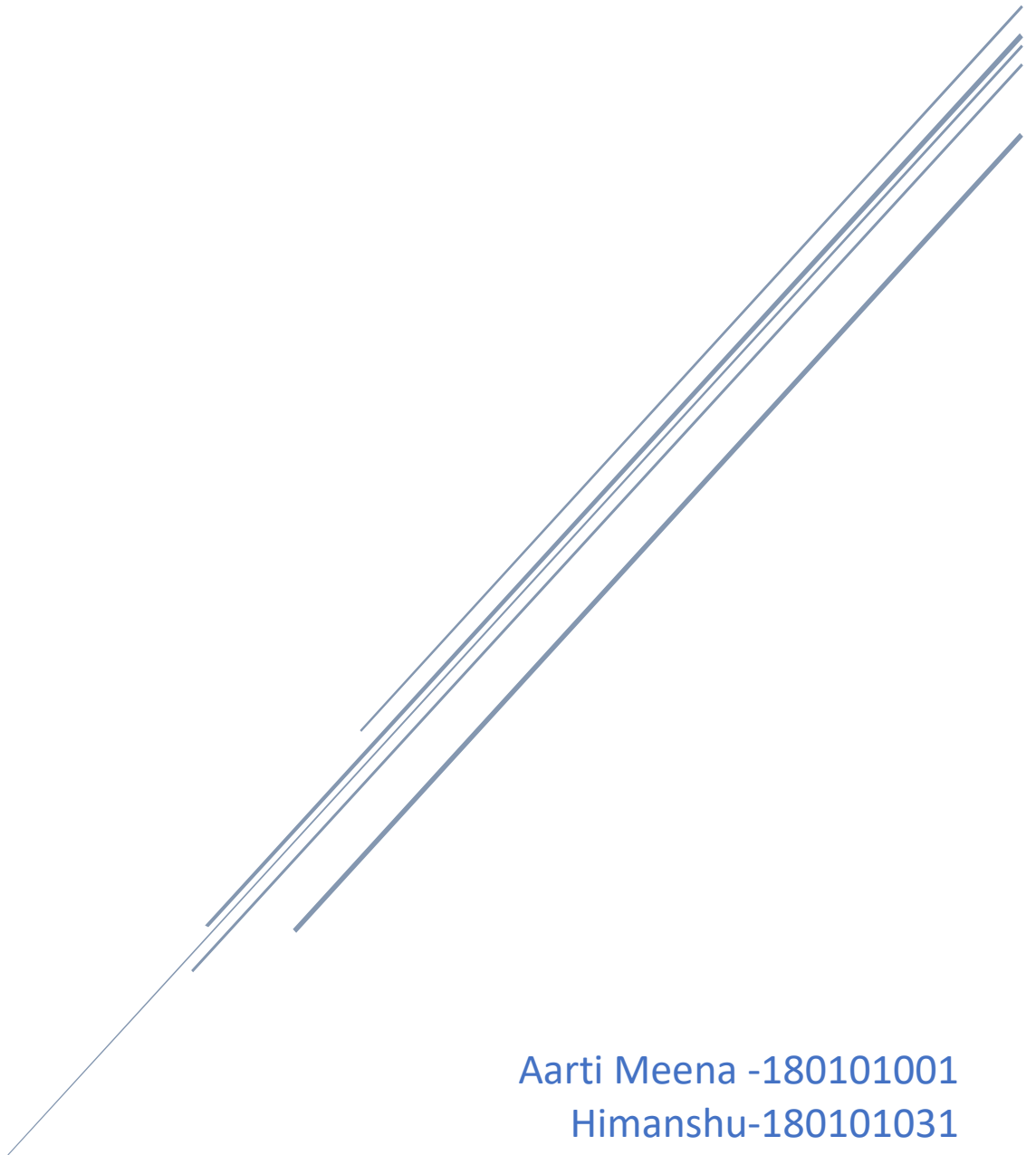


DESIGN DOCUMENT

INTERACTIVE HUMAN DIGESTIVE SYSTEM VR TOUR

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Introduction

This document will give the information about overall architecture and implementation of an Interactive Human Digestive System through Virtual Reality. This document consists of Data Flow Diagram (DFD) to show the processes that are involved in the software and flow of data from the input to output and reports its generation. Lastly this document will show the Entity Relationship Diagram (ER diagram) to give the overview of how database is managed.

