CloudTurbine
for
Mixed-Reality

NASA Phase II-X SBIR
Contract: NNX16CD06C

NASA Phase 3 SBIR
Contract: 80NSSC18P1456

Project Review
October 10-11, 2018

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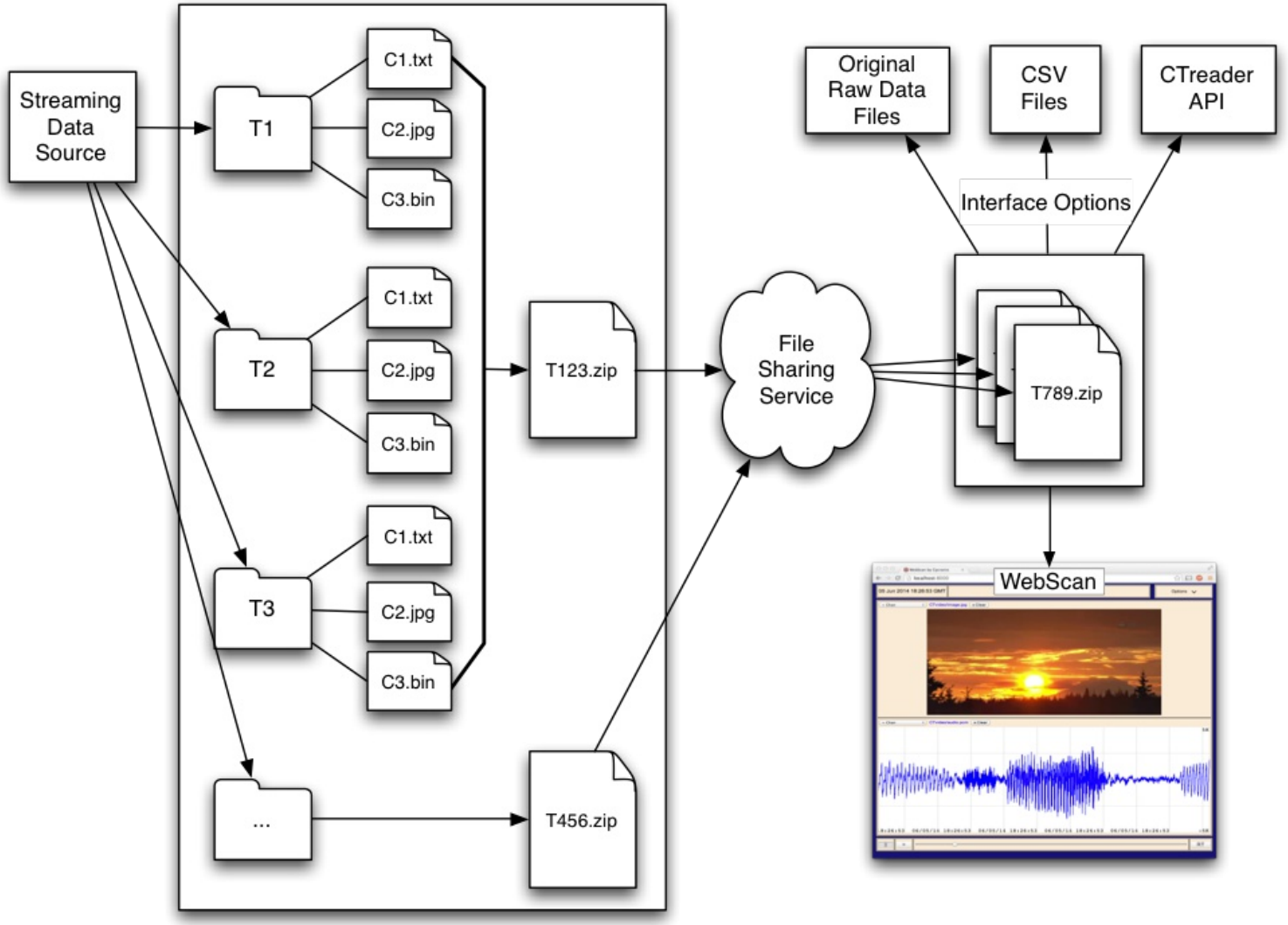
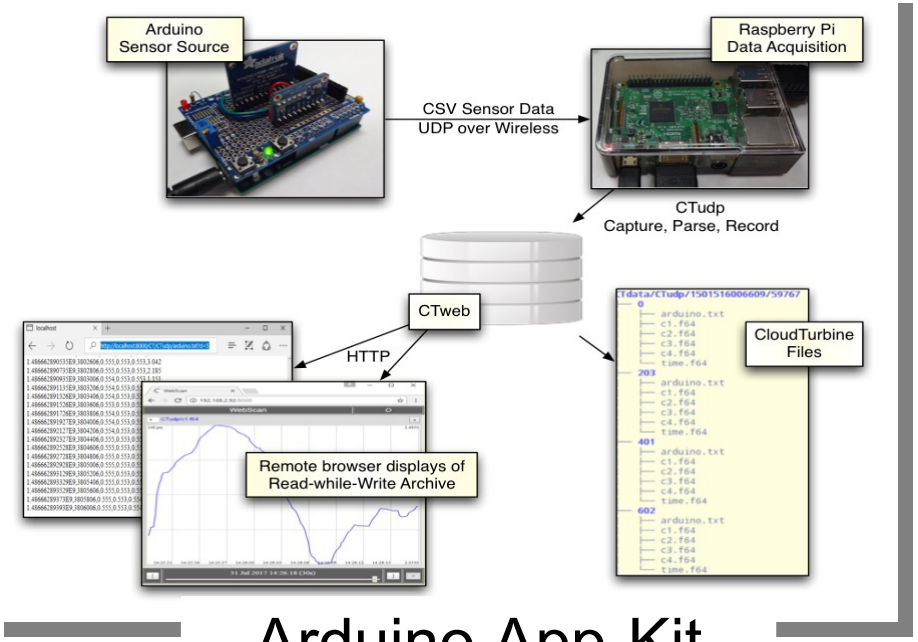
CloudTurbine Overview

