DashFit

AR Virtual Try-On for clothing items using Unity and Pose Detection

Project Proposal

(7th Semester)

BY

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INDUSTRY MENTOR: *Mr. Arsalan Rashid (Systems Ltd.)*

SUBMITTED TO
The FYP Committee

Abstract

Our project proposes the development of an innovative mobile application that combines computer vision and augmented reality (AR) technologies to revolutionize the way users try on clothing. This AR-based system will allow users to virtually try on a wide range of clothing items from the convenience of their mobile devices. By leveraging 3D models and real-time camera input, users can visualize how various garments will look on them, ultimately enhancing their online shopping experience.

PROJECT OVERVIEW

A **PROJECT TITLE**: AR Virtual Try-On for clothing items using Unity and Pose Detection

B **ACRONYM:** DashFit

C **TAGLINE:** Say goodbye to size surprise

D **START DATE: 5**th July 2023

E **EXPECTED COMPLETION:** 1st June 2024

F **PROJECT BRIEF**

Introducing our cutting-edge project, which aims to redefine the fashion retail experience. Our mobile application will serve as a virtual dressing room, offering users the ability to try on clothing items virtually. The clothing items included in the current scope of our project are tops and bottoms. Key technical features include:

- AR Visualization: Users can use their phone's camera to visualize the clothing on themselves, making informed purchase decisions.

- Computer Vision Integration: Our system will map clothing onto the user's body, ensuring a realistic fit and appearance.

- Realistic Interaction: Users can move, adjust, and explore the virtual clothing on their bodies, enhancing the accuracy of the try-on experience.

PROBLEM STATEMENT

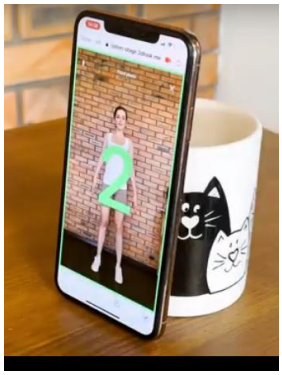
Recent years have seen the sales of online clothing stores skyrocket. According to Statista, the ecommerce fashion market was estimated to be US$752.5 billion in 2020**.** With this shift from traditional store-to-store shopping to online retail, the need to create an enhanced and enjoyable user experience has also become urgent. In this regard, one of the issues that customers of e-commerce fashion stores face when ordering clothes online is the item not looking what they expected it to once they receive it and try it on.

The proposed system will allow brands to bring their store experience to the virtual world by enabling users to visualize how a piece of clothing will look on them without having to physically try it on.

Our intended user base is business owners running e-commerce fashion sites and customers purchasing items from such websites. The former will have the role of admin while the latter will be considered a user of the system which can be integrated within the online shopping site.

MARKET/LITERATURE REVIEW

Existing Technology	**Description**	**Inadequacies**	**Reference Image**
Zero10's AR Mirrors And Kinect for Windows for Retail Clothing	Mirrors installed in stores- such as the Tommy Hilfiger outlet in London- allow a customer standing in front of it to virtually try on the chosen piece of clothing.	• Only available in stores and not online • Hardware intensive and thus expensive • Cannot cater to multiple users simultaneously	

YourFit by 3D look	This virtual fitting technology enables consumers to try on garments for size, fit, and style without physically wearing the product. As a camera-equipped device captures the customer, underlying AR technology maps a realistic virtual representation of the product over their real-world image to show how the product would look on the customer's body	• Requires pictures as input rather than real-time video	
Try on clothes by HB- Built using Snap AR	A snapchat lens created using Snap AR (Snap Inc.'s augmented reality platform that allows distribution on both iOS and Android) that allows the user to place a limited collection of clothes on themselves	• Lack of cloth visual realism- clothes appear rigid and animated • Not built for online shopping purposes and therefore cloth sizing or fitting not included	
Smart Fitting: An Augmented Reality mobile application for Virtual Try On	An iOS mobile app utilizes the back camera of an iPhone to overlay a digital representation of clothing articles onto the user. The primary functionalities of the application encompass displaying a comprehensive array of available clothing categories, presenting details regarding colors and sizes for each garment, and offering users the capability to virtually try on clothing items.	• Occlusion not handled • Lack of cloth visual realism	(cited under references)

PROJECT DETAILS

A PROPOSED SOLUTION:

Our project provides a solution to the common online shopping dilemma of uncertainty regarding clothing fit and style. By seamlessly integrating computer vision and AR technologies, our application offers a unique and user-friendly way for customers to confidently explore and virtually try on clothing items from the comfort of their homes.

