

HUMANOID

Project plan and First Increment

Team Number: 12

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Project Objectives

Significance/Uniqueness:

The significance of this application is that it provides real life view of human anatomy and it also features the interactions with the application. This application helps in exploring more features of human anatomy in simple way using voice commands, gestures and gazes from the user based on deep learning concepts, through which we train the model. Our main aim is to provide the real life view of human anatomy with interaction features in Microsoft HoloLens.

System Features:

- Experience the spatial view of human body.
- Users can easily understand the complex human system.
- Can access instantly, just by wearing the head mounted device.
- Users can control the application by using gestures.
- Users can interact with application by voice commands.
- Users can also see the visualization of real time user data extracted

Approach

Data Source:

3D models: We will collect the 3D models of human body from the internet. Major source of 3D models is clara.io, which provides the real-time models for free. Also by using existing objects, we can develop complex models in Unity 3D.

Real-time data: Fitbit smart watch, which provides the data of an individual for the daily activity. Various activities of individual include number of steps, heart rate, number of floors he climbed, number of calories he burned, distance he traversed.

Tools:

- Unity 3D
- Microsoft Visual Studio

Expected Inputs/Outputs:

Input: Major source of input for this application is the real-time data that includes heartbeat, location, weight, sleep data.

Expected Output: Application displays real-time view of human anatomy along with the real-time data in the form of charts and graphs.

Algorithms:

Deep Learning: We will be using deep learning to train our application to respond to voice commands by user. After training and testing with separate sets, application would be able to respond to the voice commands from the users.

Related Work

Open Source Projects:

- There are many applications in the field of medicine using Augmented Reality. Following are some of them.
 - AccuVein: Helps doctors to identify patients' veins.
 - VR Dentist: dental app for educational purposes.
 - Anatomy 4D: Visualizes detailed bone structures.
- By understanding the working of these applications, we want to develop an application that provides real time experience and interaction features to application.

Application Specification:

a. System Specification:

Architecture Diagram:



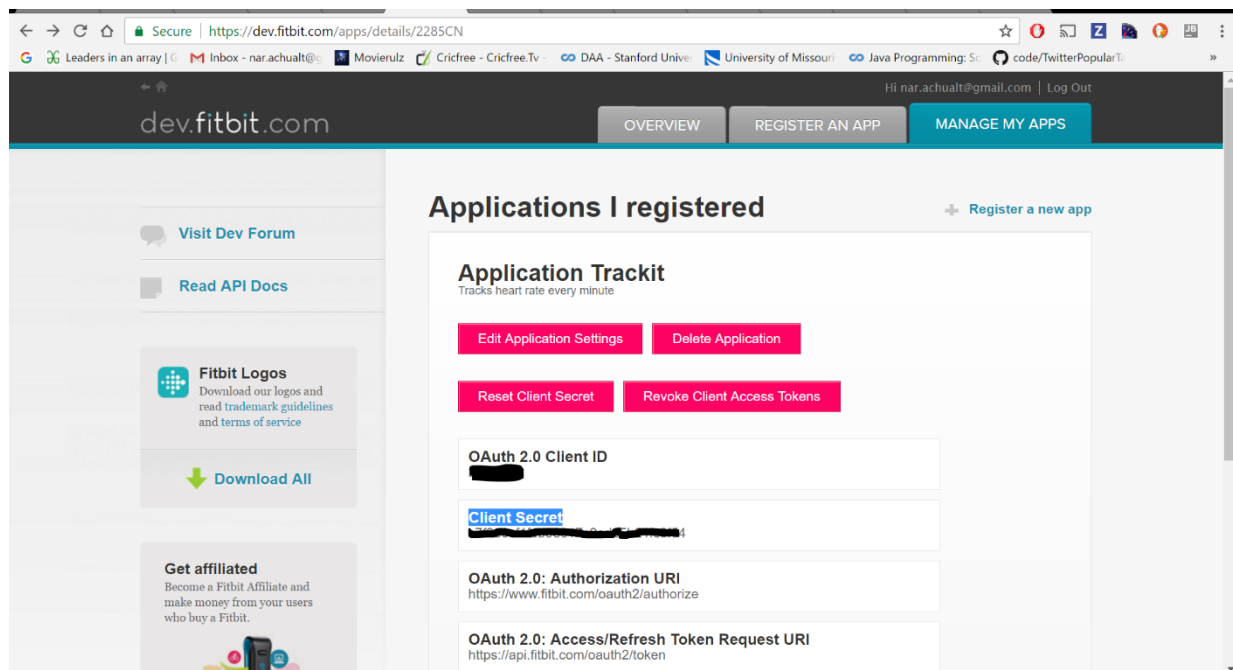
b. Existing applications/services used:

