URBAN MOVEMENT: VR SIMULATOR

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SELF-INTRODUCTION

NUS, Year 2 in upcoming AY
Computer Science

(it’s me in the middle!)

01

OBJECTIVES

Problem Statement

02

THE PROJECT

Demo

03

ANALYSIS

Tools, Timeline

04

CONCLUSIONS

Future Improvements

PROJECT OBJECTIVES

To develop a VR/AR game that can be used for urban training.

PROBLEM STATEMENT

Due to reduced training opportunities caused by COVID-19, new training methods to ensure that soldiers are **combat-ready** need to be devised.

WHY THIS P.S.?

- Limited training opportunities due to the pandemic and the nature of urban operations (need to go outfield)
- Need for social and safe distancing between soldiers
- Familiarisation of new building layouts before heading out to train. This saves on training time.

SOLUTION

VR training tool for commanders to practice commanding in urban combat situations.

It aims to allow:

- soldiers to **safely experience how to respond to threats in urban environments**
- **familiarise themselves with new combat environments**.

PRODUCT OVERVIEW

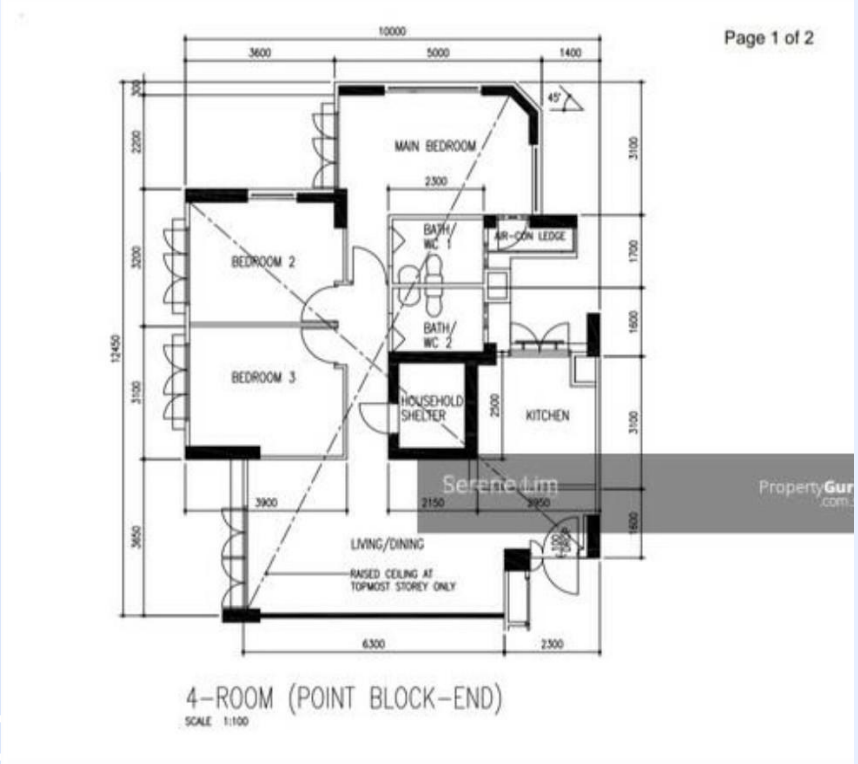
- Virtual Reality
- + Speech Recognition
- Assessment System