Our distinct advantage lies foremost in the fact that we are designing this technology for online shoppers. With an easy-to-use interface, customers can conveniently check if a piece of clothing looks good on them or not. Added to that, we will be giving considerable attention to ensuring accuracy and realism of the virtual try-on experience, empowering users to make informed purchasing choices.

B PROJECT OBJECTIVES:

Integration of Virtual Attire onto Live User Image: Develop the foundation for the application-overlay virtual clothing onto the real-time live image of the user, employing advanced augmented reality (AR) techniques

Wardrobe Diversity: Expand the system to encompasses a diverse array of clothing items and sizes, enabling users to choose and visualize various clothing items on themselves

Mobile Application: Design and construct a user-centric mobile application that incorporates interactive 3D models of clothing items, facilitating an immersive experience for users while utilizing the aforementioned technology.

Realistic Fitting of Virtual Garments: Ensure a realistic and visually accurate fitting of virtual clothing on the user's live image, enhancing the overall authenticity of the augmented reality simulation.

C METHODOLOGY:

The following is our proposed methodology to implement the project described above along with the tools and technology we will be utilizing.

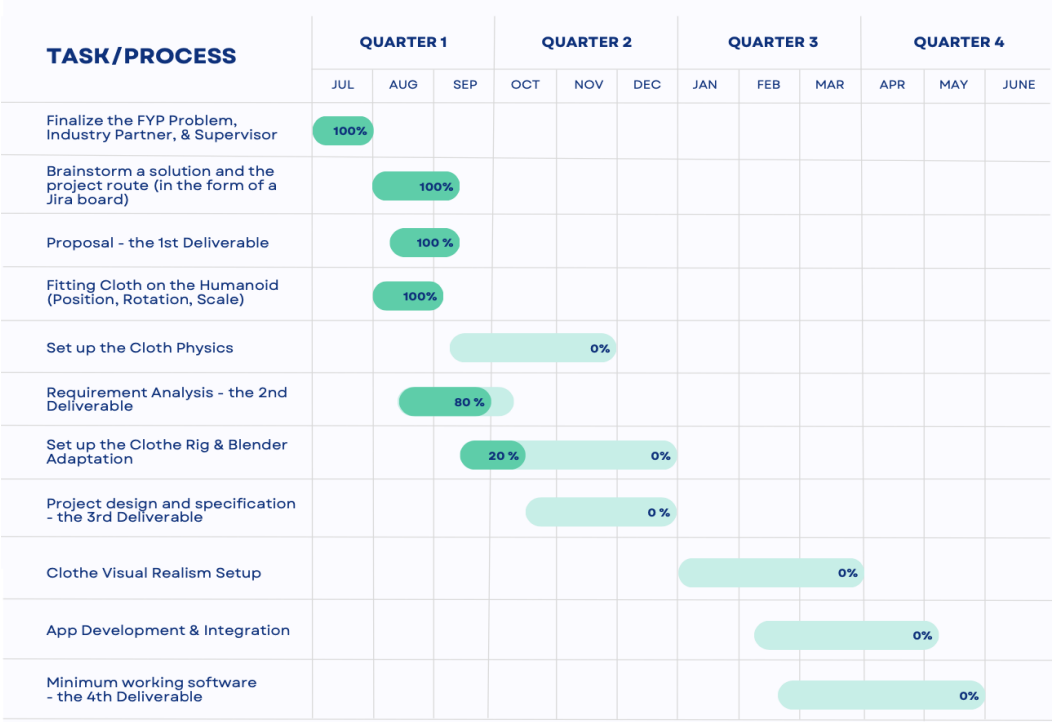
- Utilize **Unity AR foundation** and **ARcore** for building AR mobile application
- Integrate **Google MediaPipe** plugin with unity AR
- Use pose detection to place the 3D cloth model on the person
- **Final Inverse Kinematics** or **Unity Animation Rigging** package for inverse kinematics and mapping human pose to cloth rig
- Expand the functionality to a variety of clothing items and size range
- Work on cloth physics- allowing it to adjust to the user's movements
- Ensure cloth visual realism- 3D models of the clothes are realistic and the user 'wears' it realistically in different lighting conditions
- Design the UI for the mobile application
- Develop the mobile application using **Flutter** and integrate the technology within it.