- Fitbit OAuth2.0 for authorization, to access Fitbit data.
- Fitbit API using developer account- <https://dev.fitbit.com/apps/oauthinteractivetutorial>
- Chrome browser for parsing the data.

Implementation

FitBit Data Extraction:

We register an application on Fitbit developer account, and provide the necessary information as required. Once we register we get the - OAuth 2.0 Client ID, Client Secret as shown below



Once we click on the OAuth 2.0 tutorial page we will see the screen below, fill up Client ID, secret key and redirected URI and select the required parameters for the data you want to extract. Here we extracted the data for heart rate.

Then we click on the url generated as shown in Img 3, then we parse the url in text box provided, next we proceed to make request through 'Send to Hurl.it' option as shown in Img 4. Then we give our credentials and allow the application to access our account, then the JSON format is displayed. Then we convert the JSON format data to CSV.

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OAuth 2.0 tutorial page

For a detailed explanation of OAuth 2.0, see the Fitbit API [documentation](#).

1: Authorize

- First, choose the type of flow your application will use. Implicit grant flow is for use in client-side applications that cannot keep a secret because they distribute their source code to the client (web apps, mobile apps). The authorization code flow is for server-side applications that can keep a secret. If possible, use the authorization code flow, because while both flows are secure, it provides additional security.

Flow type: ☒ Implicit Grant Flow ☐ Authorization Code Flow

- Enter all of your application's relevant data below. You can find this data at [dev.fitbit.com](#).

Fitbit URL:

OAuth 2.0 Client ID:

Client Secret:

Redirect URI:

- Choose below what user data you'd like to have access to.

Select Scopes

<input checked="" type="checkbox"/> activity	<input checked="" type="checkbox"/> heartrate	<input checked="" type="checkbox"/> location	<input checked="" type="checkbox"/> nutrition
<input checked="" type="checkbox"/> profile	<input checked="" type="checkbox"/> settings	<input checked="" type="checkbox"/> sleep	<input checked="" type="checkbox"/> social
<input checked="" type="checkbox"/> weight			

- The default expiration times are 1 hour for the authorization code flow, and 1 day for the implicit grant

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Expires In(ms):

- We've generated the authorization URL for you, all you need to do is just click on link below:

https://www.fitbit.com/oauth2/authorize?response_type=token&client_id=2285CN&redirect_uri=http%3A%2F%2Fgoogle.com&scope=activity%20heart%20location%20nutrition%20profile%20settings%20sleep%20social%20weight&expires_in=604800

2: Parse response

Copy and paste the ending part, starting from "#scope.." of the url after user clicked "allow" button. For instance for
uri:https://localhost/# = scope=nutrition&user_id=28GVhZ&token_type=Bearer&expires_in=593433&access_token=blablaToken
#scope=nutrition&user_id=28GVhZ&token_type=Bearer&expires_in=593433&access_token=blablaToken
in input field below

```
#access_token=eyJhbGciOiJIUzI1NiJ9.eyJzdWUiOiI1NURaWkslCjhdWQlOIiYmJ1Q04lCjpc3MlOjGaxRiaXQlCj0eXAiOiJhY2Nlc3NfdG9rZW4lCjZyZ29wZXMiOiJyc29lIHJzZXQgcFJdCBybG9lIHJ3WkgcmhYlHudXQgcGByByc2ZllwZXhwIjoxNDg4NzY4NDM2LjJpYXQlOiJ0E0DgxMzc0MjJ9.-lhCmWu2d7TP8uW4WHuIRGXlWqat-bWZwxuoYQ4b1yr4&user_id=55DZZK&scope=sleep+settings+nutrition+activi
```