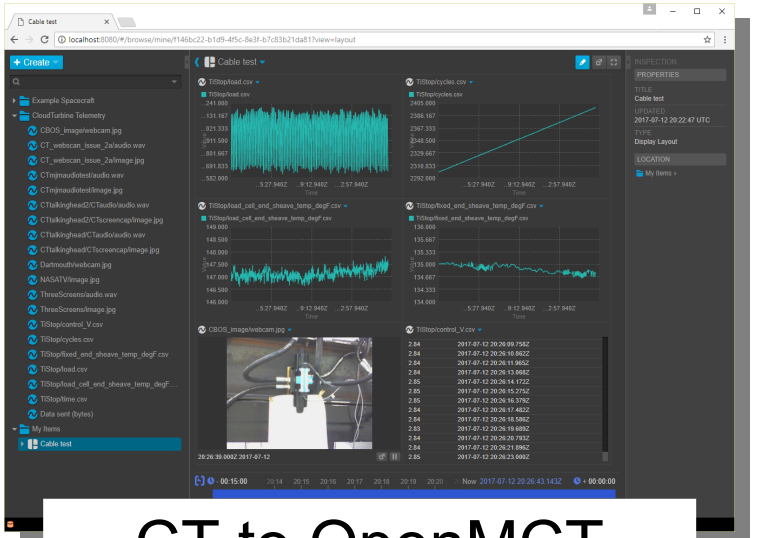
"Stream Sharing"



Phase 2: CT Interfaces

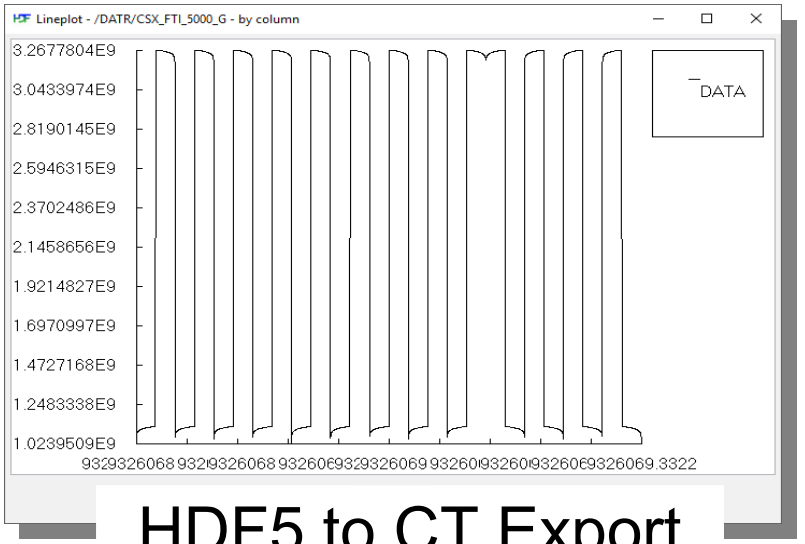


Arduino App-Kit



CT to OpenMCT

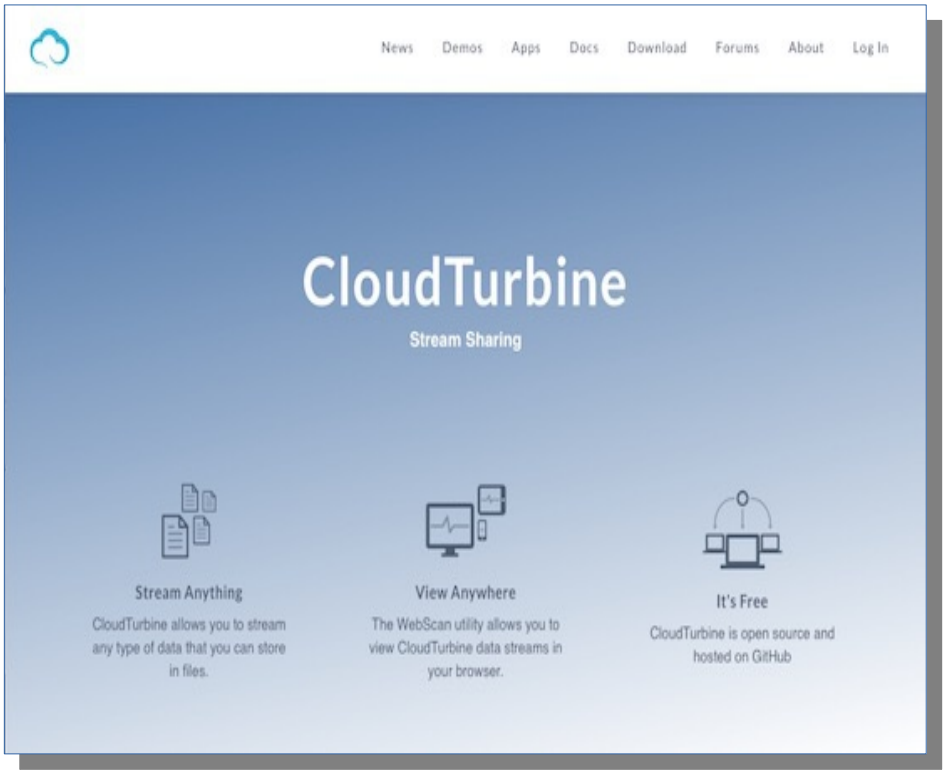
- PocketTurbine
- Android apps
- PTERA demo
- End-to-end encryption



