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Gestation 3D

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◠ **D**-Simulation and Modeling ○ **E**- Smartphone Application

1 Project Description

1.1 Problem Statement

The gestation period is the nine months period of baby development inside a woman's womb. During this period, most of the women are not aware about the changes taking place inside their body. How does a single cell changes into a baby? Talking about gestation period is considered a taboo in our society. Some of the pregnant women do not feel comfortable discussing about their physical and mental conditions. They have no guidance for the whole process. They need a time to time guidance. A doctor can recommend proper diet plans along with exercises for different stages of their gestation period. But going to the doctor can be physically difficult for a pregnant woman and some women simply feel shy about going to a doctor. Being outside their city, there may arise an emergency situation when the woman needs to see a doctor immediately. She might not know the location of the hospital. Nascent children are very delicate to handle and their parents, sometimes, do not have guidance on how to physically handle the baby. There are some already developed systems on the process of gestation but they are too technical and developed for doctors or medical students. They are not for general users and provide no proper diet plan or exercises for pregnant women. By developing **"Gestation 3D"**, we would learn the skills of 3D Object Modelling, Android Programming, Virtual and Augmented Reality.

1.2 Problem Solution

We are going to develop an application about gestation period, "**Gestation 3D**". The main purpose of **Gestation 3D** is to provide user with guidance and information about gestation period. It would guide user about how to handle a newly born child. In case of an emergency when a woman needs to see a doctor immediately, **Gestation 3D** would locate the nearby hospitals. **Gestation 3D** will provide user with information in text and images about the gestation period. **Gestation 3D** will provide user with ideal 3D models of the baby in different stages of development inside the womb. **Gestation 3D** would also provide with the details of ideal diet and exercises for the mother during each gestation stage. The user can observe the whole process of baby development in virtual reality. By using Augmented Reality, the user will learn how to carry, feed and lay down the baby properly. **Gestation 3D** would also locate the user using the GPS and provide locations of the hospitals that are located in the 10 KM radius. **Gestation 3D** would be easily available for any smartphone user and he/she can get guidance and help from it. A user can take a quiz to test his knowledge about the overall process of the gestation period. The user can also visually test his techniques about handling a child.

1.3 Related System Analysis

Existing Systems Analysis		
Application Name	**Weakness**	**Targeted Project Solution**
3D Atlas Embryo	Only covers gestation period between 15 to 60 days of pregnancy only. It contains 3D pdf files which cannot be easily used by laymen.	**Gestation 3D** would cover the full 9 months period of pregnancy using different development stages as checkpoint. It is an android application that can be used by any user.
PregApp – 3D Pregnancy Tracker	The app does not provide any help for the mother in terms of ideal diet plans and exercises. The app says it is free but they charge if the user cross week 30, misleading the user.	**Gestation 3D** would provide ideal diets and exercises for good heath of the baby and mother. The terms and conditions of the app would clearly define the pricing.
Baby Development Week By Week	All about information and static images and provide no interactive models of the week by week development of the baby. Some of the content is very offensive and illustrate no research behind it.	**Gestation 3D** would have 3D models of the stages of baby's development along with labeled parts of the body. It would have content directly by the doctor or the research papers on the topic.

1.4 Advantages/Benefits of proposed system

Following are the advantages/benefits of our system:

- **Gestation 3D** would be **easy to use**, compared to those already developed systems of the same kind.
- Being a smartphone application, **Gestation 3D** would be **easily available** for any general user who wants to learn about the process.
- **Gestation 3D** will **practically demonstrate** the handling of newly born baby in an efficient way.
- **Gestation 3D** will **increase the knowledge** of the person about development and handling of baby.
- **Gestation 3D** will be a **reliable source of information** as the information is based on practical knowledge of doctors and research papers.

1.5 Scope and Modules

A user will download **Gestation 3D** from app store. He/she will make his/her profile in the application. Then the user will be taken through an overview of the application and described all

the features of **Gestation 3D** and how they can be used. Using **Gestation 3D**, the user will be given a textual introduction to gestation period in 2D using simple images and text. In the next step, user can view baby's development that is divided into different stages and at each stage user can view the guide about ideal diets and exercises at each stage. In the next step, the user can view the whole gestation process in 3D using virtual reality. Furthermore, the process of handling the baby can be viewed by the user in augmented reality. Using the baby as the marker, the user can view options on how to handle baby in situation like feeding, carrying and lying down. After learning about the process, user can also take a quiz about the gestation period as well as the handling of the baby. This way he can evaluate his knowledge on the subject. Now if the user is a pregnant woman and in an unknown place or city, she can get locations of the nearby hospitals in case an emergency situation arises.

Modules of Gestation 3D:

Following would be the modules of **Gestation 3D**:

M1: User Management

The purpose of this module is to make a profile for the user who downloads and installs **Gestation 3D** on his smartphone. The user will give his/her personal details. Following are the features, the module would contain:

- **M1F1:** The user would sign up for an account.
- **M1F2:** The user would log in to **Gestation 3D**.
- **M1F3:** The user can change his/her account password.
- **M1F4:** User's information would be sent over and stored in server.
- **M1F5:** User can log out of **Gestation 3D**.