The project management methodology we intend to implement is a combination of agile and incremental methodology. Agile would be best suited considering it is particularly effective when dealing with projects that have a high degree of complexity and uncertainty. In our project, there are multiple aspects to consider, agile will allow us to adapt to changing requirements and address uncertainties as they arise. Similarly, using an incremental methodology would allow us to break the work into manageable increments as outlined in the bullets above.

D THE PRODUCT:

- Mobile Application
- User Manual

PROJECT MILESTONES AND DELIVERABLES



WORK DIVISION

Mir Hamza Ali

- Initialize the AR app in Unity, utilizing MediaPipe for pose detection, plane detection, and ARCore depth API for realistic cloth fitting
- Fitting cloth on a humanoid, incorporating a variety of clothing models, and enabling position, rotation, and scale adjustments for a comprehensive fitting experience within a specified area.
- Oversee the “Cloth Physics” and “App Integration” modules of the project
- Build the ideal project architecture, leveraging the most effective combination of technologies, libraries, and packages to achieve the project's best outcome

Dania Ahmed

- Explore dynamic cloth movement techniques in Unity, synchronizing cloth rig with detected poses, and experimenting with animation rigging, predefined constraints, and ARKit's body tracking capabilities.
- Supervise the seamless integration of the Mobile Application to ensure a straightforward and trouble-free deployment process
- Create intricate wireframes and prototypes, leveraging industry-standard tools and techniques, to visualize and refine project design elements.
- UI/UX Designing of every interface that is going to be formulated in the project employing artistic flare to make the final product as user-friendly as possible

Adeen Atif

- Employ Blender and 3D modeling techniques to rig the humanoid model and its individual clothing items, enabling versatile size manipulation
- Integrate cutting-edge rendering technologies to enhance visual realism and optimize performance in Unity's 'Cloth Visual Realism' module.
- Tailor a project-specific Software Development Life Cycle (SDLC) framework to optimize workflows, enhance quality assurance, and drive project success.
- Spearhead the general management of the project, as the scrum master, be it setting strategic sprints, or being a point of contact between the team members

Saad Tariq

- Handle the “Cloth Visual Realism” module of the project in Unity, specifically targeting shaders with URP and HDRP render pipelines
- Oversee the “Cloth Rig” module of the project, ensuring the cloth rig moves according to the pose detected using Inverse Kinematics in Unity
- Oversee the DevOps aspects. Handling deployment and integration related workflows and assisting with code merges, branching strategies, and resolving version control-related issues.
- Employ Blender and 3D modeling to rig the imported models as well as ensuring compatibility with assigned weights according to the rig armature for multiple sizes

COLLABORATION

We have been able to secure a collaboration with Systems Ltd and have been working under the mentorship of Mr. Arsalan Rashid, VP-QA Services. As of August, we have conducted six successful meetings with him. Our first few meetings were based on discussing various project ideas and narrowing down to one based on our expertise, the scope of the project and its potential market value. The remaining meetings were aimed at working on a proposal, proof of concept and project plan. Throughout our meetings, Mr. Arsalan has helped us refine our idea and guided us on the best way forward.

