

Carnegie Mellon University

Doom and Unreal Game Engines

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Doom Game Engine

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- ViZDoom API (python, Java, Lua)



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- Extremely fast: upto 7000 FPS



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- ViZDoom API (python, Java, Lua)
- Extremely fast: upto 7000 FPS
- Synchronous
- Flexible
 - Modify behavior of bots
 - Place/remove objects at any location
 - Random mazes
 - Random textures



Doom: Applications

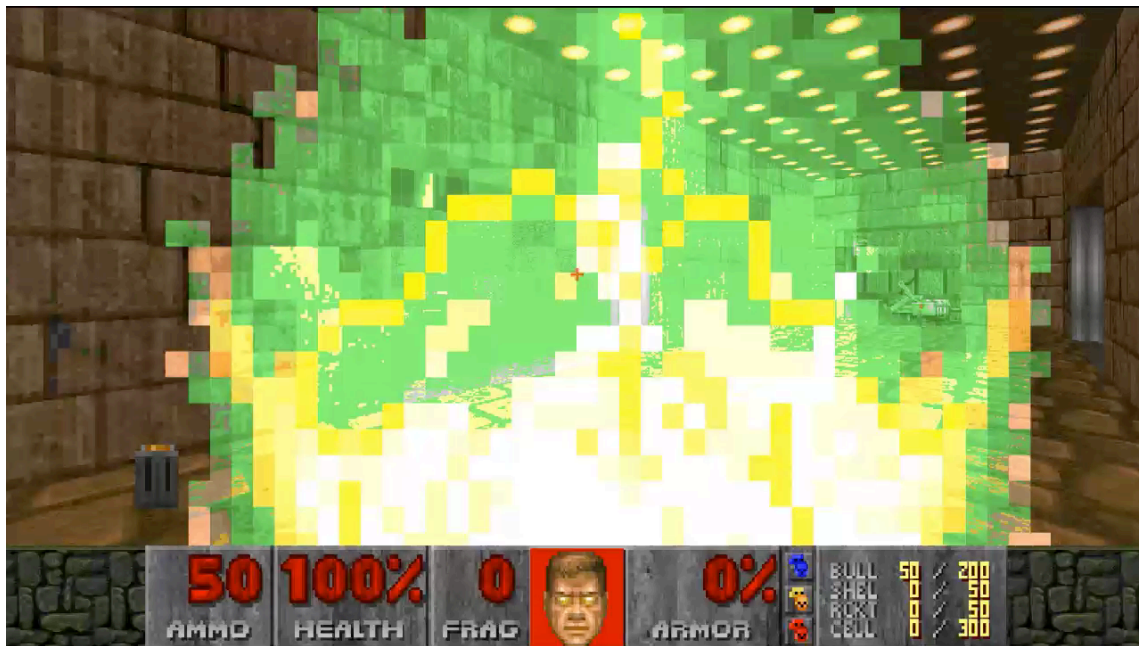
Doom: Applications

- Navigation: <https://youtu.be/8ljAT-tEG-E>



Doom: Applications

- Playing deathmatches: <https://youtu.be/oo0TraGu6QY>



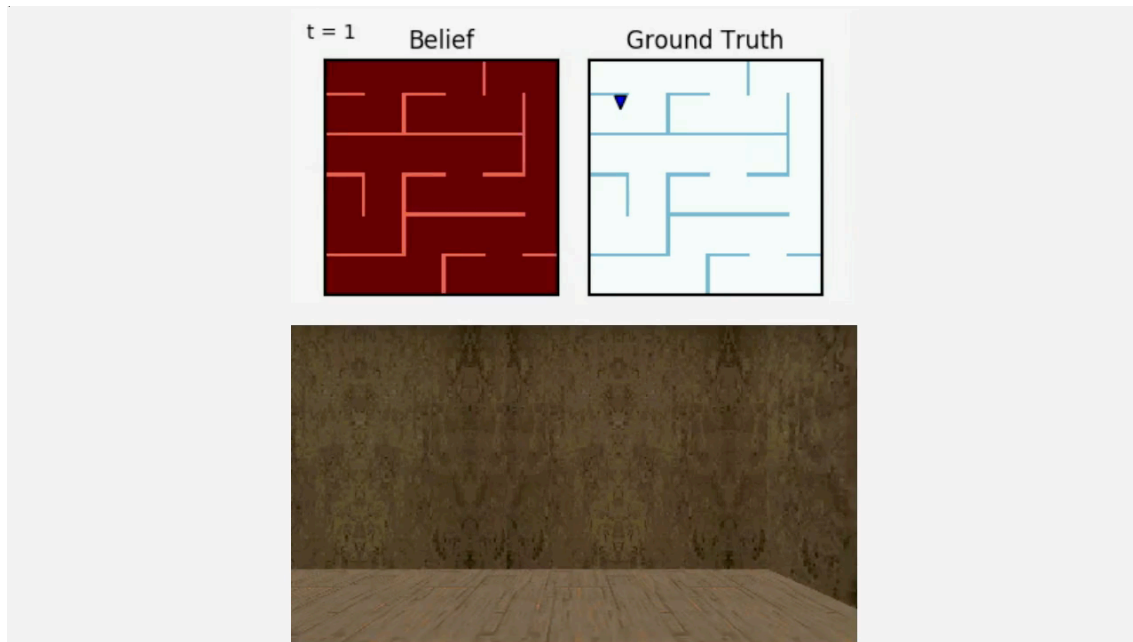
Doom: Applications

- Task-oriented language grounding: <https://youtu.be/JziCKsLrudE>



Doom: Applications

- Localization: <https://youtu.be/rdhKu8GqVLw>



Doom Game Editor: Slade



Doom Action Code Scripts

```
script "set_position" (int x, int y, int angle){  
    //print(s:"Received ",f:x,s:" ",f:y,s:" ",f:angle);  
    int o = 0.0;  
    if (angle == 0){  
        o = 1.0;  
    } else if (angle == 1){  
        o = 0.25;  
    } else if (angle == 2){  
        o = 0.5;  
    } else if (angle == 3){  
        o = 0.75;  
    }  
  
    SetActorAngle (0, o);  
    SetActorPosition(0, x, y, GetActorZ(0), 1);  
}
```

Unreal Game Engine

Unreal Game Engine

- APIs: Carla, Airsim, Unrealcv



Unreal Game Engine

- APIs: Carla, Airsim, Unrealcv
- Photo-realistic!



