MoreThanALICE
Developing an augmented reality mobile application for the ALICE detector

J. Ouellette, B. von Haller, & J. Niedziela
Goal:

Development of a mobile app in Unity describing the ALICE detector, featuring both

• an augmented reality (AR) interface, and
• a virtual reality (VR) interface,

as well as the potential to overlay nearly-live collisions occurring in the detector from a central database.
Features Summary

ALREADY IMPLEMENTED

- VR detector mode, with
  - improved controls,
  - labeled detectors
- AR detector mode
  - labeled detectors that are tracked on the screen
  - functionality with detector models and pictures
    (with some caveats)

TO BE IMPLEMENTED

- ALICE collisions overlay
- Multi-language support (possibly limited)
- More accurate VR detector
Features Summary

**ALREADY IMPLEMENTED**

- VR detector mode, with
  - improved controls,
  - labeled detectors
- AR detector mode
  - labeled detectors that are tracked on the screen
  - functionality with detector models and pictures (with some caveats)

**TO BE IMPLEMENTED**

- ALICE collisions overlay
- Multi-language support (possibly limited)
- More accurate VR detector
Main Menu Scene

v 2.0.0

MORE THAN ALICE

Camera Mode

Virtual Detector Mode

Copyright © 2016 The ALICE Collaboration. All Rights Reserved.
Model created by T. Virgili
Virtual Reality Scene

Activate Collisions

ACORDE
SOLENOID
DIMUON
Virtual Reality Scene

Activate Collisions

Back

ACORDE

Exploded View

Solenoid

DIMUON
Virtual Reality Scene

Exploded View

Transparent View

Activated Collisions

Solenoid

Dimuon

Interactable Buttons

Back

ACORDE
Augmented Reality Scene
The ALICE Time Projection Chamber (TPC) is a large volume filled with a gaseous detection medium and is the primary particle tracking device in ALICE. As charged particles move through the detector, they interact with gas atoms along their track.
The ALICE Time Projection Chamber (TPC) is a large volume filled with a gaseous detection medium and is the primary particle tracking device in ALICE. As charged particles move through the detector, they interact with gas atoms along their path.
The ALICE Time Projection Chamber (TPC) is a large volume filled with a gaseous detection medium and is the primary particle tracking device in ALICE. As charged particles move through the detector, they interact with gas atoms along their path, allowing for the tracking of their trajectories.
Augmented Reality Scene

Current Trackable Components:
- DIMUON
- EMCAL
- PHOS
- TPC
- TRD
- TOF

Current Nontrackable Components:
- ACORDE
- HMPID
- ITS
- PMD
- SOLENOID
- VZERO
Augmented Reality Scene

Current Trackable Components:
- DIMUON
- EMCAL
- PHOS
- TPC
- TRD
- TOF

Current Nontrackable Components:
- ACORDE
- HMPID
- ITS
- PMD
- SOLENOID
- VZERO

… a good place to start for subsequent versions!
Project Structure

- Written in C# (31 scripts in total)
- Scenes directly assembled in Unity
- Improvement over v1.0: 31 vs. 335
  - 91% decrease!
... and after
MoreThanALICE v2.0

MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

<table>
<thead>
<tr>
<th>Namespace List</th>
</tr>
</thead>
<tbody>
<tr>
<td>MoreThanALICE</td>
</tr>
<tr>
<td>Namespaces</td>
</tr>
<tr>
<td>Namespace List</td>
</tr>
<tr>
<td>Namespace Members</td>
</tr>
<tr>
<td>Classes</td>
</tr>
</tbody>
</table>

Here is a list of all documented namespaces with brief descriptions:

- **Collision**
- **Common**
- **Controllers**
- **Detectors**
- **Managers**
- **Scenes**
  - **AR**
    - **Common**
  - **MainMenu**
  - **VR**
MoreThanALICE v2.0

MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

... and after

for gathering and plotting collision data
MoreThanALICE v2.0

MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

- for structures common to multiple scenes
... and after

MoreThanALICE  v2.0

MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

Namespace List

Here is a list of all documented namespaces with brief descriptions:

- Collision
- Common
- Controllers
- Detectors
- Managers
- Scenes
  - AR
  - Common
  - MainMenu
  - VR

for classes controlling a single object
MoreThanALICE v2.0

MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

For classes with detector information
... and after

MoreThanALICE v2.0
MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

<table>
<thead>
<tr>
<th>Namespace List</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision</td>
<td>for classes controlling many objects</td>
</tr>
<tr>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>Controllers</td>
<td></td>
</tr>
<tr>
<td>Detectors</td>
<td></td>
</tr>
<tr>
<td>Managers</td>
<td></td>
</tr>
<tr>
<td>Scenes</td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td></td>
</tr>
<tr>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>MainMenu</td>
<td></td>
</tr>
<tr>
<td>VR</td>
<td></td>
</tr>
</tbody>
</table>
MoreThanALICE v2.0

MoreThanALICE is an augmented reality mobile application written in the Unity Engine. This documentation covers the scripts written in C#.

Namespace List

Here is a list of all documented namespaces with brief descriptions:

- Collision
- Common
- Controllers
- Detectors
- Managers
- Scenes
  - AR
  - Common
  - MainMenu
  - VR

... and after

for classes controlling scene behaviour
Work still to be done
Work still to be done

Add more features!
Work still to be done

Add more features!

Background Music and Sounds
Work still to be done

Add more features!

Background Music and Sounds

Multiple Language Framework
Work still to be done

Add more features!

Background Music and Sounds

Multiple Language Framework

Acquire higher quality object scans
Work still to be done

Add more features!

Background Music and Sounds

Multiple Language Framework

Acquire higher quality object scans

Connect collisions to the web application
Special Thanks

- To the National Science Foundation, for providing funding for the opportunity to work at CERN,
Special Thanks

• To the National Science Foundation, for providing funding for the opportunity to work at CERN,

• To the University of Michigan REU program and the CERN summer student program,
Special Thanks

• To the National Science Foundation, for providing funding for the opportunity to work at CERN,

• To the University of Michigan REU program and the CERN summer student program,

• ... and to Reid Pinkham, for letting me borrow your phone late at night when you just wanted to go to sleep
Prague!
Prague!
Prague!