

## Group 09

# ACCESS BRIDGE



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# Critical Report

## Literature Review

Our project required a deep understanding of required technologies and processes since it involved developing an app with an AR indoor navigation system and a Firebase login system. Our team approached this by researching numerous facets of app development, authentication systems, and agile methodologies through peer-reviewed research.

Key information about Firebase authentication methods, augmented reality technology, and agile processes was uncovered by the literature review.

For these literature reviews we researched some of the articles to get the knowledge of that area to continue our work with unity game engine.

### **AR Indoor Navigation**

On the international conference Maran,B., Giridharan,L., & Krishnaveni,R. (2023) talked about,

The evolution of technology with the introduction of mobile devices has provided users with day-to-day advancements in existing technologies. Augmented Reality (AR) is combined with an Artificial Intelligence navigation agent to track the environment that is provided specifically. Unity 3D engine provides an inbuilt AR framework easily accessible and the navigation mesh agent tracks penetrating paths with segregated walkable areas and areas that cannot be accessed. The current machine learning systems use inertial sensors and high-end cameras for computer vision-based motion tracking. Whereas, this system does not require external hardware as the environment model is constructed with provided measurements in Unity Engine and virtual trackers, which can be functioned in any AR-enabled device. The proposed model aims to provide the framework with real-time virtual visualization for a better user experience.

### **Agile Process**

On the international conference Altaleb,A., Alhashimi,H., & Gravell,A. (2020) talked about,

In the software development process, effort estimation is essential and a critical phase for the development team in order to ensure that development tasks will be delivered within the planned time. This presents a confirmatory case study in an IT company, which examined its current estimation techniques and its process in the context of mobile app development in the Agile process. Moreover, the study provides, and has validated, a proposed estimation technique, namely Pair-estimation, in order to enhance the accuracy of the existing technique. This study, in addition, presents the effectiveness of estimation factors/predictors in supporting the development team to manage, estimate and create subtasks for their user stories.