COSTING

The current scope of our project does not entail any cost and can be accomplished with the resources we have and through packages and services available for free online. However, there is the potential of funds required if the resources currently available do not produce the intended results. This cost might be covered by Systems Ltd. The tentative cost is as follows:

Package/Subscription/Service	**Cost Range**
3D model	$5-$40
Final Inverse Kinematics- for rig manipulation and inverse kinematics)	$90
(For Cloth Natural Physics)	
Cloth Dynamics	$70
Magica Cloth 2	$25
Obi Cloth	$47

REFERENCES

Schwarz, M. (2023, March 24). Try on clothes with AR effects at Hilfiger in London, Milan, Berlin. *MIXED Reality News*. https://mixed-news.com/en/try-on-clothes-with-ar-effects-at-hilfiger/

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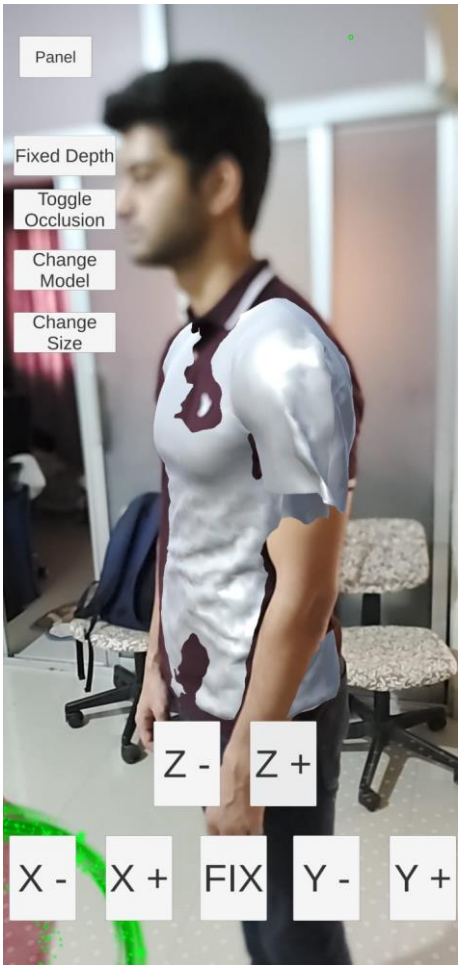
ALZAMZAMI, O., ALI, S., ALKIBSI, W., KHAN, G., BABOUR, A., & BITAR, H. (2023). Smart Fitting: An Augmented Reality mobile application for Virtual Try On. *Romanian Journal of Information Technology and Automatic Control*, *33*(2).

APPENDIX

The following are four screenshots from the proof of concept followed by a snippet of the project plan that has been created on jira to ensure a smooth project flow.



