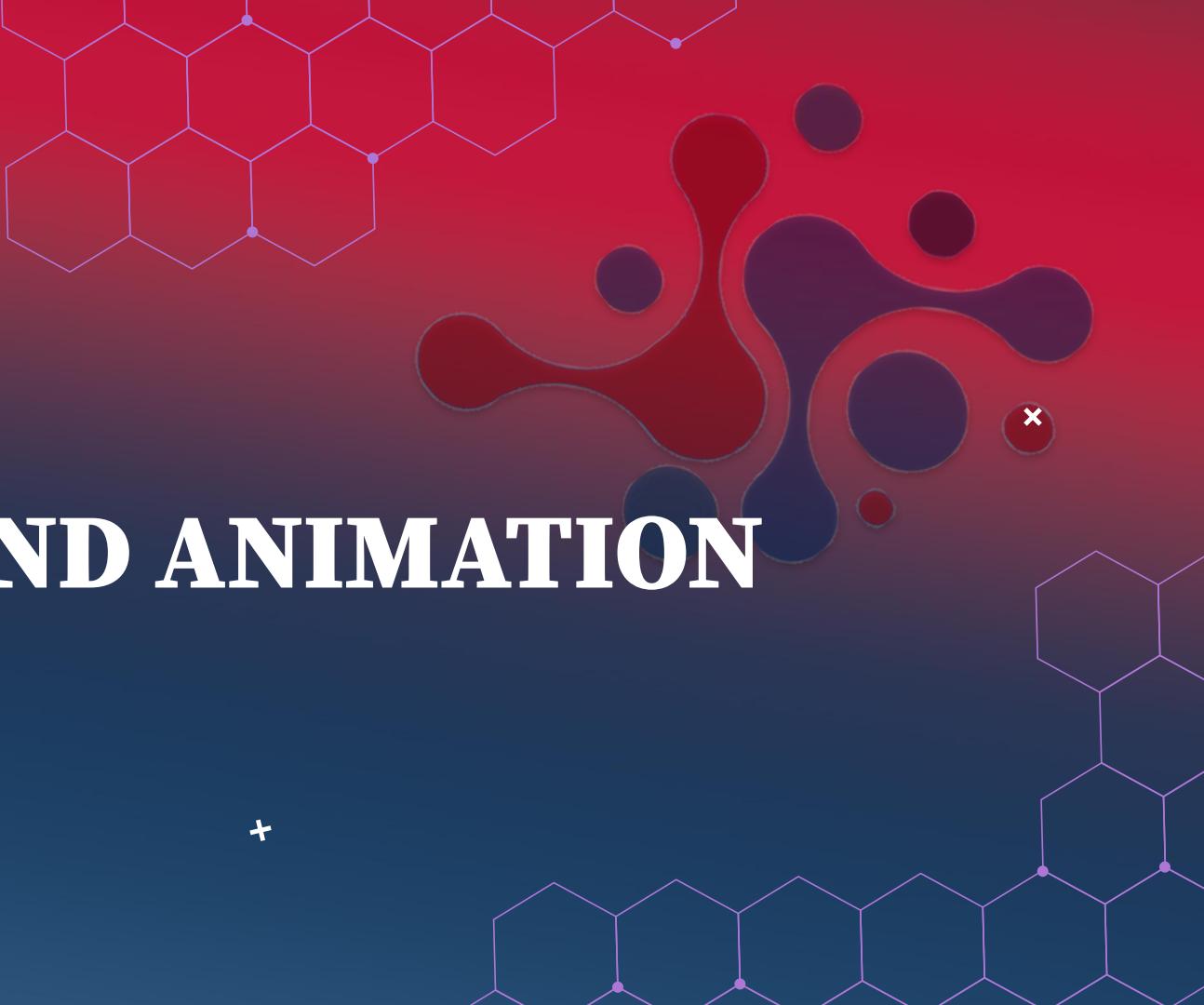
03

UI/UX AND ANIMATION

A window to our app



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Translating design into code into interface

Ideation:

x

- ◆ Coming up with a design by incorporating all the feedbacks we received from our test users and making the theme of the app that goes along with touch of modernity of AR while creating an educational platform to learn about organic molecules was a tricky challenge.

x Design:

- ◆ Our AR project is divided in 4 main components:

i) The first screen is the main activity where user can click on the AR button to try out x our MVP product.