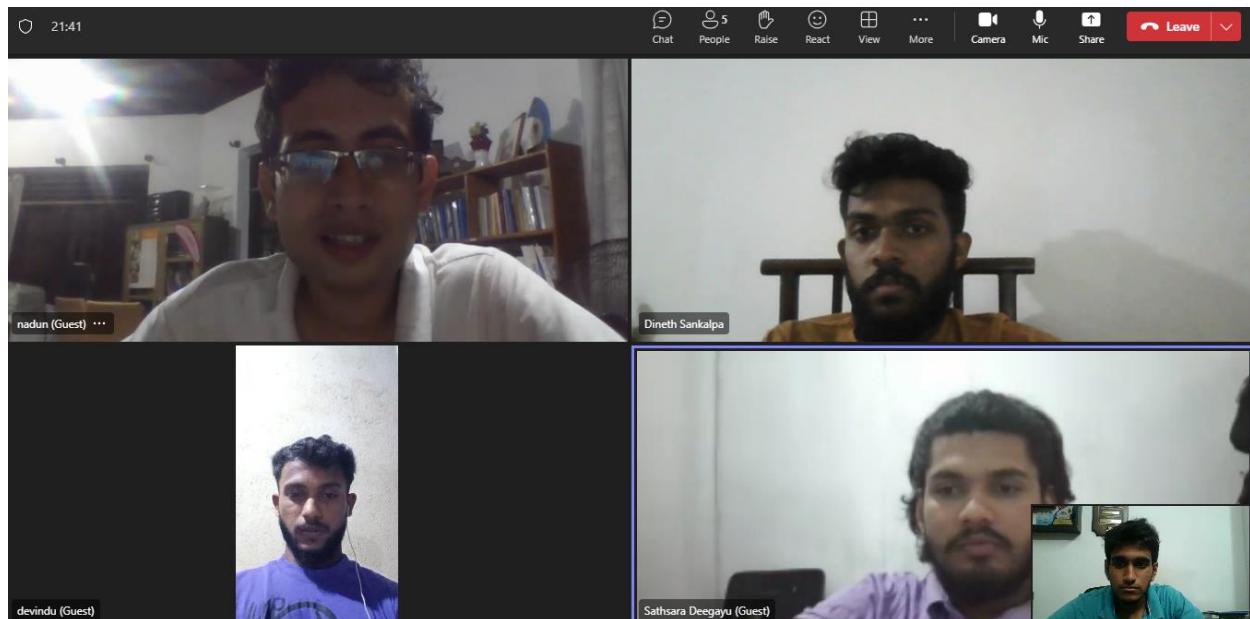
## **Process Evaluation**

As the Scrum Master, I implemented the Scrum methodology for project management within our team. We successfully followed agile principles throughout the development cycle, which enabled iterative development and continual improvement.

### **Planning the process**

We have done daily scrum meetings throughout each sprint where team members discussed progress, challenges and plans for the day. And each beginning of sprint we had a sprint planning meeting to schedule the product backlog items and everything for to do in that sprint and at the end of the meeting we had a sprint retrospective meeting to discuss about the issues and future plans for the next sprint.

As the scrum master I have managed all of this process through the correct agile knowledge. I have used ‘Microsoft Teams’ to put up these meetings. Overall this helped keep the team focused and aligned with the project objectives.

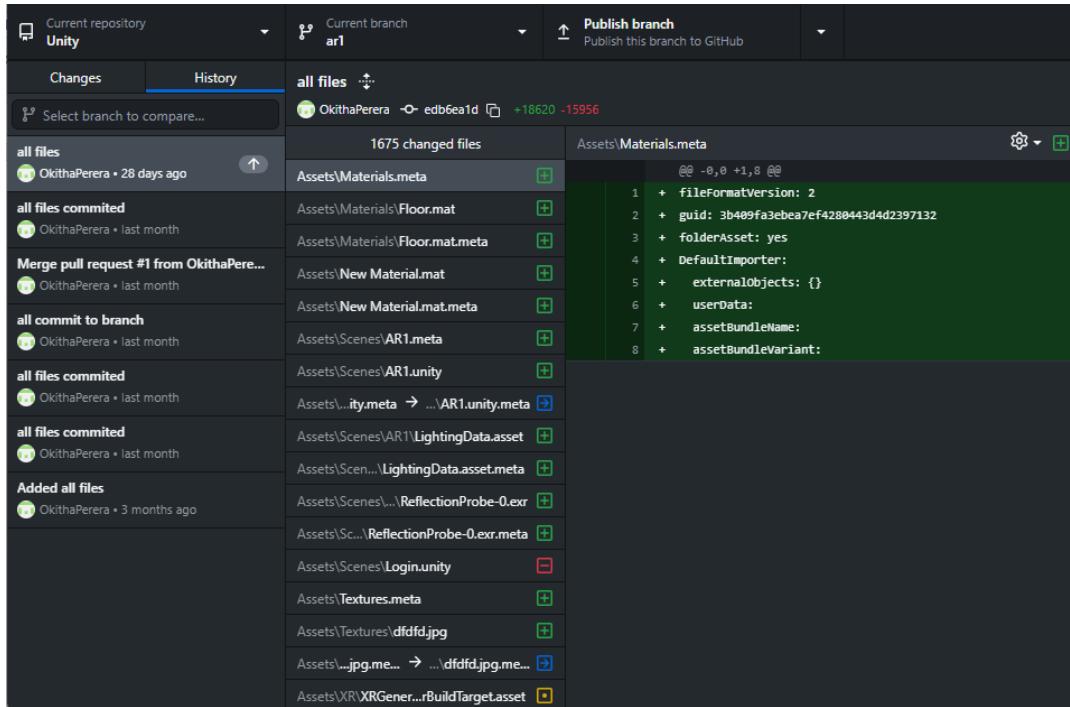


In addition, we employed Trello as collaboration tools to facilitate communication and process management and to encourage openness and responsibility among team members. We managed to finish our work in two sprints and draw burndown charts.

