

DESIGN & 
MANUFACTURING
FUTURES LAB

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EPSRC

Engineering and Physical Sciences
Research Council

 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
- ?



Design Parameters

- Window Interval (H) 4 FT
- Window Interval (V) 4 FT
- Window Width 6 FT
- Window Height 8 FT
- Shading: Random by Prob.
- Shading Width 3.0 FT
- Shading Offset 5 FT
- Shading Pl. Prob. 50%
- Shading Mat. Prob. 40%
- Apply Shading Mat. Prob.
- 1st Floor Height 12 FT
- Column Spacing 3 Bay(s)
- Column Setback 2 FT
- Awning Height 4 FT
- Parapet Height 5 FT
- Window Stagger Mode 2

Make Windows Stagger

This is on

Environmental Settings

Time of The Day 17:15

Weather Sunny

Fog Density 0.02

Automatic Facade Design Generation & Optimization

Design Generation

Generate (G): Avant-Garde

Design Evaluation

55.25 100 RM Full

67 WP Full W2F 34 Full

20 W2R Full



Who are the big players?

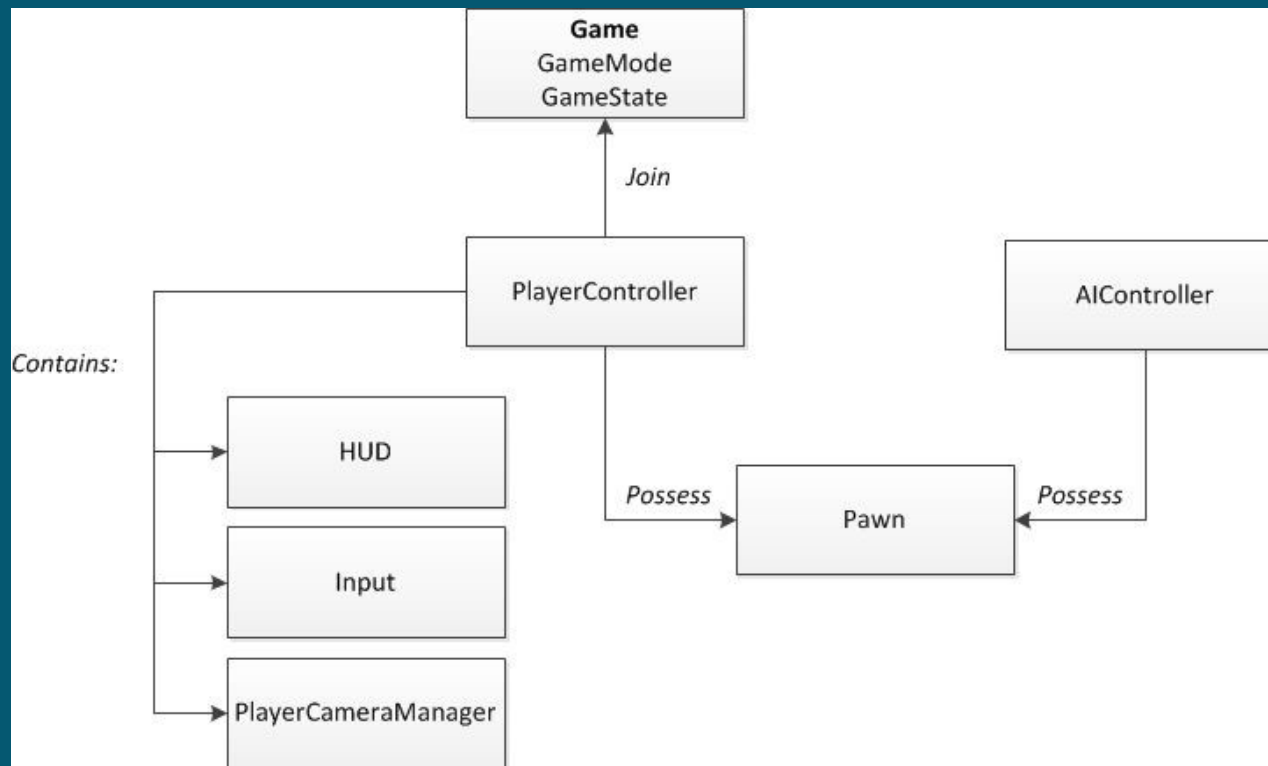
Engine	Who?	Famous for...	License
Creation Engine / Creation Kit	Bethesda	Elder scrolls / Fallout	Proprietary
Frostbite	DICE	Battlefield / FIFA	Proprietary
Gamemaker Studio	YoYo Games	Lots of indie games	Pay to use
Godot	?	Being open source	Open source
ID Tech	Id Software	Doom	Kind of open source
Java 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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