scopes: sleep+settings+nutrition+activity+social+heart+profile+weight+location

user id: 55DZZK

time to live:: 601014

token:
eyJhbGciOiJIUzI1NiJ9.eyJzdWUiOiI1NURaWkslCjhdWQlOIiYmJ1Q04lCjpc3MlOjGaxRiaXQlCj0eXAiOiJhY2Nlc3NfdG9rZW4lCjZyZ29wZXMiOiJyc29lIHJzZXQgcFJdCBybG9lIHJ3WkgcmhYlHudXQgcGByByc2ZllwZXhwIjoxNDg4NzY4NDM2LjJpYXQlOiJ0E0DgxMzc0MjJ9.-lhCmWu2d7TP8uW4WHuIRGXlWqat-bWZwxuoYQ4b1yr4

3 Make Request

Finally, when you have an access token, you can start making requests. If you had a token before, you don't need to go through steps 2-3, just paste your token below and make sure you enter your app data in step 1. We only support GET requests at the moment in this tutorial. But please feel free to check out other types of requests in the docs too on your own.

OAuth 2.0 Access Token:

API endpoint URL:

```
curl -i
-H "Authorization: Bearer eyJhbGciOiJIUzI1NiJ9.eyJzdWIiOiI1NURaWksiLCJhdWQiOiIyMjg1Q04iLCJpc"
https://api.fitbit.com/1/user/-/activities/heart/date/today/1d/1sec/time/00:00/00:01
```

[Copy to clipboard](#)

[Send to Hurl.it](#)

[embedcurl.com by Runscope](#)

X-Frame-Options: SAMEORIGIN

BODY

[view raw](#)

```
{
  "activities-heart": [
    {
      "customHeartRateZones": [],
      "dateTime": "today",
      "heartRateZones": [
        {
          "max": 98,
          "min": 30,
          "name": "Out of Range"
        },
        {
          "max": 137,
          "min": 98,
          "name": "Fat Burn"
        },
        {
          "max": 166,
          "min": 137,
          "name": "Cardio"
        },
        {
          "max": 220,
          "min": 166,
          "name": "Peak"
        }
      ]
    }
  ]
}
```

