



DESIGN & MANUFACTURING FUTURES LAB

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EPSRC

Engineering and Physical Sciences
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University of
BRISTOL

Game Engines: The What, Why and How

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What is a game engine?

- A game engine is a software framework that enables the development of video games
- Development driven by games
- The core functionality is to enable
 - rendering of 2D/3D objects (show your cool assets)
 - interaction with 2D/3D objects (move your cool assets)
 - 2D/3D objects to interact with each other (physics engine/AI)
 - integrated memory management (garbage collection)
 - integrate external libraries (sound/hardware/networking)
 - platform agnostic development (packaging)

Why use a game engine?

- Getting to the good stuff
 - Start with a keyboard driver
- Interact with your assets
- Branching engines
 - Nothing is new
- Pipeline integration
 - Need something to do something
- Game engine is for games?

```
.model small
.stack 100h

.data
msg db 'Hello world!$'

.code
start:
    mov ah, 09h ; Display the message
    lea dx, msg
    int 21h
    mov ax, 4C00h ; Terminate the executable
    int 21h

end start
```



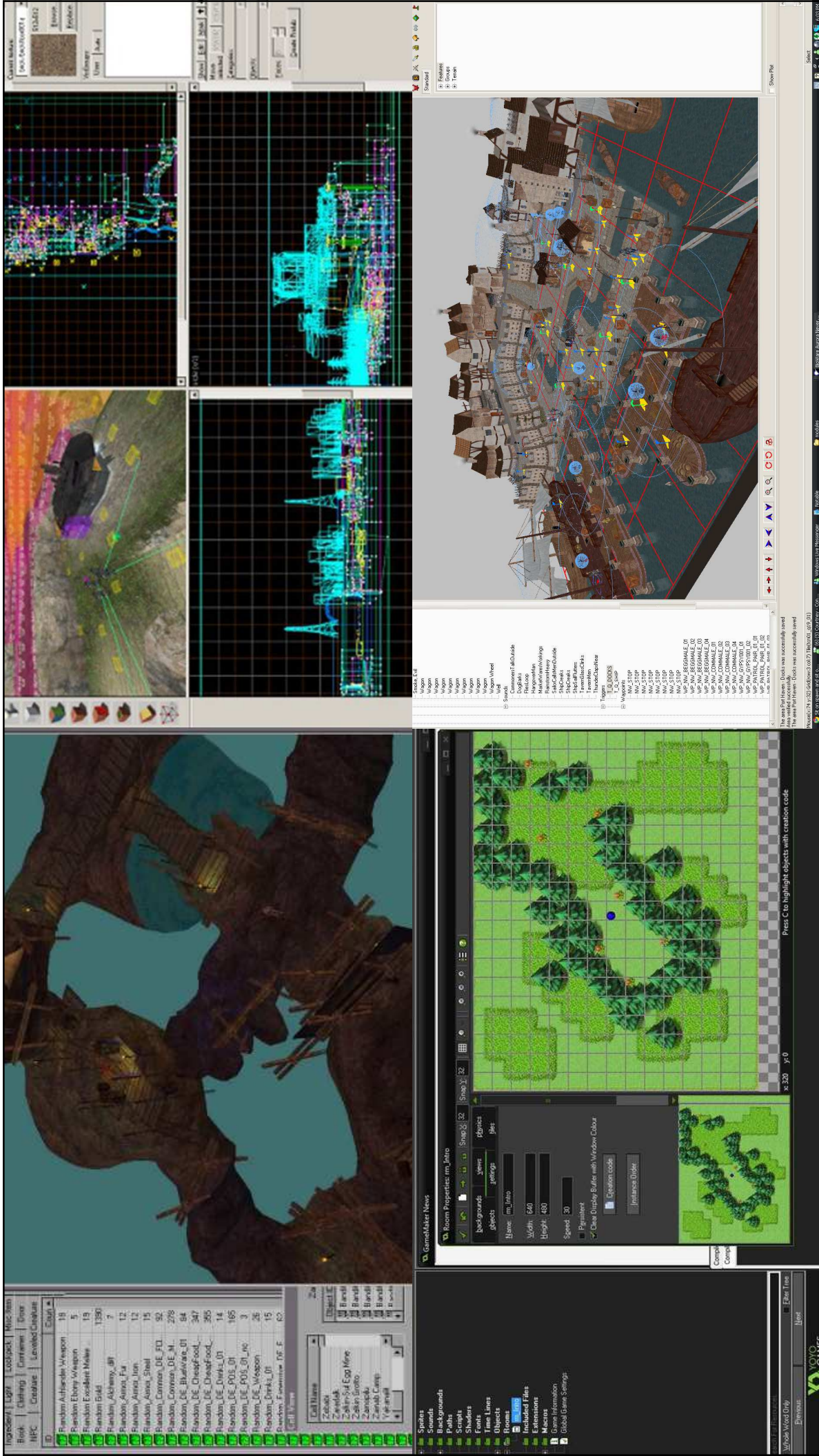
Game ? Engine

- Architecture
- Film & television
- Broadcast & live events
- Automotive & transportation
- Simulation
- Virtual production
- Human-machine interface
- Parametric design
- ?