HDF5 to CT Export

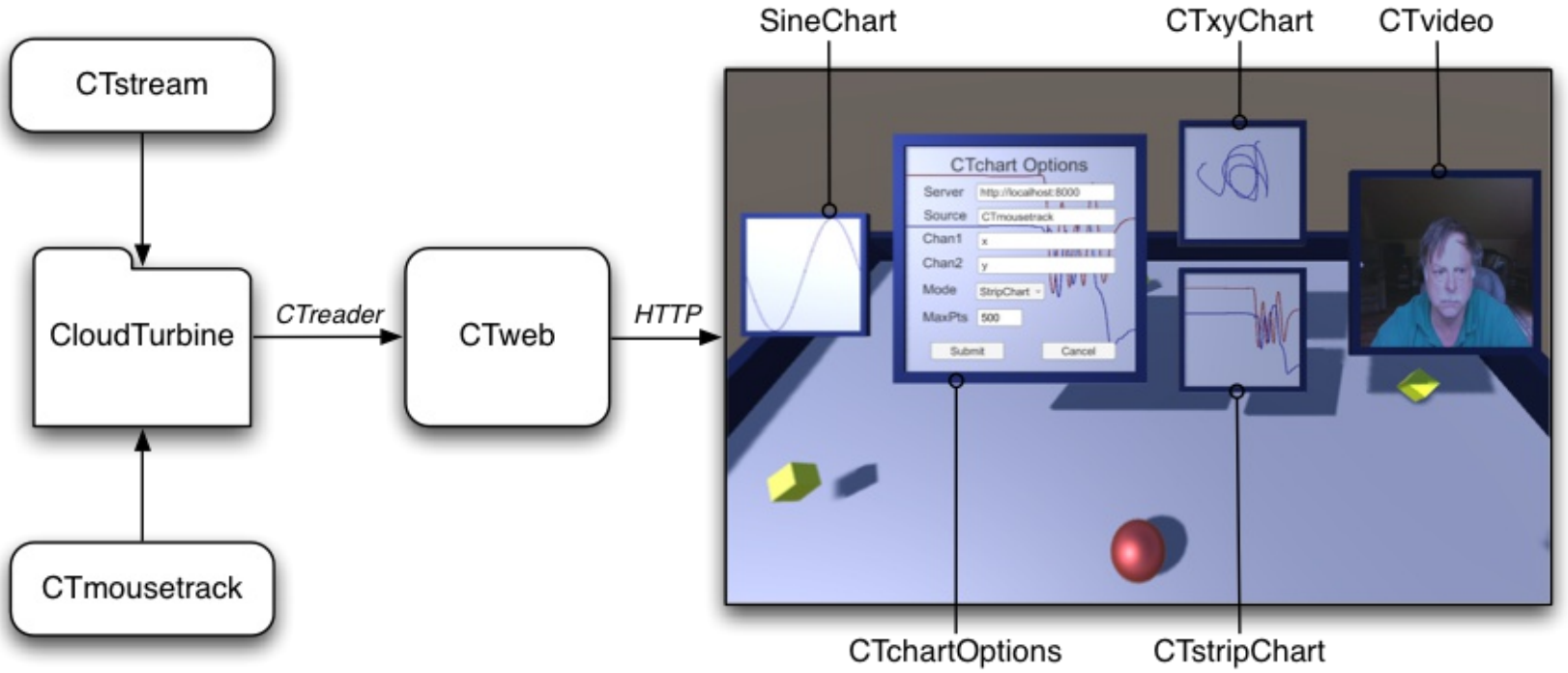
Phase 2: CT Open Source

- Github Open Source:
  - https://github.com/cycronix/cloudturbine
- Java, C#, HTTP Interfaces
- Gradle build system
- CloudTurbine Web Portal