M2: Textual and Graphical 2D Information

The information regarding the gestation period would be displayed in simple textual format along with related images. Following are the features, the module would contain:

- **M2F1:** The user can view the information of overall process of gestation period in text.
- **M2F2:** The user can view the information of overall process of gestation period in images.
- **M2F3:** The user can view the gestation period stage wise in textual form.
- **M2F4:** The user can view the gestation period stage wise in image form.
- **M2F5:** The user can search for a specific stage in gestation period.

M3: 3D Modelling Gestation Period Stages

This module includes the 3D view of all gestation period stages that will be rotatable and the user can look at different parts along with the information on that part. Following are the features, the module would contain:

- **M3F1:** The user can view a particular stage in gestation period in 3D.
- **M3F2:** The user can look at the model from different angels.
- **M3F3:** The user can view the details of a specific part in a specific model.
- **M3F4:** The user can look at the ideal diets in textual form at each development stage.
- **M3F5:** The user can look at the ideal exercise in image form at each development stage.

M4: Virtual Reality Experience

The purpose of this module is to display all of the stages of gestation period summed up in a video that user can view in virtual reality and see the process of the baby's development from fetus to a fully grown baby inside the womb. Following are the features, the module would contain:

- **M4F1:** The user can view the full development process of the baby in virtual reality.
- **M4F2:** The user can pause the video at any moment to look at the details of the baby at a specific time interval.
- **M4F3:** The user can zoom in to look at the details closely.
- **M4F4:** The user can jump at a specific stage of gestation period.

M5: Augmented Reality Baby Handling Guide

This module would show the handling of the baby in different situations like sleeping, carrying and feeding in augmented reality. Following are the features, the module would contain:

- **M5F1:** The user can view the newly born baby in augmented reality using marker.
- **M5F2:** The user can look at the proper way to feed baby.
- **M5F3:** The user can look at the proper way to carry a baby in arms.
- **M5F4:** The user can look at the proper way to lay down the baby to sleep in a proper way.

M6: Mother's Health Guide

This module would describe ideal diet plans along with the exercises at each development phase during the gestation period. Following are the features, the module would contain:

- **M6F1:** Mother's Health guide would have ideal diet plan for each specific stage.
- **M6F2:** Mother's Health guide would have proper exercises for each specific stage.
- **M6F3:** A diet plan of a specific stage would have proper edibles that are necessary for the health of the child as well as the mother.
- **M6F4:** Diet plan would suggest ideal breakfast, lunch and dinner diets.
- **M6F5:** The diet plan would also suggest the drinks and juices that would help the women in her pregnancy.

M7: Show nearby Hospitals

This module of **Gestation 3D** will help women who are in need of a doctor to easily locate a hospital within their 10 Km radius. Following are the features, the module would contain:

- **M7F1:** Users can locate the nearby hospitals from their location
- **M7F2: Gestation 3D** would detect the user's location.
- **M7F3:** Using user's location, **Gestation 3D** would detect the hospitals in 10 Km radius using google maps.
- **M7F4:** User can select any of the nearby hospitals to see the route from his location to hospital.

M8: Help Guide for Gestation 3D

This module would guide the user whenever a user needs some guidance related to any part of **Gestation 3D**. The user would be navigated using text and images. Following are the features, the module would contain:

- **M8F1:** User can use the Help Guide to see all the features that **Gestation 3D** provides.
- **M8F2:** User can look for the frequently asked questions and their answers.
- **M8F3:** User can take a complete tour of **Gestation 3D**.
- **M8F4:** Help guide would contain "Terms and Conditions" of **Gestation 3D**.

1.6 System Limitations/Constraints

It will only act as a guidance and will not completely replace the doctor. The diets and exercises described in the software are for the ideal conditions. **Gestation 3D** will require internet connection and would require the user to be logged in. The baby development shown in **Gestation 3D** are only for ideal conditions and does not take into account women's physical, psychological or environmental factor. **Gestation 3D** does not show the development of twin babies. The augmented reality handling of the baby can only be done through the available functions of **Gestation 3D**. The location of the nearby hospitals depends on how accurately the user's position is detected through the phone's GPS.

1.7 Tool and Technology

Following are the tools and technologies along with their version and purpose in the development of **Gestation 3D** that we are going to use:

	Tools	**Version**	**Purpose**
Tools	Android Studio	2.3.0	Developing the front-end of **Gestation 3D**

And Technologies	MS SQL Server	2016	For storing data related to **Gestation 3D**
	MS Word	2016	For the documentation of **Gestation 3D**
	MS Power Point	2016	To design presentations of related documentation of **Gestation 3D**
	MATLAB	8.5	Simulation of 3D models
	Pencil	2.0.5	For drawing diagrams in documentation
	ARPA SDK	2016	To implement augmented reality related features of **Gestation 3D**
	Cinema 4D	2016	To implement virtual reality related features of **Gestation 3D**
	Technology	**Version**	
	Java	7.0	Implementation of android programming
	SQL	2016	Storing and retrieving of data in database of **Gestation 3D**

1.8 Data Gathering Approach

To gather data on **Gestation 3D** we will visit a gynecologist on regular basis to interview, and gather information of each development stage in gestation period. Along with the guidance of the

ideal diet plan and exercises that can be recommended to pregnant women. We would also get guidance about handling of new born baby from the doctor. In order to develop 3d models of each stage we will perform a comprehensive study on the gestation period using books and internet related to gynecology and embryology.