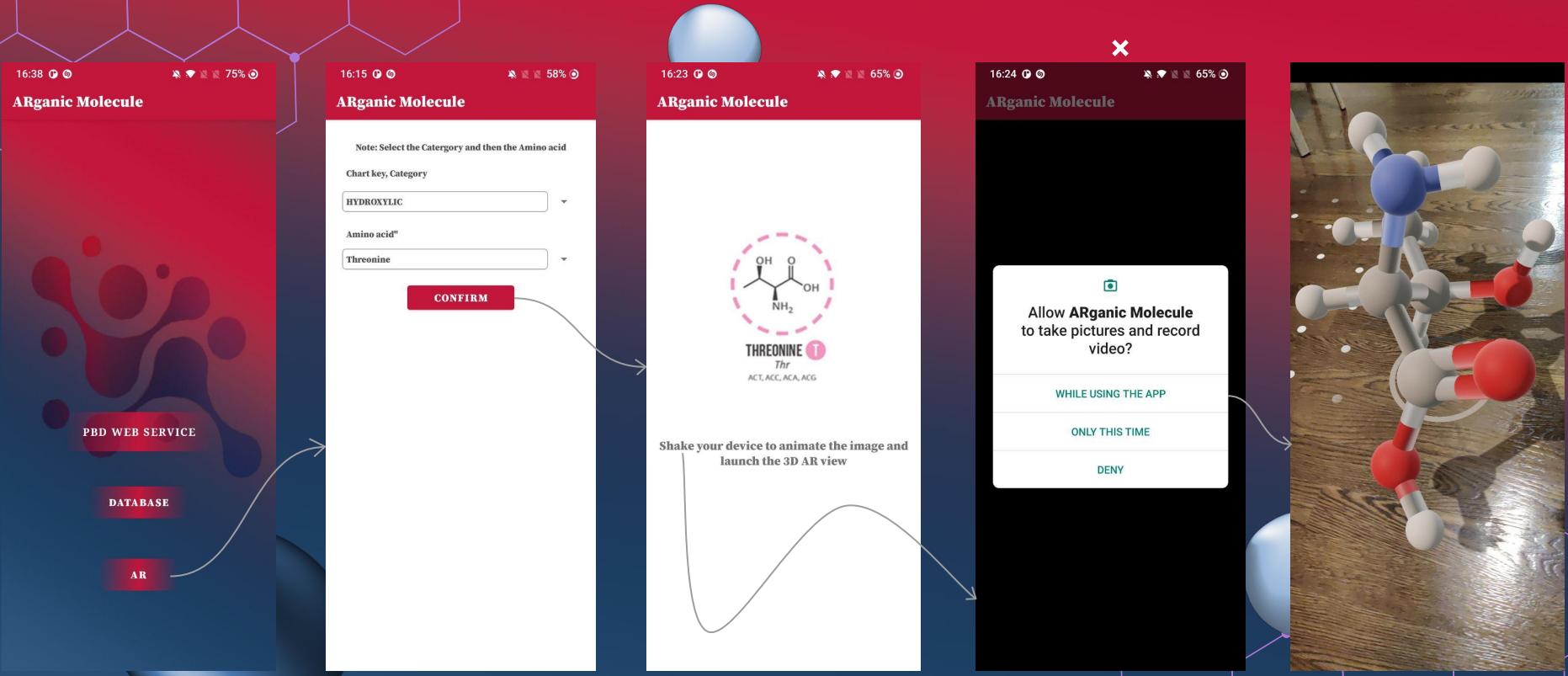
ii) Selecting an amino acid from a dropdown list of 20 amino acids separated categorically on the second activity screen.

iii) Displaying a 2D image of the selected molecule by passing it through intent between the second and third activity screens and giving it an animation using the accelerometer sensor and vibrating motors of a mobile.

iv) The AR screen that uses the camera of a mobile that helps the user to see a 3D model of the amino acid molecule selected by them.



SCREENS



04

AUGMENTED REALITY

Using Firebase for real-time display



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Sceneform is a 3D framework with a physically based renderer that's optimized for mobile devices and that makes it easy for you to build augmented reality apps without requiring OpenGL