System Overview

This software is designed to give practical understanding to the students about human digestive system through Virtual reality simulations as visualisation gives far more insight into the topic than theory. System will provide a virtual environment of human digestive system and observer can move and rotate the virtual environment as per the convenience. It will also give the information about the different organs present in the digestive tract.

Functions Involved in The System

The simulations involved in the system have two parts:

1. Static: In Static Mode, the users will be able to view the various organs of the digestive system and interact with them which will enable them to view information about that particular organ.
2. Dynamic: the simulation will show how the food is processed and undergoes various cycles while passing through the digestive system which will allow the users to get a visually better idea and context about the whole working of the human digestive system.

Movements and Rotation of the virtual environment:

1. Move FPV Forward
Input: Pressing Forward Button on VR input device
Alternate Input: Pressing Forward Arrow on Keyboard
Output: Increments the X coordinate value of FPV
2. Move FPV Backwards
Input: Pressing Backward Button on VR input device
Alternate Input: Pressing Backward Arrow on Keyboard
Output: Decrements the X coordinate value of FPV

3. Move FPV Left

Input: Pressing Left Button on VR input device

Alternate Input: Pressing Left Arrow on Keyboard

Output: Increments the Y coordinate value of FPV

4. Move FPV Right

Input: Pressing Right Button on VR input device

Alternate Input: Pressing Right Arrow on Keyboard

Output: Decrements the Y coordinate value of FPV

5. Move FPV Upwards

Input: Pressing Up Button on VR input device

Alternate Input: Pressing + (Plus) Key on Keyboard

Output: Increments the Z coordinate value of FPV

6. Move FPV Downwards

Input: Pressing Down Button on VR input device

Alternate Input: Pressing - (Minus) Key on Keyboard

Output: Decrements the Z coordinate value of FPV

7. FPV Rotation

Input: Head Gesture using VR headset

Alternate Input: Mouse Cursor Movement

Output: Change in Rotation Value of FPV

Information About the Organ:

Input: Interaction Button Press on VR input device

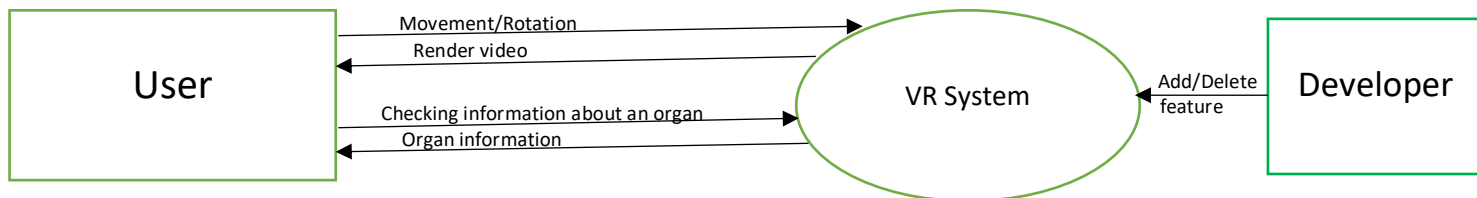
Alternate Input: Mouse Click

Output: Displays a pop-up screen with organ information

With keeping these functions in mind, we have created DFD (Level 0 and Level 1) which will show the flow of data and processes taking place in the software.