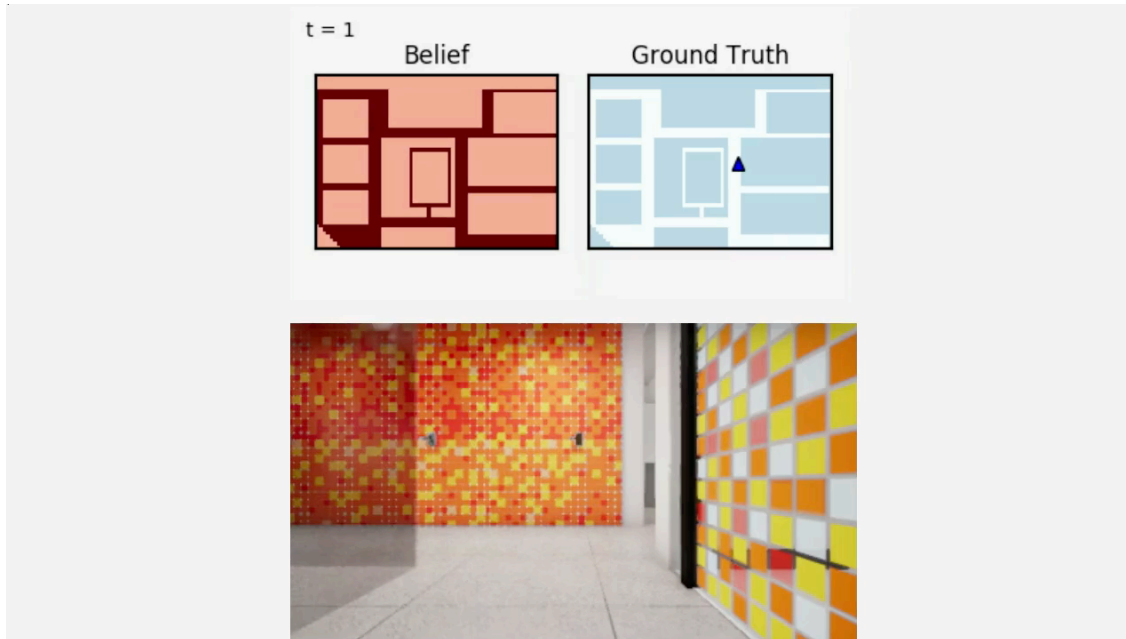
Unreal Game Engine

- APIs: Carla, Airsim, Unrealcv
- Photo-realistic!
- Online Marketplace with plenty of environments