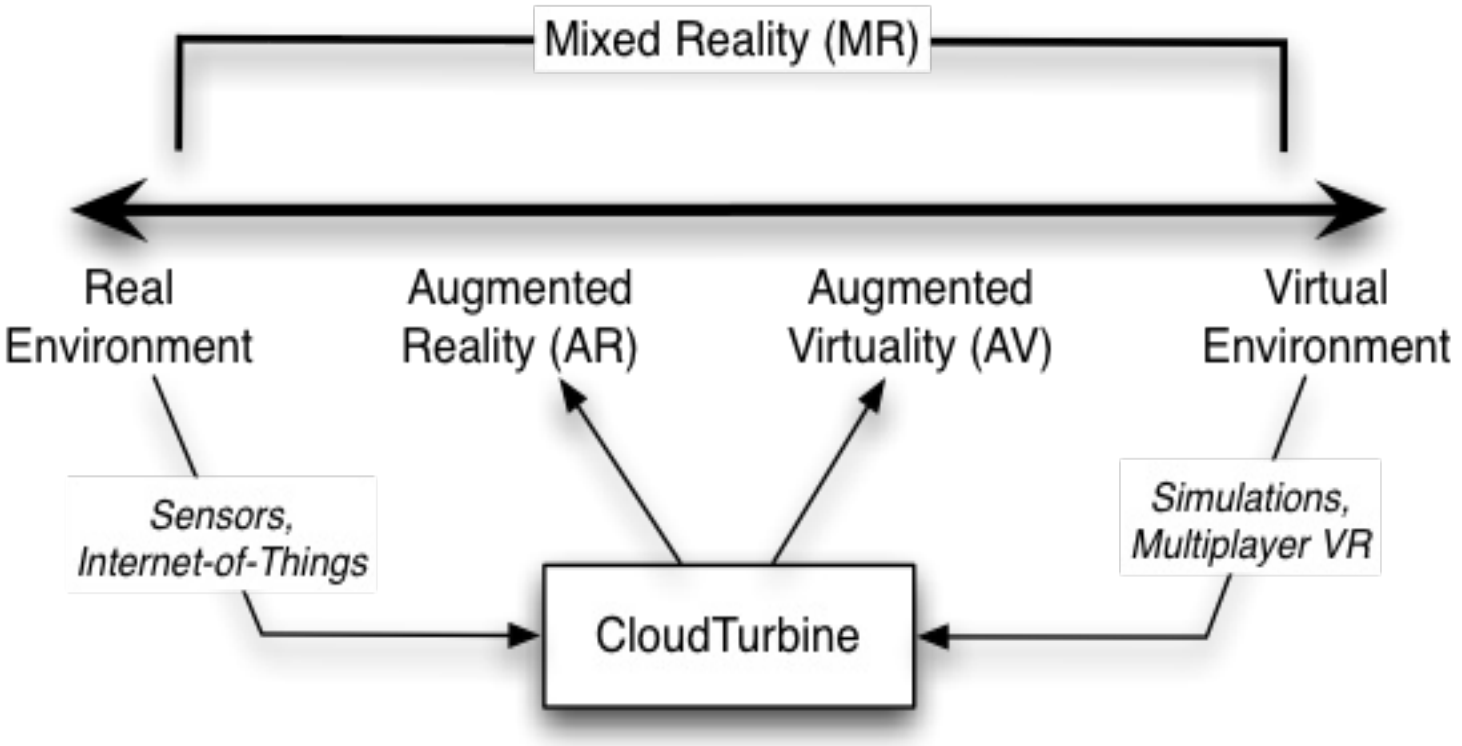


https://www.cloudturbine.com

Phase 2: CT Mixed Reality



Phase 3: Go Deep



A Merged Reality Recorder (MRR)

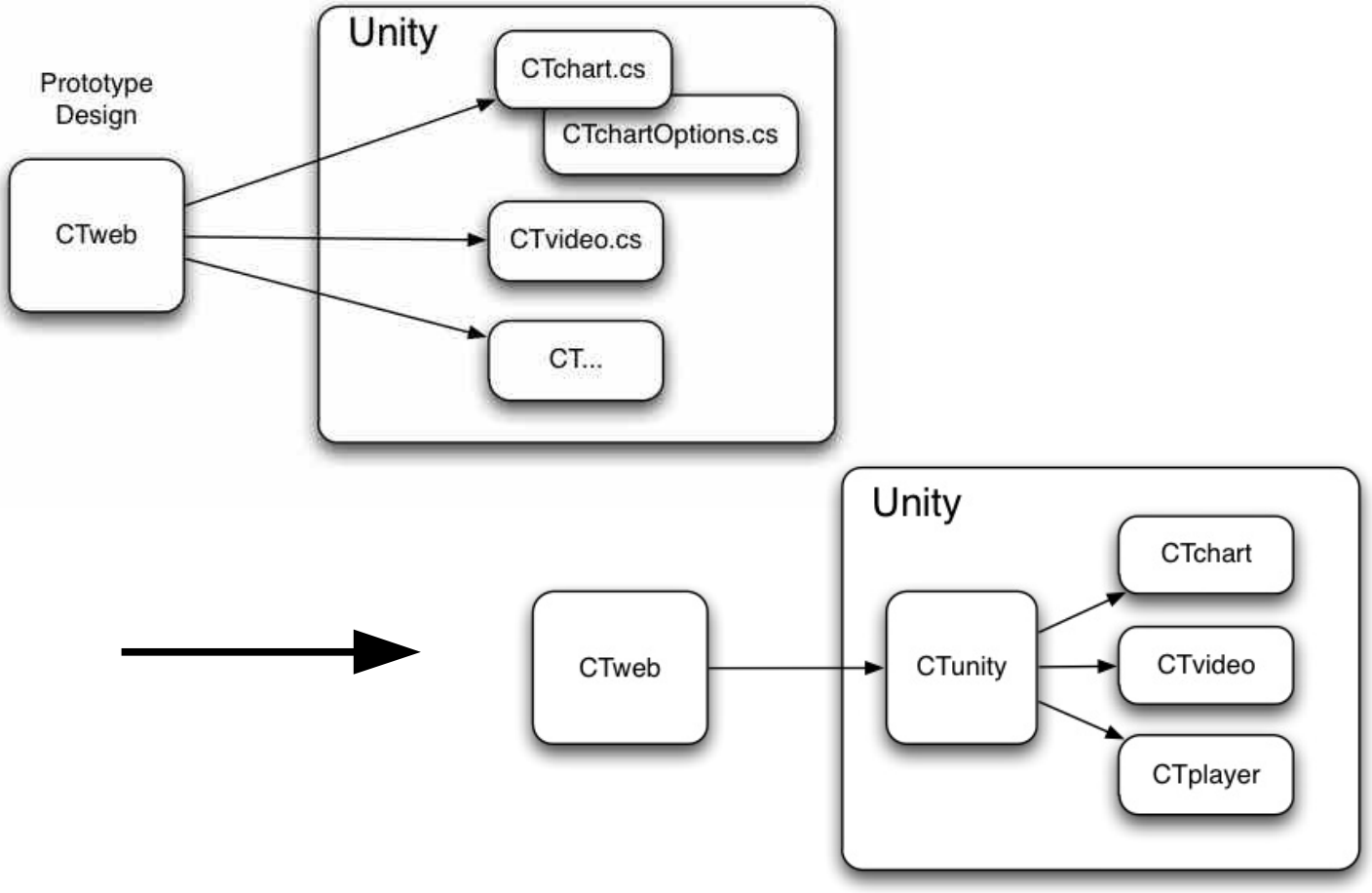
- Record and replay mixed-reality streams
- Merges real-time virtual and real worlds
- Distributed network of players & observers
- Immersive replay and exploration
- Time/space (4D) data archives