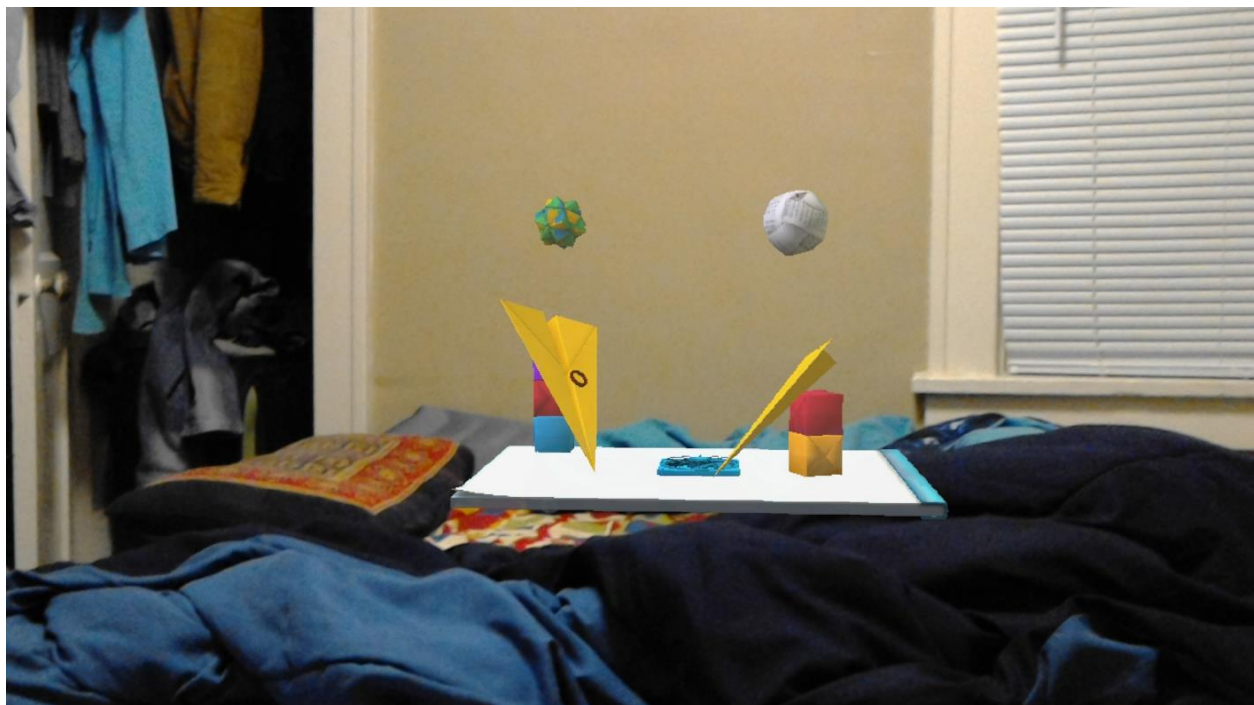
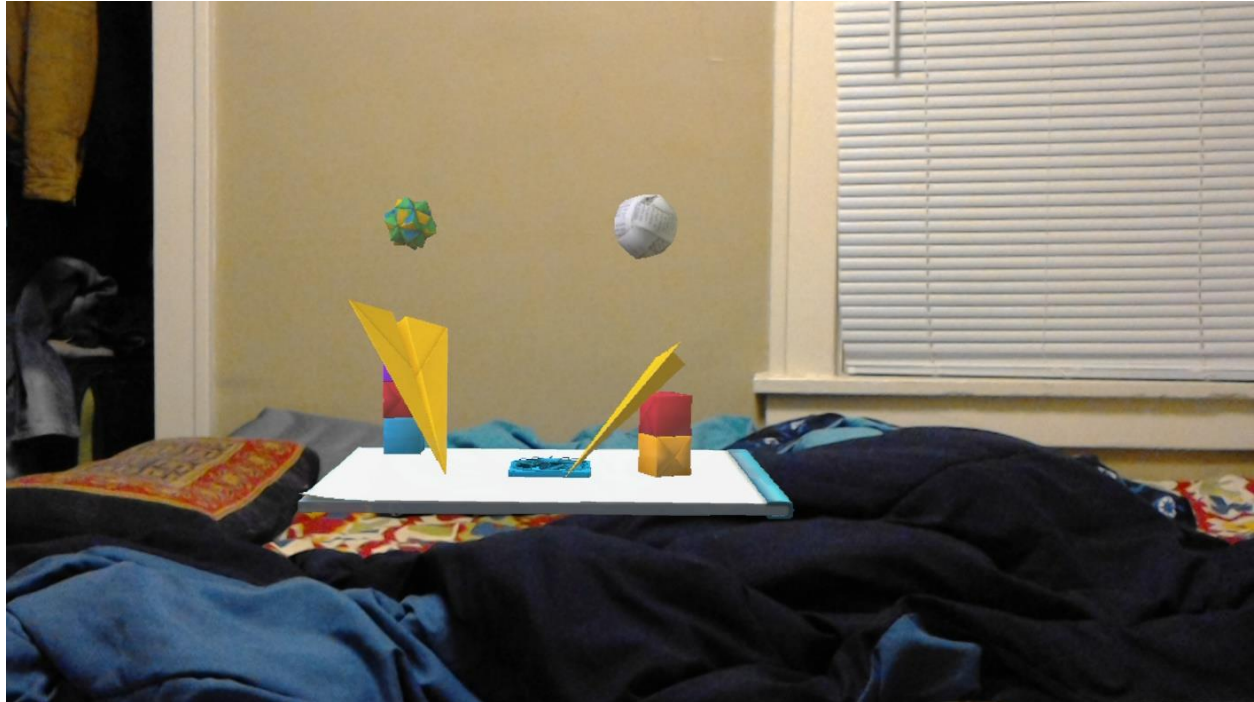