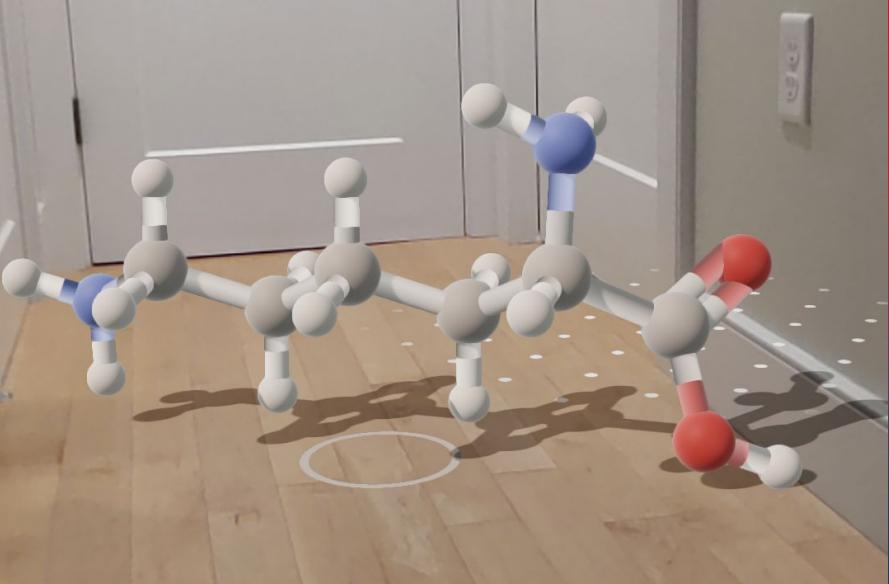


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1. Require the use of User's camera for AR – ArFragment()
2. Create a node that is automatically positioned in world space based on an ARCore Anchor – AnchorNode
3. Make a 3D model and consists of vertices, materials, textures as a renderable – ModelRenderable.builder()
4. Load 3D models(our glb files) at runtime from our Firebase – RenderableSource

SCENEFORM (AR)

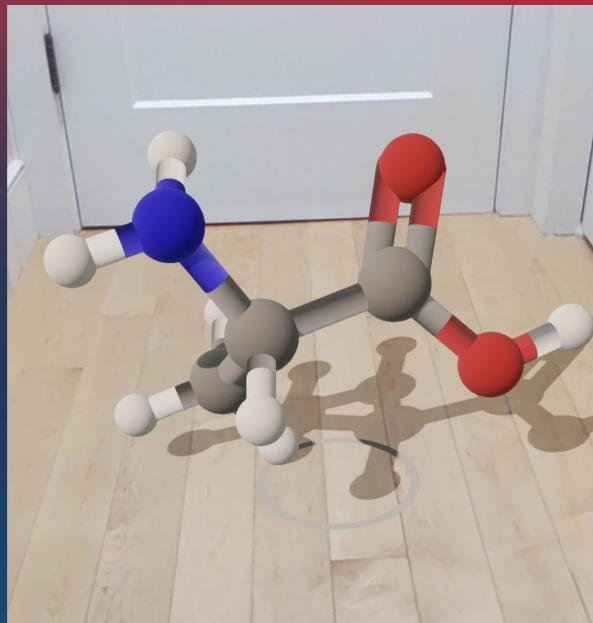
IN A NUTSHELL



USING 3D MODELS

x

REINFORCES THE
LEARNING
EXPERIENCE



How do we set up Firebase with AR?

Working with Models:

- ◆ Creating and Storing our 3D models into connected Firebase Storage
- ◆ We have three activities, so, we need to pass user's choice of Amino Acids as a string to next activity
- ◆ After receiving the intent, we match the name with storage reference
- ◆ Creating temporary files and plug into AR renderable source using
`Uri.parse(file.getPath())`

x

The whole process is pretty straightforward but leads to a lot of learning that will be mentioned in the next section.

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05

FUTURE DEVELOPMENT

Connecting to RCSB Protein Data Bank (RCSB PDB)



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Analyse PDB Molecule archive and 3D display technology

**198,998 Structures from the PDB
1,000,361 Computed Structure Models (CSM)**

Each Molecule Structure is made up by different components.

You can save the structure in mmCIF (a flexible and extensible tag-value format for representing macromolecular structural data) or binary mmcif (more efficient binary encoding) file formats.

Special Format you can get from there:

A typical PDB formatted file includes a large "header" section of text that summarizes the protein, citation information, and the details of the structure solution, followed by the sequence and a long list of the atoms and their coordinates.

Using Bootstrap Lightbox and other js, css files analysing molecule structures and display them in Their 3D-View Web model rendering page