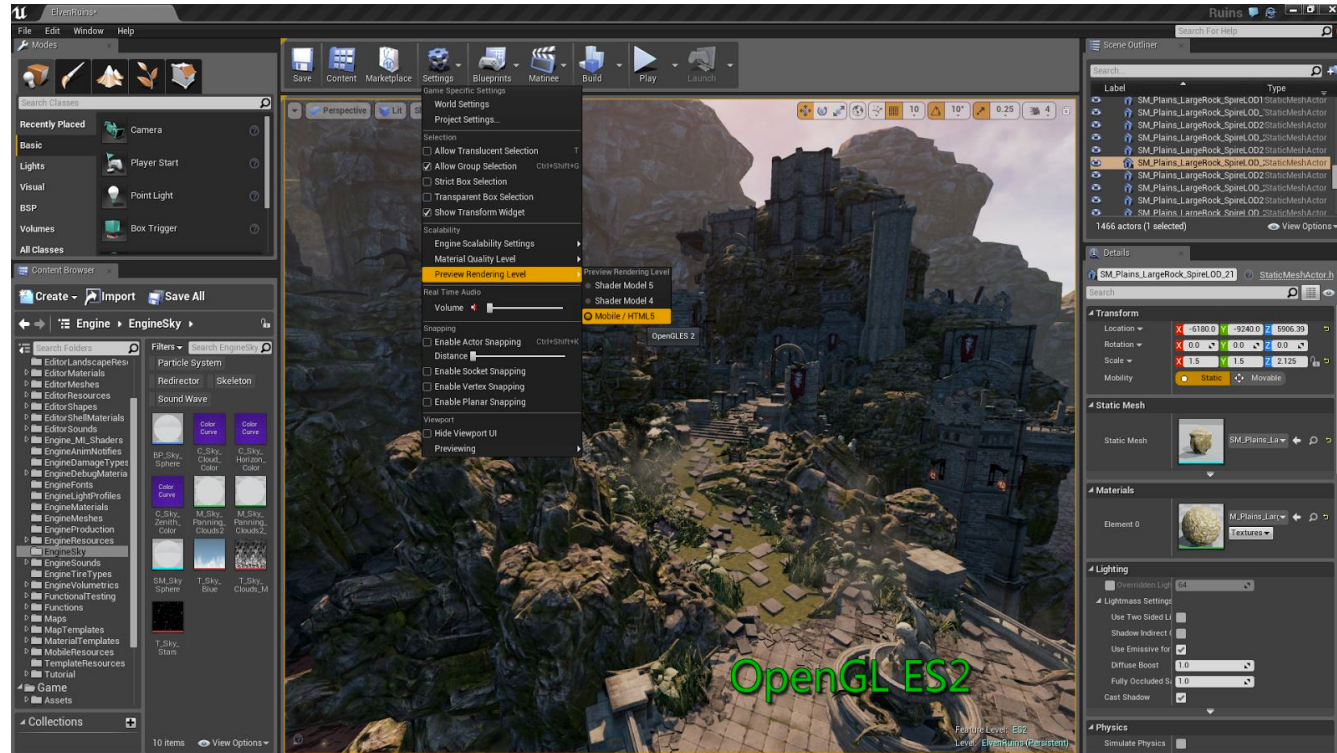


Unreal Applications

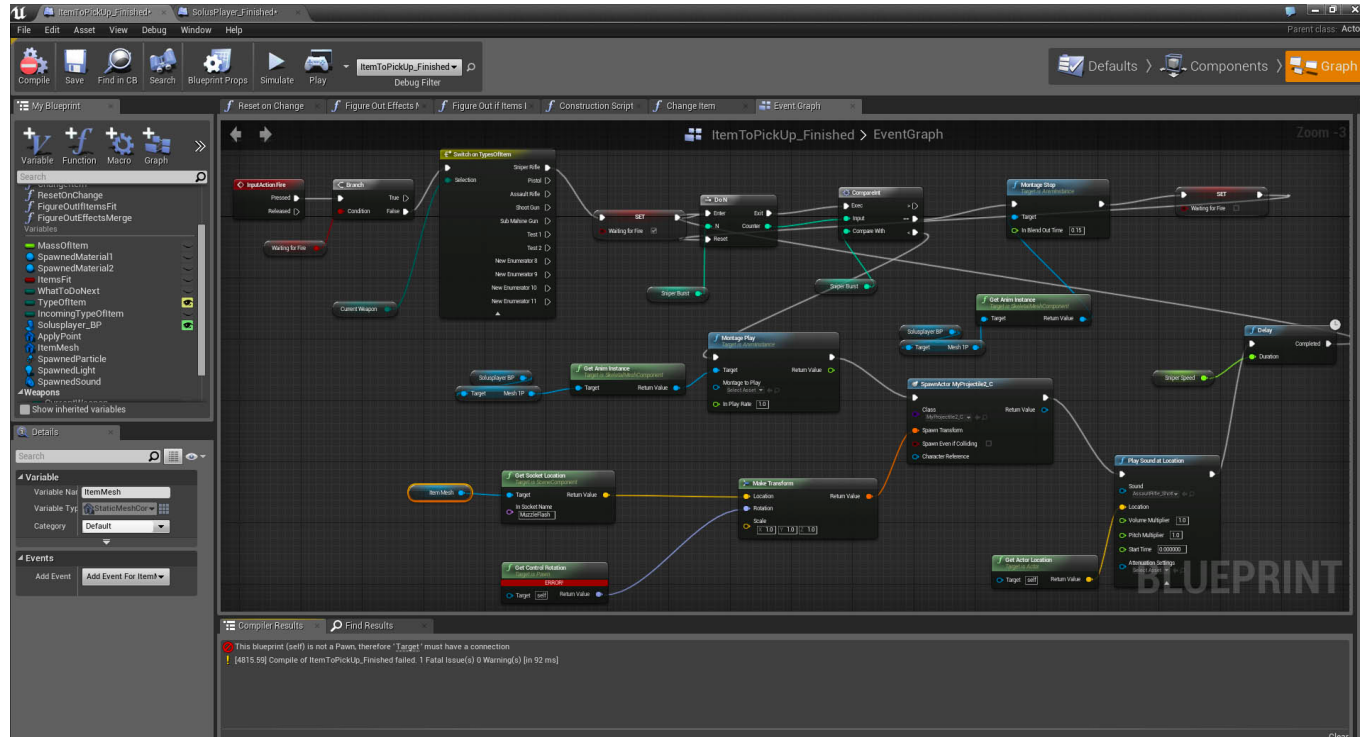
- Localization: <https://youtu.be/T5Ezx-QfU0>



Unreal Editor



Unreal Blueprints

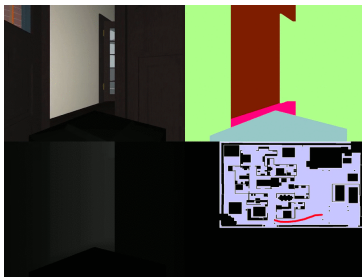


Trade-off



Doom, Quake

(ViZDoom, Deepmind Lab) (HomePlatform, House3D, MINOS)



SUNCG



Unreal/Unity

(AI2Thor, Airsim, Carla, Chalet, Unrealcv)



Faster, more flexible

More realistic

What do we want?

What do we want?

Everything!

What do we want?

Everything!

Fast, flexible and realistic

Thank you