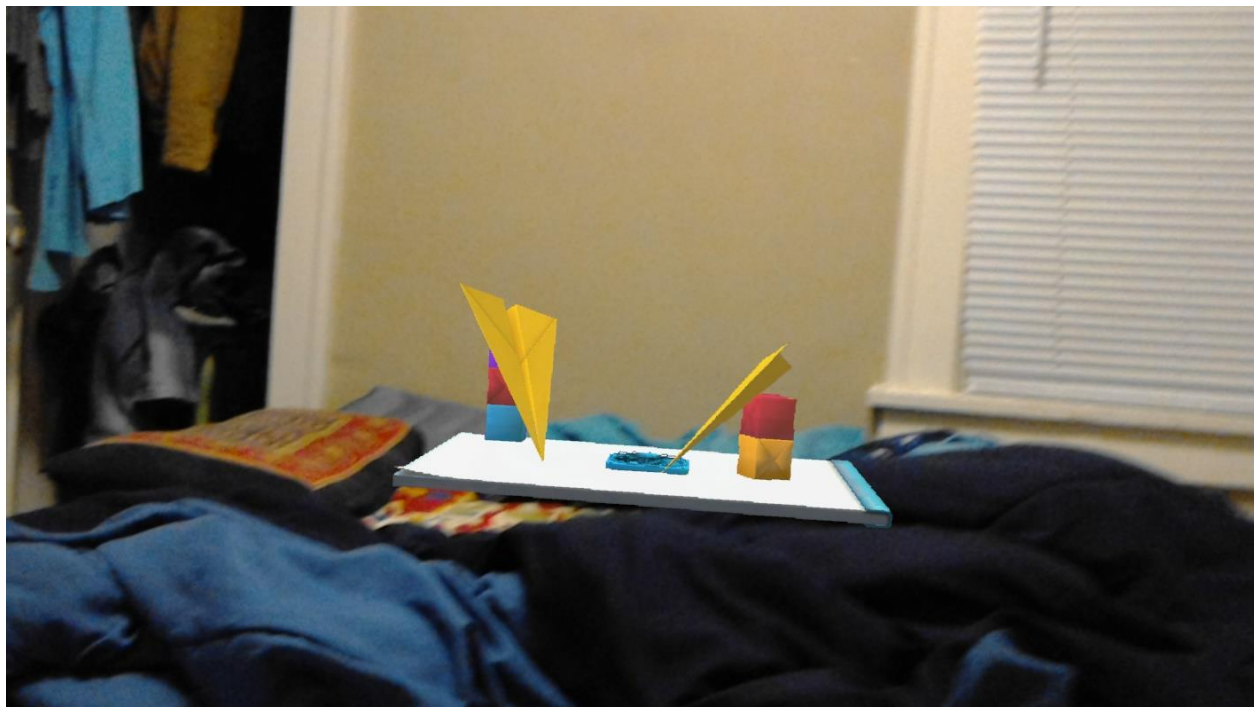
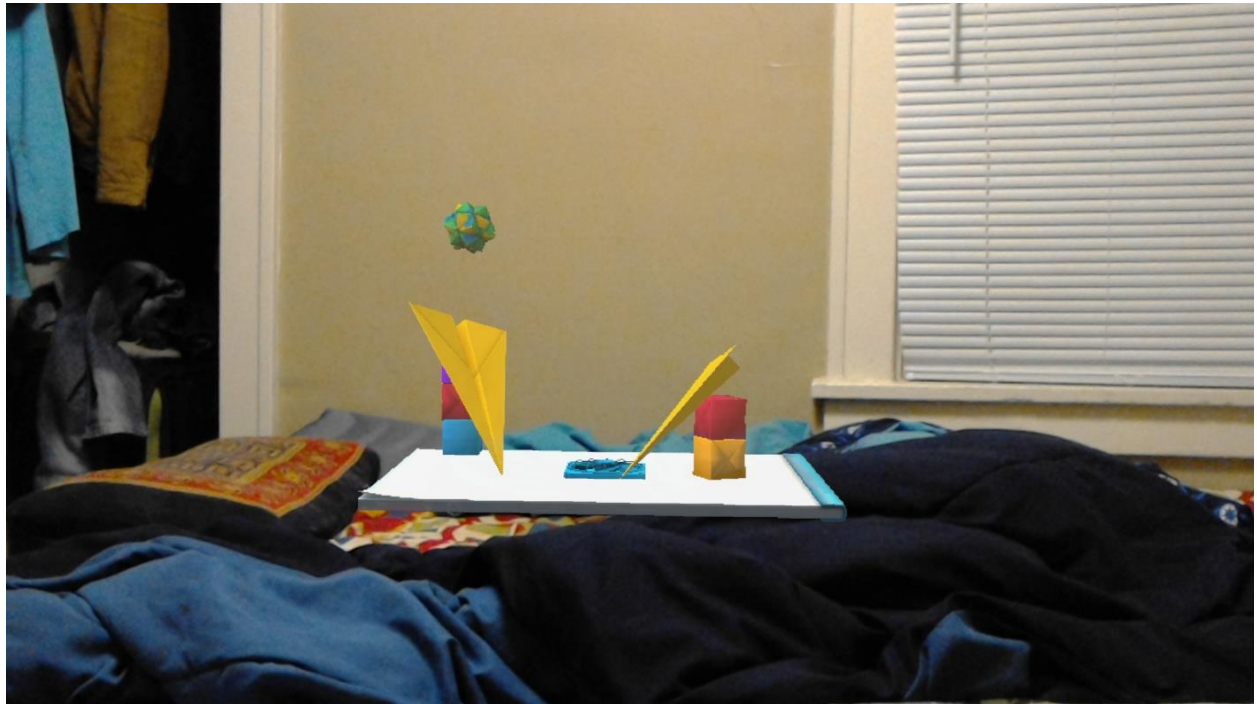
Microsoft Excel
Worksheet