Who are the big players?

| Engine | Who? | Famous for... | License |
|--------------------------------|-------------|---------------------------|-------------------------------|
| Creation Engine / Creation Kit | Bethesda | Elder scrolls / Fallout | Proprietary |
| Frostbite | DICE | Battlefield / FIFA | Proprietary |
| Gamemaker Studio | YoYo Games | Lots of indie games | Pay to use |
| Godot | ? | Being open source | Open source |
| ID Tech | Id Software | Doom | Kind of open source |
| Java 3D | Sun | Minecraft / Runescape | Very free |
| Lumberyard (Open3DEngine) | Amazon | ... | To be open-source (CryEngine) |
| XNA | Microsoft | Terraria/Stardew Valley | Free |
| RAGE | Rockstar | GTA | Proprietary |
| Source 2 | Valve | Half life series | Weird |
| Unity | Unity Tech | Wiki List | Kind of free |
| Unreal | Epic Games | Wiki List | Kind of free |

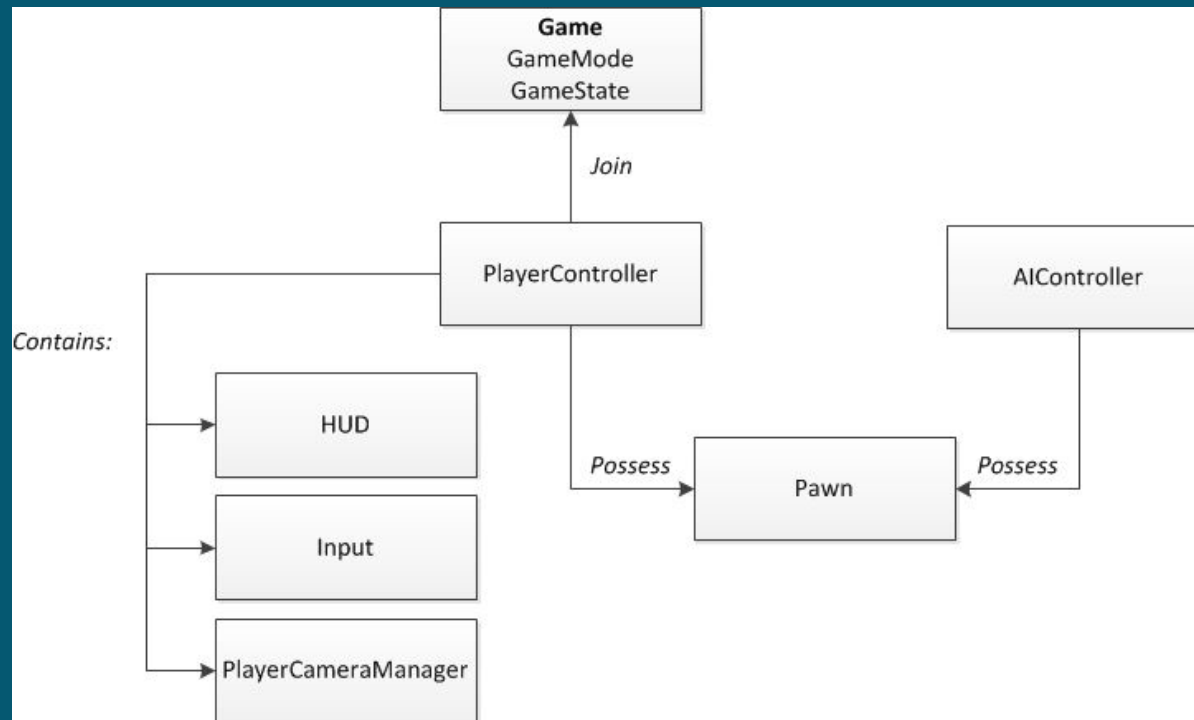


Picking a game engine

- Why not something like python?
- Plugins
- Low level stuff cannot be changed
- Framerate is important
- Hardware integration is great and/or terrible
- Multiplatform development



Unreal Demo



In conclusion.

Game Engines are not just for games anymore

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