## Professional Measures

To keep in touch with the professionalism manner in the product, Github was used to manage version control, allowing for easy collaboration and tracking of code changes. Correct implementation was developed to automate the testing and deployment processes to ensure the reliability and stability of our product. Because every team member need to participate in the coding I also did some coding for the AR system and committed into the Github by creating another branch called “ar1”. After that I created a pull request and discussed with others if there are any issues with that and also I was the owner of the repository I merged it afterwards to the main branch. For creating new branches and commit the work we used Github desktop, and for merge that branch to the main branch we used Github.

These are the git commits of my branch.



The screenshot shows the GitHub Desktop application interface. At the top, there are three dropdown menus: 'Current repository' set to 'Unity', 'Current branch' set to 'ar1', and 'Publish branch' with the sub-option 'Publish this branch to GitHub'. Below these are two tabs: 'Changes' (selected) and 'History'. A dropdown menu 'Select branch to compare...' is open. The main area displays a list of commits:

- 'all files' by OkithaPerera, 28 days ago
- 'all files committed' by OkithaPerera, last month
- Merge pull request #1 from OkithaPere...
- 'all commit to branch' by OkithaPerera, last month
- 'all files committed' by OkithaPerera, last month
- 'all files committed' by OkithaPerera, last month
- 'Added all files' by OkithaPerera, 3 months ago

On the right side, a detailed view of the first commit is shown. It shows 1675 changed files and focuses on the file 'Assets\Materials.meta'. The commit message is: 'OkithaPerera -O- edb6ea1d +18620 -15956'. The file content is displayed as follows:

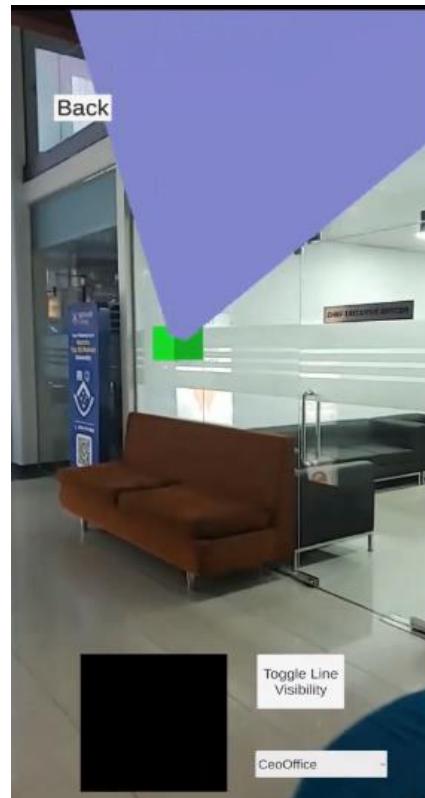
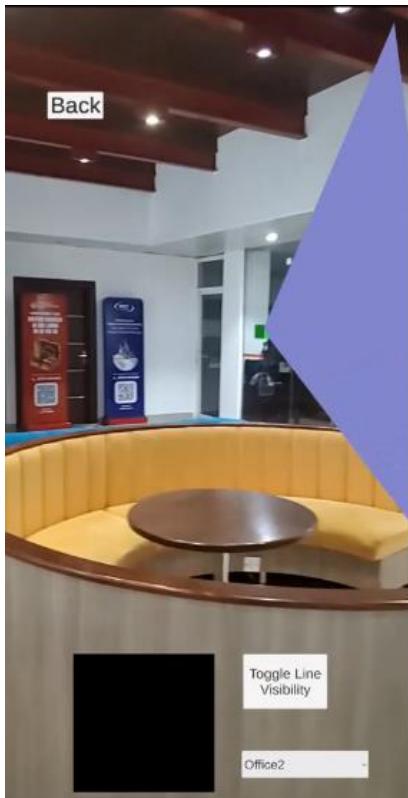
```
@@ -0,0 +1,8 @@
1 + fileFormatVersion: 2
2 + guid: 3b409fa3ebea7ef4280443d4d2397132
3 + folderAsset: yes
4 + DefaultImporter:
5 + externalObjects: {}
6 + userData:
7 + assetBundleName:
8 + assetBundleVariant:
```

Finally, this is the main branch with all the other branches were merged and the product was finalized and after it push to the Github.