The extracted data is saved in csv file.

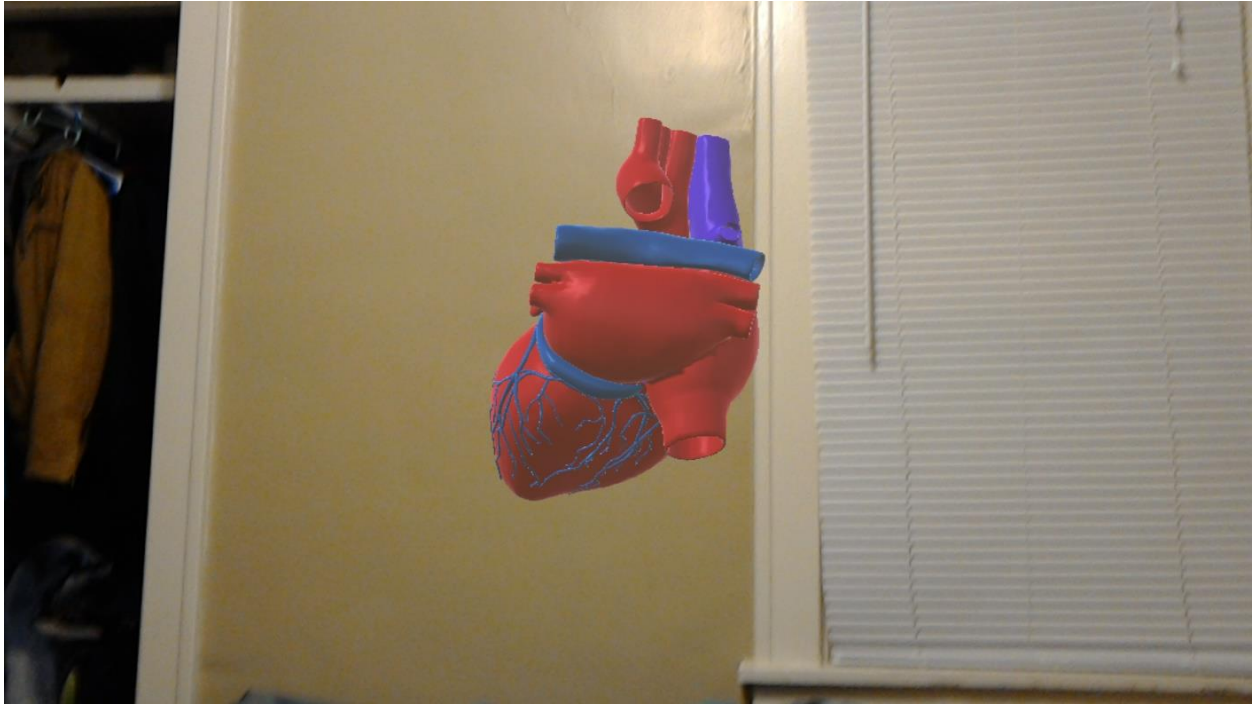
HoloLens:

We have implemented the basic origami with gaze, gestures, voice command and installed it to Microsoft HoloLens. Following screenshots corresponds to the implementation part of the application.





We have also installed a basic heart model to the HoloLens.



Project Management

Project Timelines and Responsibilities:

ramgopalm / Big-Data-Analytics-and-Applications-Project

Unwatch 1 Star 0 Fork 1

Code Issues 4 Pull requests 0 Boards Reports Projects 0 Wiki

Filters is:issue is:open Labels Milestones New issue

4 Open 0 Closed

Author Labels Milestones Assignee Sort

- Upload Fitbit data to Unity enhancement 5
#4 opened 40 minutes ago by ramgopalm Increment 1 New Issues
- Add Gaze to the unity model enhancement 3
#3 opened 41 minutes ago by ramgopalm Increment 1 New Issues
- Extract data from FitBit enhancement 8
#2 opened 42 minutes ago by ramgopalm Increment 1 New Issues
- Creating Heart model in unity enhancement 8
#1 opened 43 minutes ago by ramgopalm Increment 1 New Issues

ProTip! Updated in the last three days: updated:>2017-02-24.

ramgopalm / Big-Data-Analytics-and-Applications-Project

Unwatch 1 Star 0 Fork 1

Code Issues 4 Pull requests 0 Boards Reports Projects 0 Wiki

Burndown Velocity tracking

Increment 1


Milestone for Project Increment 1

Edit Milestone Milestones

Labels Hide Pull Requests Burn Pipelines

Start: Feb 20, 2017 Edit Due: Feb 28th, 2017 Edit

weekends ideal completed



24 Total Story Points 4 Total Issues and Pull Requests

Work Completed:

- Created Origami 3D model in Unity 3D
- Developed the basic Hologram model 'Origami' to the Microsoft HoloLens
- Added interactions to the Origami model by using c#.net
- Developed a basic human heart model and installed it to HoloLens
- Extracted the heart data from the Fitbit to excel sheet

Work to be completed:

- Need to develop complex human body model in unity 3D
- Develop interactions with the human model by using c#.net
- To display Fitbit data along with the Unity model in HoloLens

Issues:

- Creating human model in unity 3D.
- Adding interactions to the created model.

Contributions:

- Sri Sai Narayana Ram Gopal Mangena – 50%
- Achyuth Reddy Nalamadgu – 50%

Bibliography

- <https://www.biodigital.com/developers>
- <https://www.eonreality.com/portfolio-items/virtual-anatomy-simulationv>
- https://developer.microsoft.com/en-us/windows/holographic/holograms_101
- [Github.com](https://github.com)
- <http://www.medpagetoday.com/practicemanagement/informationtechnology/59072>
- <http://anatomy4d.dagri.com/>
- <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0091276>
- <http://www.acculvein.com/home/>
- <https://developer.microsoft.com/en-us/windows/holographic/documentation>