PROJECT STAGES

Work with blob file inside
Android WebView

Upload the 3D models
into firebase storage

Find the work around
texture issue

STAGE 1



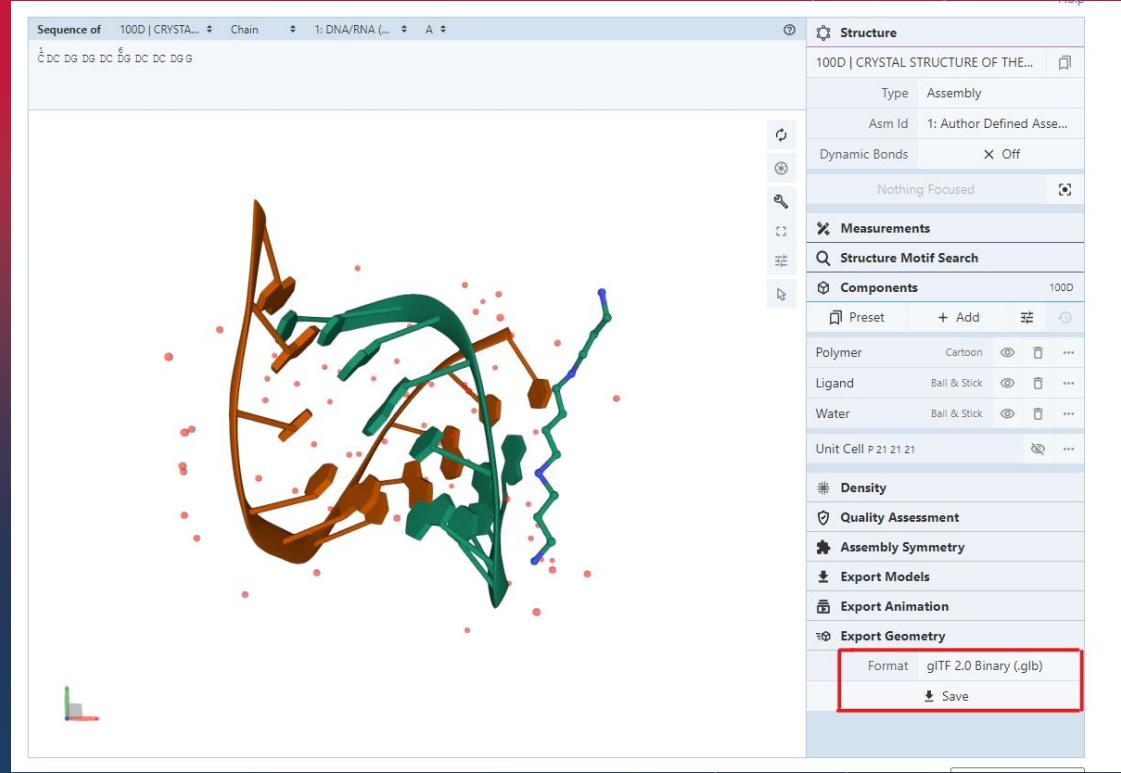
STAGE 2



STAGE 3



Android Webview can only download HTTP/HTTPS URI



Blob url contains url in Encoded format so You have to first convert url to Base64 and then store data in file. For that you need to use JavascriptInterface

Store glb files in firebase storage programmatically



```
private void uploadModel(File file, String FileName) {
    if(file!=null){
        Uri temp = Uri.fromFile(file);
        StorageReference modelRef = FirebaseStorage.getInstance().getReference().child("model/" +FileName);

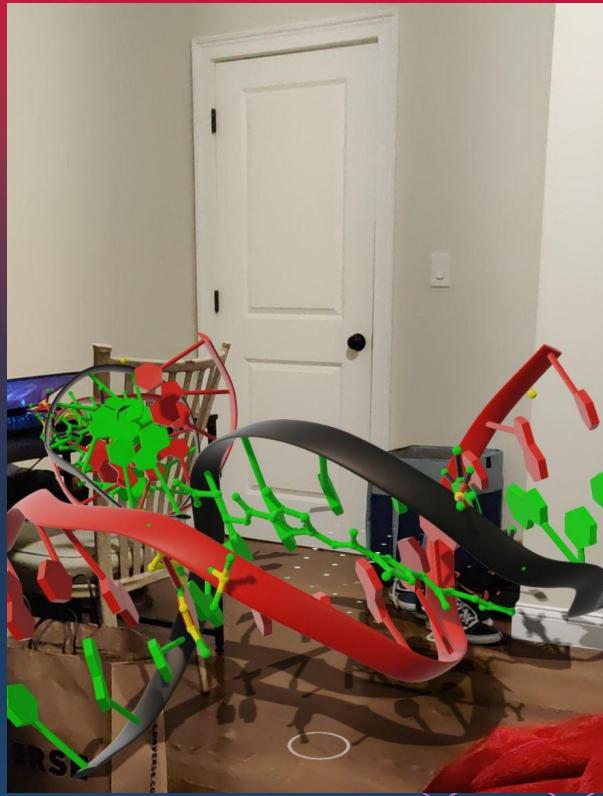
        UploadTask uploadTask = modelRef.putFile(Uri.fromFile(file));
        Log.i( tag: "upload task",uploadTask.toString());
        uploadTask.addOnSuccessListener(new OnSuccessListener<UploadTask.TaskSnapshot>() {

            @Override
            public void onSuccess(UploadTask.TaskSnapshot taskSnapshot) {
                Toast.makeText(getApplicationContext(), text: "success",Toast.LENGTH_SHORT).show();

            }
        }).addOnFailureListener(new OnFailureListener() {
            @Override
            public void onFailure(@NonNull Exception e) {

            }
        });
    }else{
        Toast.makeText(getApplicationContext(), text: "error",Toast.LENGTH_SHORT).show();
    }
}
```

Loading Texture Issue of PDB models using Sceneform





THANK YOU!