Console: HTC Vive

02

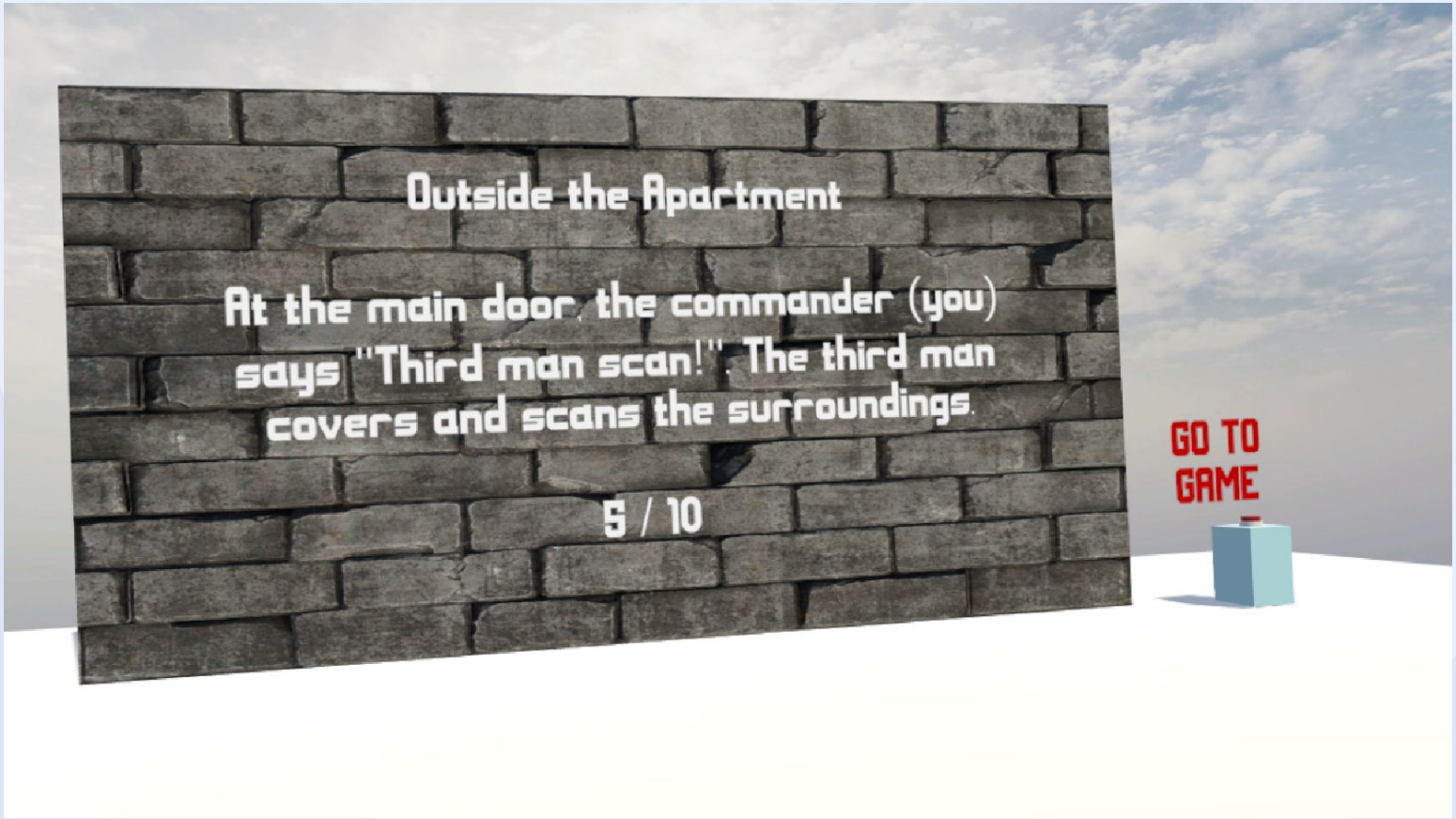
THE PROJECT

FROM BLUEPRINT TO A 3D MODEL



TUTORIAL SCREENS (1)

TUTORIAL SCREENS (2)