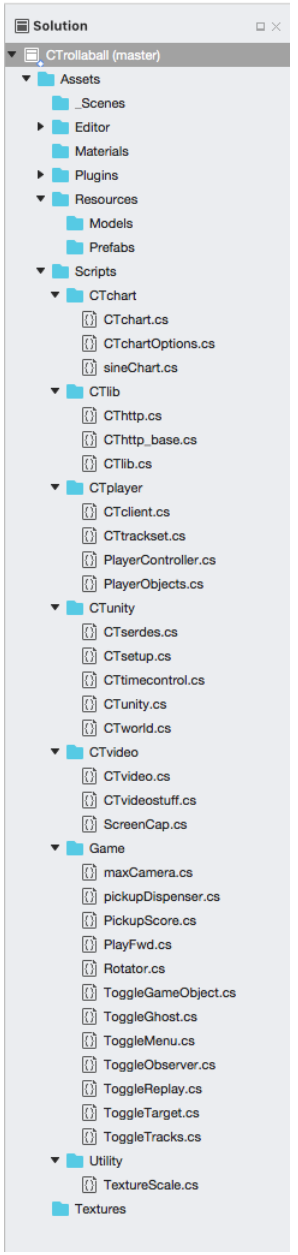
Phase IIX/3 Tasks

Table 1. Phase IIX/3 Schedule

	Quarter After Award			
Tasks	1	2	3	4
1. (P3) CT/MR OS Interface Library	■	■		
2. (P2X) CT/MR for VR community		■	■	
3. (P2X) Mixed Reality NASA Apps			■	■
4. (P3) CT Community Support	■	■	■	■
5. (P2X) Project Management				
AFRC Site Visit (TBD)			◆	
Progress Reports	◆	◆	◆	
Final Report				◆