The screenshot shows a GitHub repository page for 'Unity'. At the top, there's a message: 'Your main branch isn't protected' with a link to 'View documentation' and a 'Protect this branch' button. Below this, the repository details show 'main' branch, 4 branches, 0 tags, and 14 commits from 'f0daeef' 3 weeks ago. The commit history lists several files: '.vs/Unity project/v16', 'Assets', 'Library', 'Logs', and 'Packages', all showing 'all files committed' 3 weeks ago. To the right, sections for 'About', 'Releases', and 'Packages' are visible, each with a 'No description, website, or topics provided.' message and links to 'Create a new release' and 'Publish your first package'.

With these agile techniques and methods overall the process was a success and all the members have worked under the knowledge of agile.

These are some screenshots of the app. I have contributed of the making of the Ground floor of the AR system.



## **Product Evaluation**

The final product underwent intensive testing and evaluation to evaluate functionality, usability and performance.

### **Testing the Product**

Performance testing was conducted to evaluate the performance of the application under various conditions. After all the process was done and product was finished we showed the end product to the customer/stakeholder(for us lecturer) to get a feedback and this feedback was very helpful in improving the software and guaranteeing a smooth user experience. And with that we got a reflection on the product, with suitable consideration of strengths and weaknesses.

### **Strengths**

- The product provides a smooth user experience because to its easy-to-use interface and navigation. It guaranteed safe application access while preserving user ease by integrating Firebase authentication.
- We gave our customers an immersive and engaging navigation experience by utilizing ARFoundation and ARCore in unity framework.

### **Weaknesses**

- Sometimes the user can suffer from accuracy issues, especially in complex indoor environments or environments(like our campus background) where few visual cues are used may face challenges such as access to virtual objects(pinpointing cubes are not in correct places) or incorrect maps(measurements are sometimes not accurate).
- And also in our app the minimap of the AR system was not showing because there was some android update issues and the devices we had was not compatible with it.

### **Future Plans for the App**

For future, improvements like real-time updates and increased accuracy for the AR navigation system would greatly improve the user experience. And also adding additional features according to the users will be done because this is done in an agile environment where the product always changes and it's our responsibility to give them the best product.

## **Reflection**

As Scrum Master, my role included coordinating the team's efforts, removing roadblocks and ensuring agile practices were adhered to. This experience provided valuable insight into teamwork, effective communication, and project management improvements.

I took a proactive approach to facilitate collaboration and encourage a positive team culture. By organizing regular meetings, addressing challenges quickly and providing support to team members I helped keep the project on track and ensured product was delivered in a timely manner. In addition, I continued to get feedback from team members to identify areas for improvement and refinement.

If I talked about the critical analysis of my work thoroughly in terms of agile methodologies and project management principles, there are multiple strengths and weaknesses.

### **Strengths**

- Effective Communication throughout the entire project had been beneficial because it gave us the opportunity to Updates improved alignment and openness within the team.

### **Weaknesses**

- Sometimes I struggled to manage competing priorities and allocate time effectively. Like mange to allocate a specific time to manage meetings and stuff. This has resulted in occasional delays in processing critical issues or providing information to team members in a timely manner.

To sum it up, our project was a success that dignifies of an application that used agile methodologies(scrum) for software development. And I am sure that the experience I gained from this assessment will serve as a foundation for future projects and endeavors.

## **References**

- Maran,B., Giridharan,L., & Krishnaveni,R. (2023). Augmented Reality-based Indoor Navigation using Unity Engine. In 2023 International Conference on Sustainable Computing and Smart Systems (ICSCSS) (pp. 1696-1700). Coimbatore, India. doi:10.1109/ICSCSS57650.2023.10169855. URL: <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10169855&isnumber=10169119>
- Altaleb,A., Alhashimi,H., & Gravell,A. (2020). A Case Study Validation of the Pair-estimation Technique in Effort Estimation of Mobile App Development Using Agile Processes. In 2020 10th International Conference on Advanced Computer Information Technologies (ACIT) (pp. 469-473). Deggendorf, Germany. doi: 10.1109/ACIT49673.2020.9208985. URL: <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9208985&isnumber=9208804>