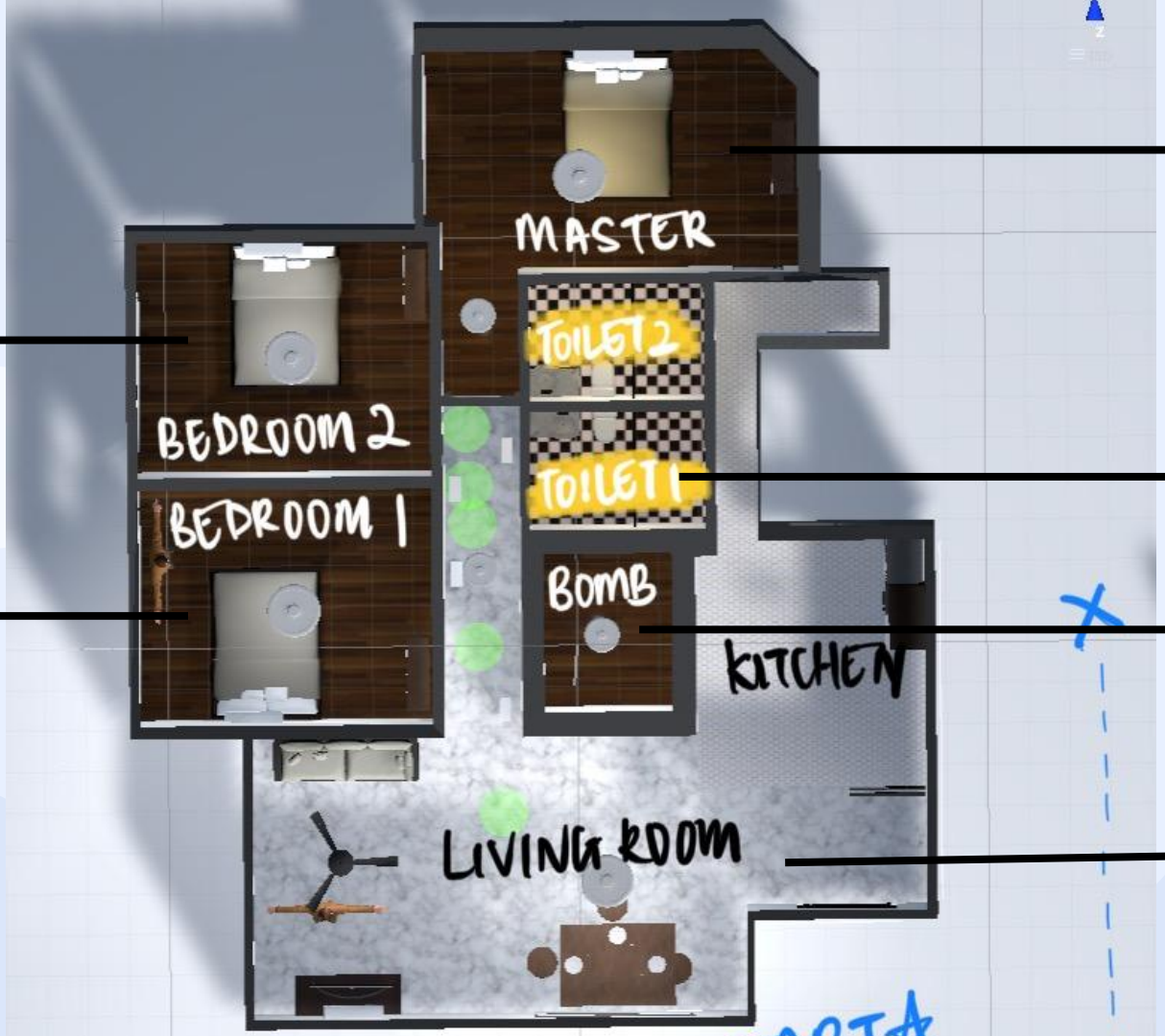
INTERFACE

Count-up Timer to track progression

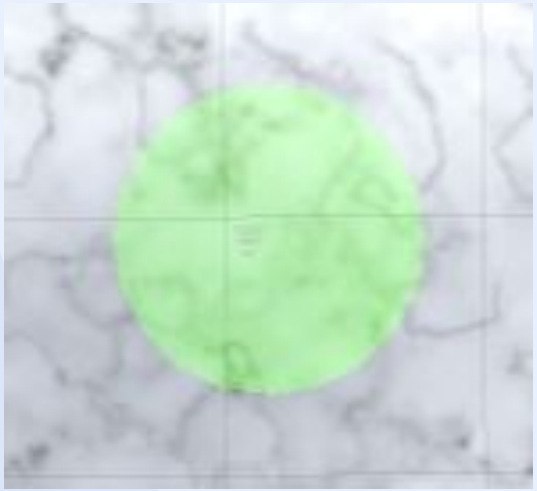
See how many rooms you're left with

OVERVIEW OF THE (TYPICAL) 4-ROOM HDB LAYOUT

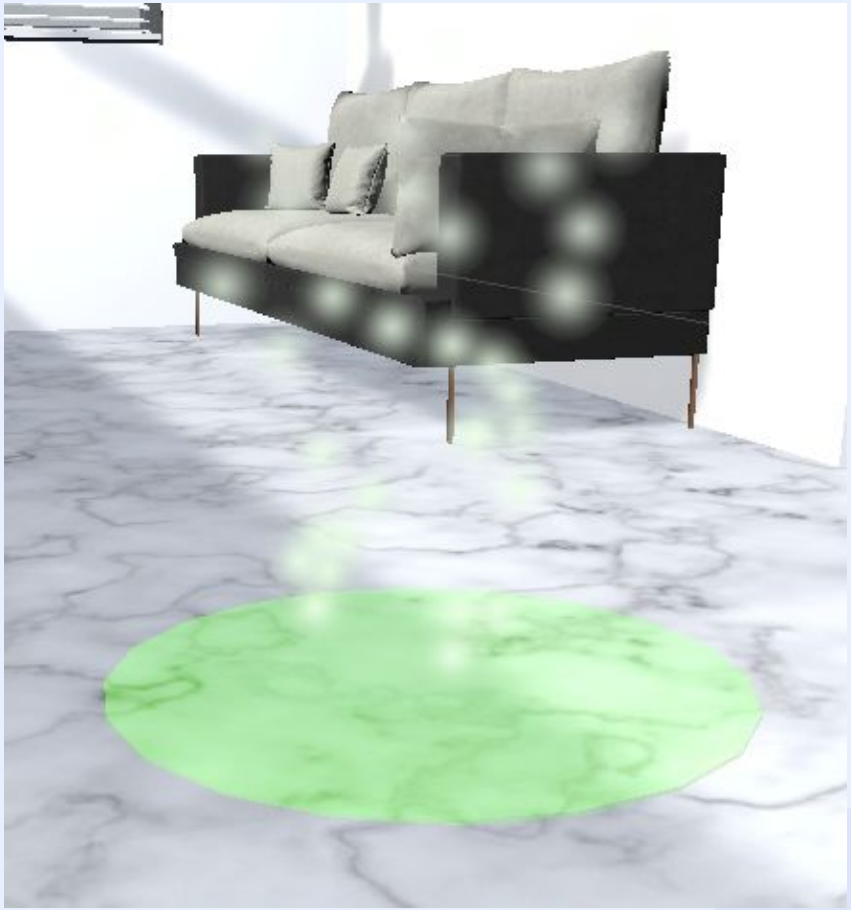
ROOM CLEARING FLOW



DETAILS



Checkpoint Markers



User experience enhancements

GRADING


WASD EQ/Arrow Keys to translate the camera
Left mouse click for standard interactions.
02:49
ROOMS LEFT: 0
MISSION SUCCESS!
Time taken: 02:49
Commands made: 13
Commands:
Grade: C

COMMANDS/ACTIONS AVAILABLE & SCENARIO FLOW

- “**Third** man **cover**” > Cover fire
- “**First** man **scan**” > Scanning surroundings
  - Ally: “No IED, no booby trap, door swing inwards”
- **Shoulder tapping** of 3rd ally > Open door
- “**Clear room!**” > Operation starts
  - Allies: “Left Clear/Right Clear!”
- “**Room clear!**” > Move on to next room

STARTING POSITIONS (1ST CHECKPOINT)

STARTING POSITIONS (2ND CHECKPOINT)

STARTING POSITIONS (3RD CHECKPOINT)

STARTING POSITIONS (4TH CHECKPOINT)

STARTING POSITIONS (5TH CHECKPOINT)

STARTING POSITIONS (6TH CHECKPOINT)

KEY FEATURES

01

Speech recognition— you command, and the NPCs react!

02

Tutorials! We teach you the basic way of room clearing and you can try executing it.

03

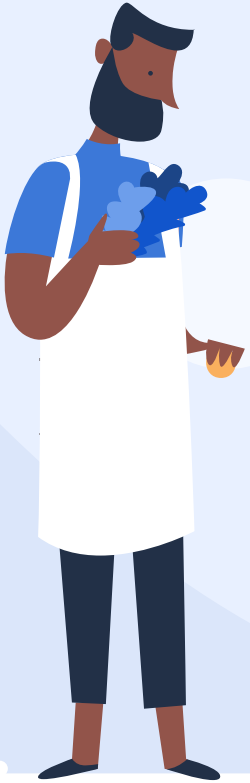
You receive a **grade** based on the completeness of your commands. Find out how you can do better :-)!

04

1 to 1 view of the real world. Enhances your experience!

DEMO

03 ANALYSIS



TOOLS

UNITY 3D

Main development platform

SKETCHUP

3D modelling of the 4-room HDB flat

SPEECH RECOGNITION

Unity’s window speech recognition library