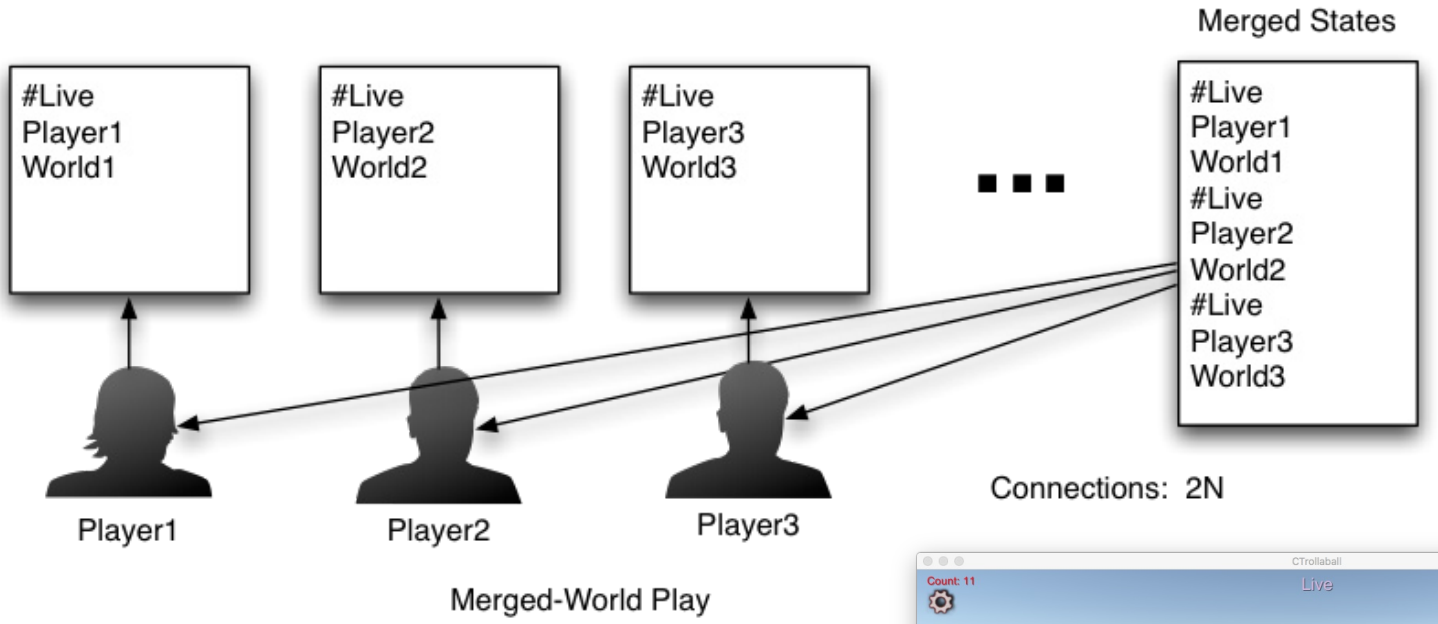
Task 1: Open Source Library

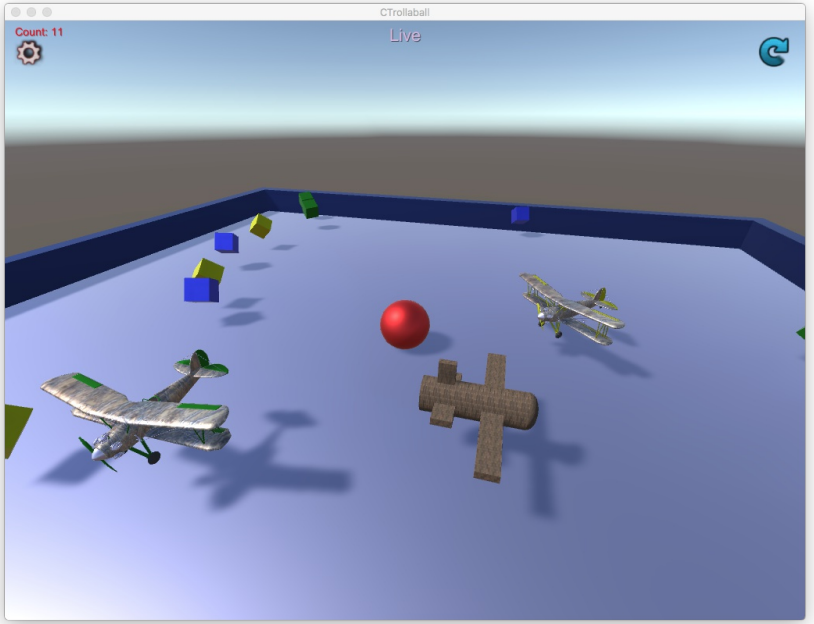




Github: https://github.com/cycronix/CTrollaball

Task 1: Streams and States

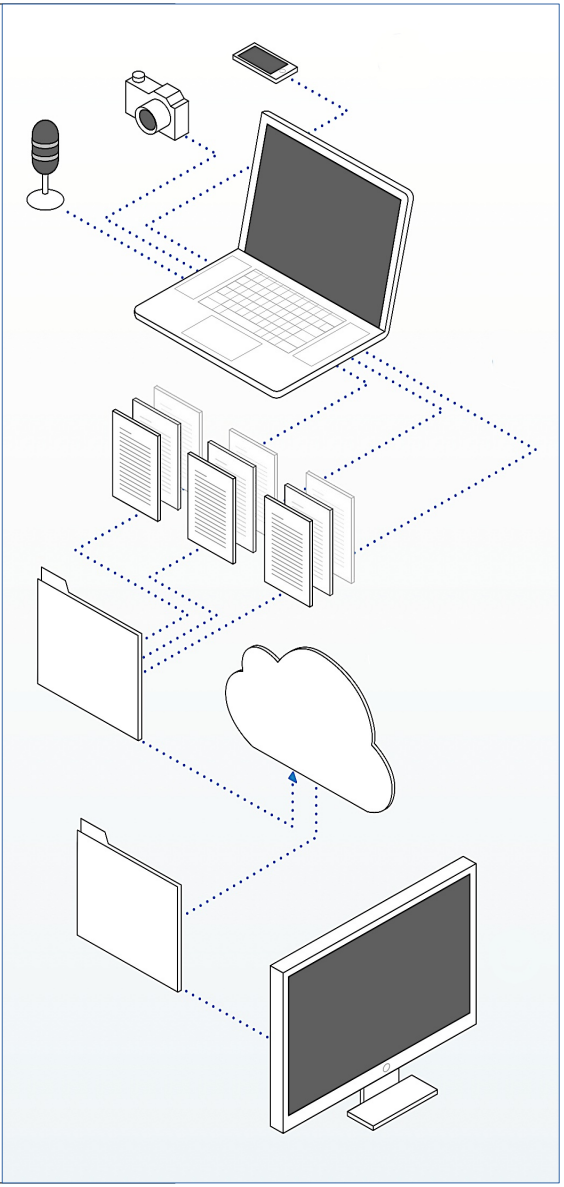




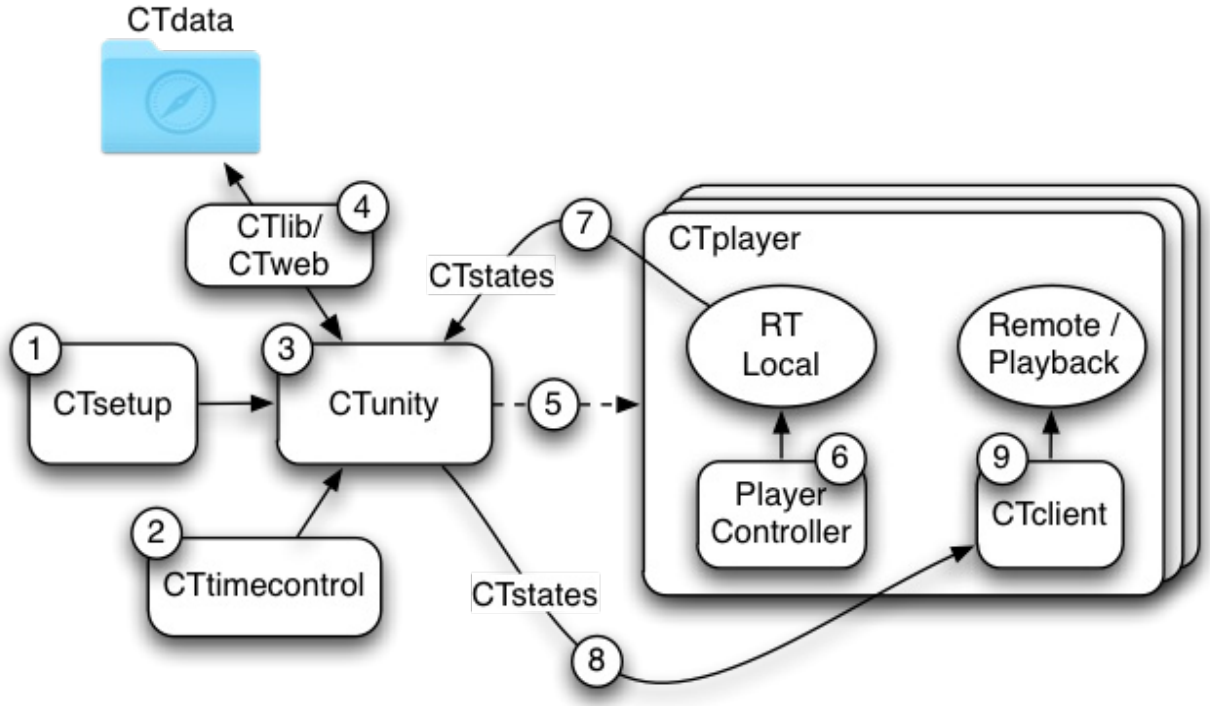
Task 1: World-State Serialization


```
{
  "mode": "Live",
  "time_sec": 1532543676.232,
  "player": "Green",
  "player_objects": [
    {
      "name": "Green", "prefab": "Biplane", "active": true,
      "position": [6.4755, 0.6, 6.1655],
      "orientation": [-0.0004, 117.7283, -0.0001],
    },
    {
      "name": "Green.Pickup0", "prefab": "Pickup", "active": true,
      "position": [9.1, 1.4, -8.5],
      "orientation": [ 334.073, 24.0876, 224.0097],
    },
    {
      "name": "Green/CTvideo", "prefab": "CTvideo", "active": true,
      "position": [1.2, 2, 0],
      "orientation": [0, 180, 0],
      "url": "http://localhost:8000/CT/CTstream/webcam.jpg?t=1.53254
     }
  ]
}
```