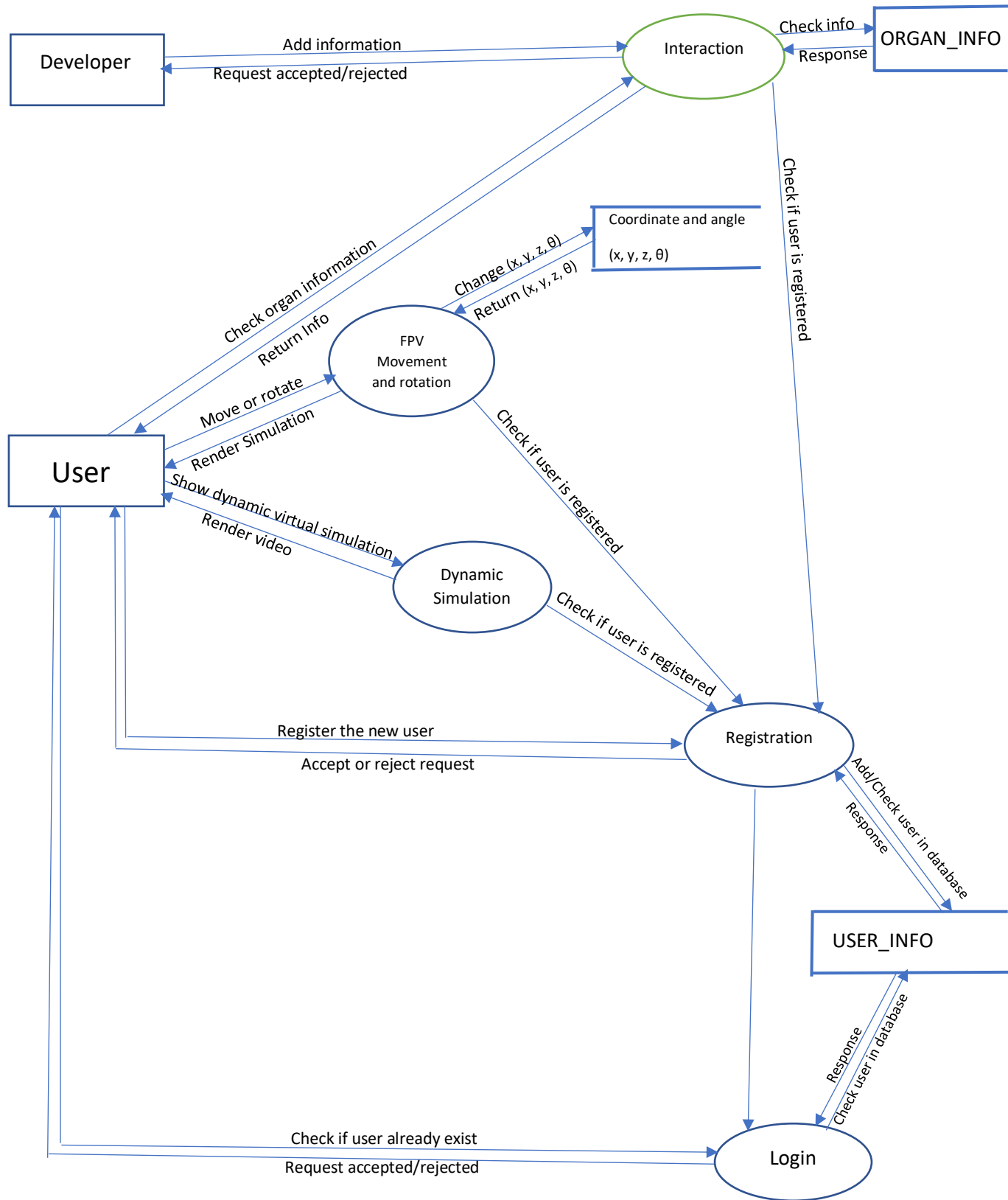
DATA FLOW DIAGRAM(DFD)

Level 0:



- As this is the context diagram, we have packed all processes taking place in the software into one and represented it by VR System.
- We have two external entities in this case:
 1. User
 2. Developer
- Input given by user and output provided by the system are written on the top of the arrows.
- In case Developer wants to add or delete information about any organ then he/she has been provided with an option to change the trivia about the organ.
- User performs two functions:
 1. Move and rotate the virtual environment.
 2. Get detailed information about the organ.

Level 1 Diagram:

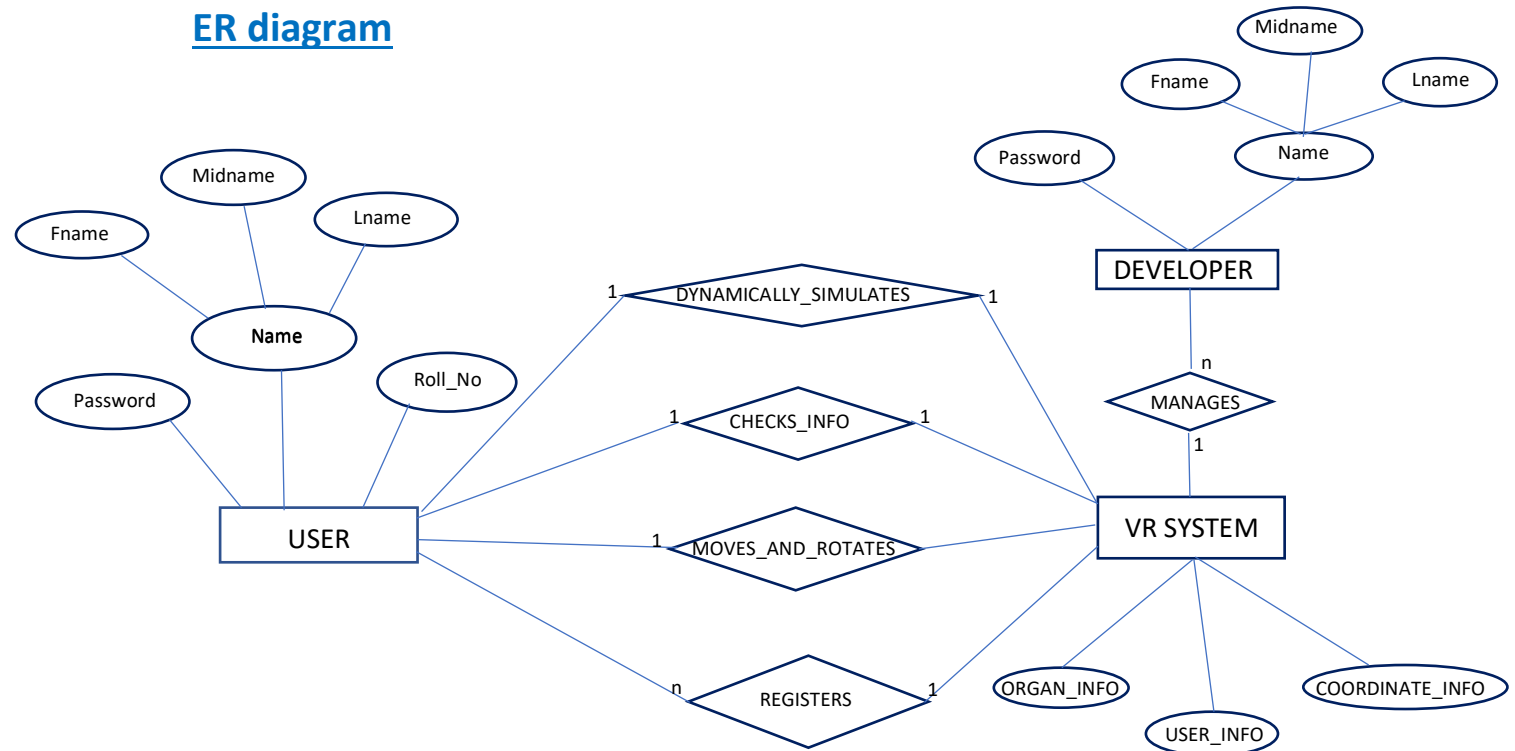


- User performs five functions:
 1. Interaction: If user wants to know detailed information about any organ then he/she has to click on that organ and a box containing description will appear in the front of user. As soon as “Interaction” process will get request to show the information, it will check “ORGAN_INFO” database and retrieve the information and pass it to the user.
 2. FPV Movement and Rotation: To get better visualisation of human digestive system, user can move and rotate the environment according to their will. According to the request made by the user, “FPV Movement and Rotation” process will change the coordinates and angle of the virtual environment in the database represented by the Data store “Coordinates and angle” and render virtual simulation with the changed parameters.
 3. Dynamic Simulation: In Dynamic Simulation, User will get better perspective of how the food is processed and go through various cycles in the human digestive tract. Once the process get demand for dynamic simulation, it will render the video to the user.
 4. Registration: If the system encounters the new user, it will store the information about the user in its database (“USER_INFO” in this case) and will provide the password to the user for further logins.
 5. Login: If the user is already registered then he/she can login using the name and password and the “Login” process will check the credentials in its database (“USER_INFO”) and accept/reject the request.

Before using the features of the software user needs to be registered in the system. So, if anyone wants to use the functions of the software and he/she is not registered then system will automatically get redirected to Registration/Login page and once the

registration/verification of the user is done then he/she is allowed to use the software.

ER diagram



- So, we have three entities in the system:
 1. User: Attributes attached with the user are the name, Roll_No and Password. Name is further subdivided into three sub-attributes namely FName (First name), Midname (Middle name) and Lname (Last name).
 2. VR SYSTEM: Attributes attached with the VR SYSTEM are ORGAN_INFO (contains information about different organs present in human digestive tract), USER_INFO (contains information about the name and password of the registered users) and COORDINATE_INFO (contains information about the coordinates and viewing angle of the virtual environment).
 3. DEVELOPER: Attributes associated with developer are name of the developer and password required for the login.

- USER and VR SYSTEM are related to each other by 4 processes:
 1. DYNAMICALLY_SIMULATES
 2. CHECKS_INFO
 3. MOVES_AND_ROTATES
 4. REGISTERS
- USER and VR SYSTEM are related to each other by “MANAGES” process.
- All the processes mentioned above are already been explained in Level 1 DFD.