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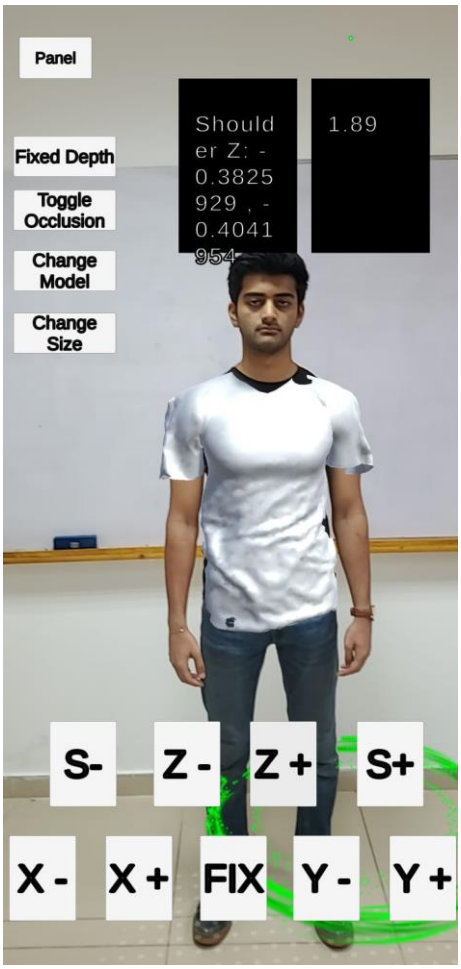
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Toggle Occlusion
Change Model
Change Size
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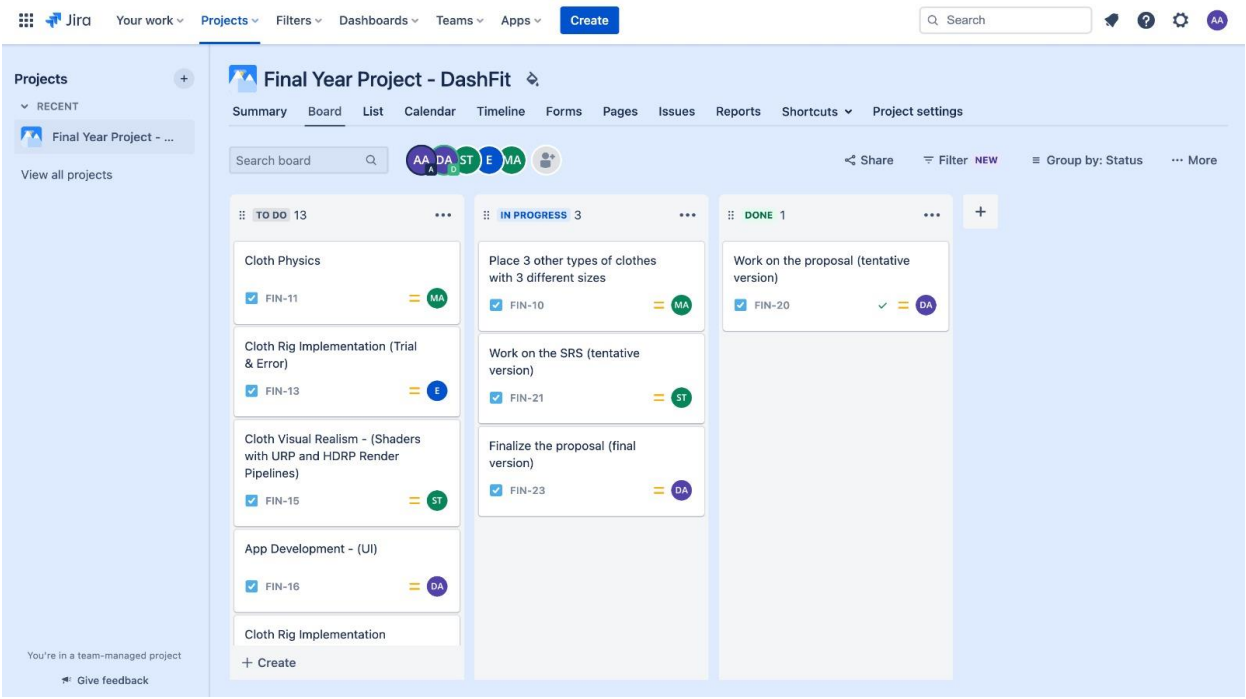
Z -
Z +
S+
X -
X +
FIX
Y -
Y +


Jira
Your work
Projects
Filters
Dashboards
Teams
Apps
Create
Search
Projects
RECENT
Final Year Project - ...
View all projects
You're in a team-managed project
Give feedback
Final Year Project - DashFit
Summary
Board
List
Calendar
Timeline
Forms
Pages
Issues
Reports
Shortcuts
Project settings
Search board
Share
Filter
NEW
Group by: Status
More
TO DO 13
Cloth Physics
FIN-11
Cloth Rig Implementation (Trial & Error)
FIN-13
Cloth Visual Realism - (Shaders with URP and HDRP Render Pipelines)
FIN-15
App Development - (UI)
FIN-16
Cloth Rig Implementation
Create
IN PROGRESS 3
Place 3 other types of clothes with 3 different sizes
FIN-10
Work on the SRS (tentative version)
FIN-21
Finalize the proposal (final version)
FIN-23
DONE 1
Work on the proposal (tentative version)
FIN-20