Example CTstates.json



Task 1: Behind the Scenes



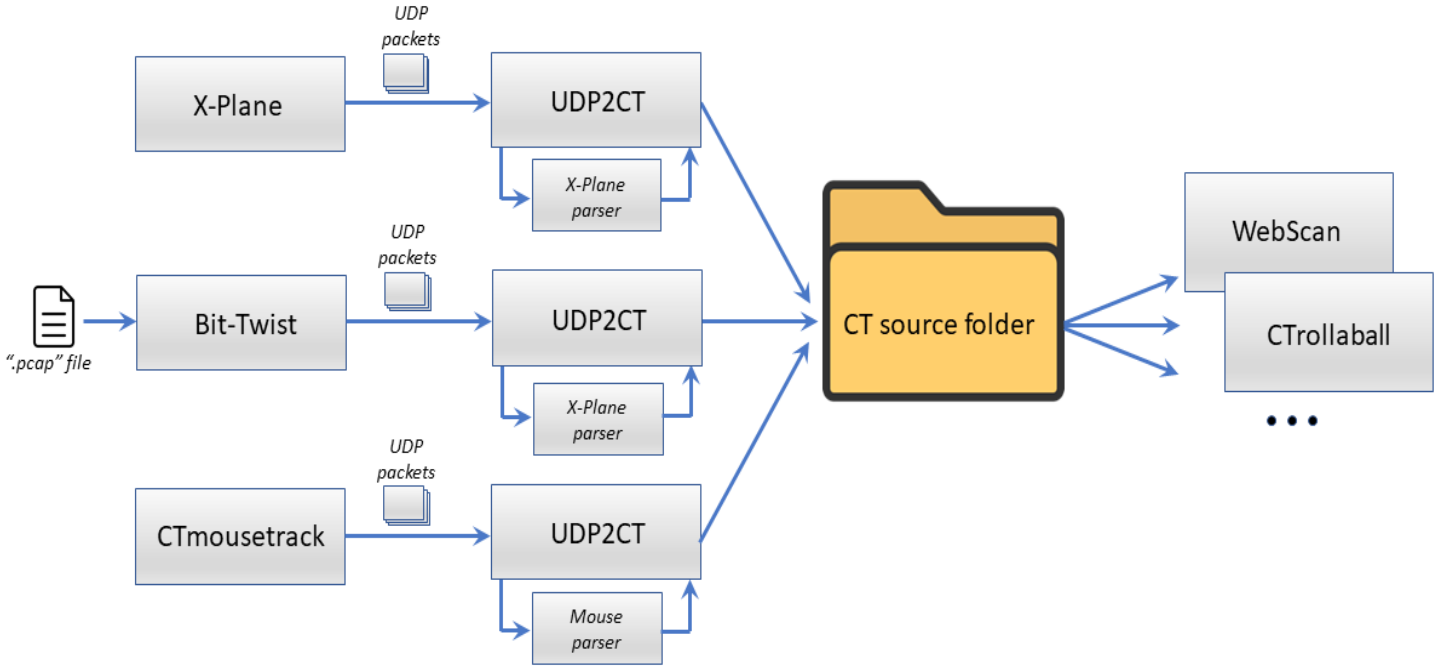
- *CTsetup* (1) provides option menu
- *CTtimecontrol* (2) sets game-time (RT & playback)
- *CTunity (3) provides shared CT data via CTlib / CTweb* (4)
- *CTunity* (3) instantiates *CTplayers* (5):
    - *PlayerController* (6) records live *CTstates* (7)
    - *CTstates* (8) replayed via *CTclient* (9)

Task 2: Promote CT/MR with VR Community

*Biplane model courtesy of: https://www.turbosquid.com/3d-models/free-obj-model-great-lakes-biplane/463859

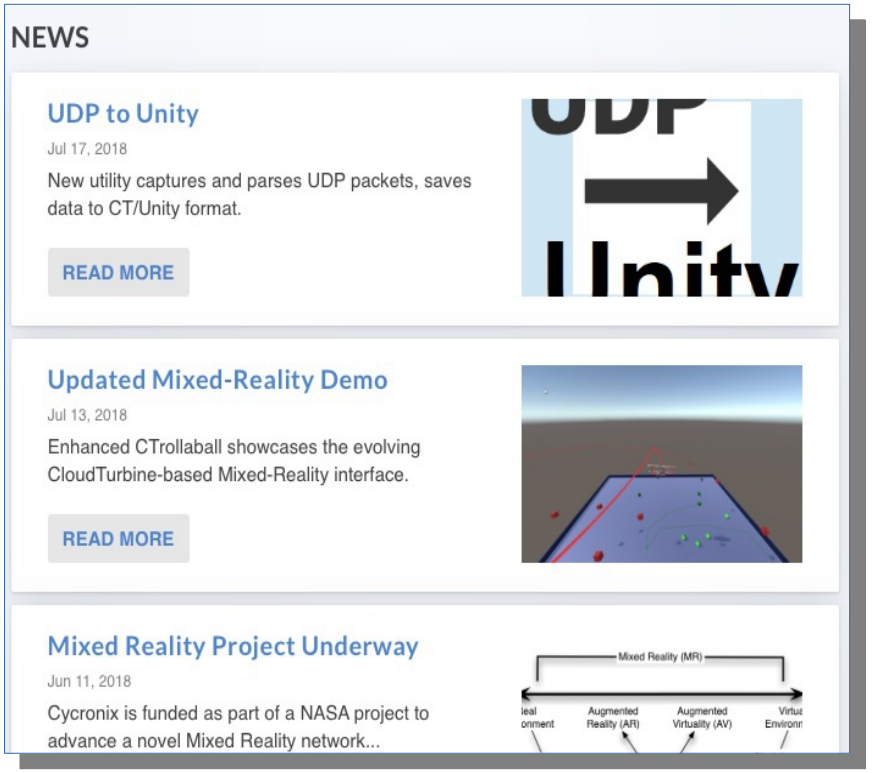
Task 3: Merged-Reality NASA Applications

- What we are here to discuss
- Identify potential NASA applications:
  - Type, Timeframe, Team



Task 4: CT Community Support

- Website updates
  - News
  - Docs
- New/updated utilities
  - UDP2Unity
  - CTmousetrack
- Code maintenance
  - Bug fixes
  - Updates



Merged-Reality Demos

- CTrollaball platform
  - Single-player
  - Multi-player
- Immersive 3D playback
  - “Observers”
- External “real” players
  - Mouse-track
  - Video
  - Xplane