INSPIRATION

- Originally: mimic typical Fire Movement in BMT/SCS training.
- COVID-19: How can VR aid in training during this pandemic?
- Taking social distancing into consideration.
- Help of mentors in refining the idea.
- Final product: **Urban Movement**!

TIMELINE

Project Ideation: Finding out more about the NS experience and potential applications for training.

WEEK 1 - 2

WEEK 3 - 4

Familiarisation with Unity, HTC Vive and coming up with environment 3D models using SketchUp.

Modelling & Building the VR environment and basic behaviours of the player.

WEEK 5 - 6

TIMELINE

WEEK 6 - 7

Additions to the **UI**, **speech recognition tests** and lots of bug fixing.

WEEK 8 - 9

More **bug fixes** & **polishing** of the entire game environment.

WEEK 10 - 11

Presentation preparation!

03 CONCLUSIONS

FUTURE EXTENSIONS

- Add more **terrains** to the game, enable soldiers to familiarise themselves with **more environments** (e.g. Australia's Live Firing Buildings).
- Add **different section sizes**, enabling commanders to familiarise themselves with **more formations/movements**.
- Apply the game to fire movement in **conventional warfare** as well (jungle warfare).
- **Multiplayer** aspects: squad members can play as their own respective roles together with the section commander.

LIMITATIONS

- Having to share one VR set with another intern meant that every alternate week, I was unable to test the game with the VR hardware.
- Use of SteamVR decreased performance quite a bit.
- Speech recognition issues
- Overall, a very fun and enriching experience working on this project :-)

THANK YOU!