Preparations Software Stack

- GIT
  - Install Git (git-scm.com)
  - Install Git LFS (git-lfs.com)

- Unity (unity.com)
  - Install Unity HUB
  - Install Unity 6000.0.36f1 or newer via Unity HUB

- Python
  - Install Python 3.10 or newer (MS Store)
  - Install Visual Studio Code or another IDE (MS Store)

EBERHARD KARLS UNIVERSITÄT TÜBINGEN

BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

Unfallkrankenhaus Berlin

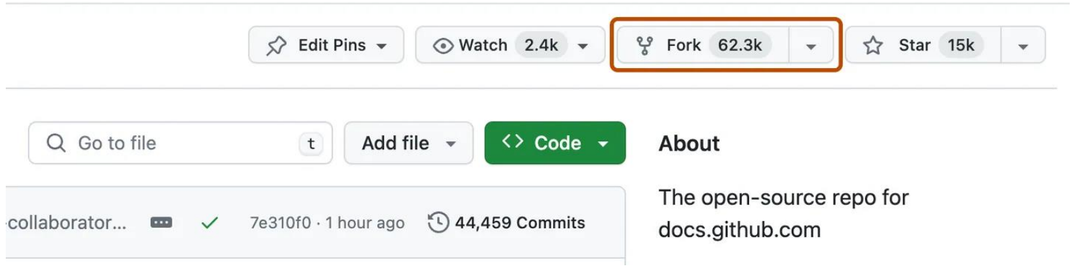
PLAY BIONIC www.playbionic.

Preparations Get Git Repository

REPO URL
https://github.com/MariusKlug/mind-and-body-UIs-hackathon.git

- Either clone (& change remote origin)
  git clone *https://github.com/MariusKlug/mind-and-body-UIs-hackathon.git*
  git remote set-url origin *https://gitlab.com/KodeKlout/my-repository.git*

- Or fork to your github account



EBERHARD KARLS UNIVERSITÄT TÜBINGEN
BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen
CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN
Unfallkrankenhaus Berlin
PLAY BIONIC www.playbionic.

Preparations Hardware Stack

Muse S (Brain, EEG)

- *IXRSuite.exe* establishes the BT connection and provides various LSL data streams containing raw EEG data well as processed “brain power”.

MyoArmband (Arm, EMG)

- *MyoArmbandBridge.exe* encapsulates the BT connectivity. Communication to the MyoArmband happens via API, which provides 8-electrode EMG data, IMU-based orientation data and allows the armband to vibrate.

Polar Belt (Heart, ECG)

- Python Script *main.py* establishes the BT connection and provides various LSL data streams containing raw ECG data as well as processed hearth rate and LF/HF ratio.

EBERHARD KARLS UNIVERSITÄT TÜBINGEN

BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

Unfallkrankenhaus Berlin

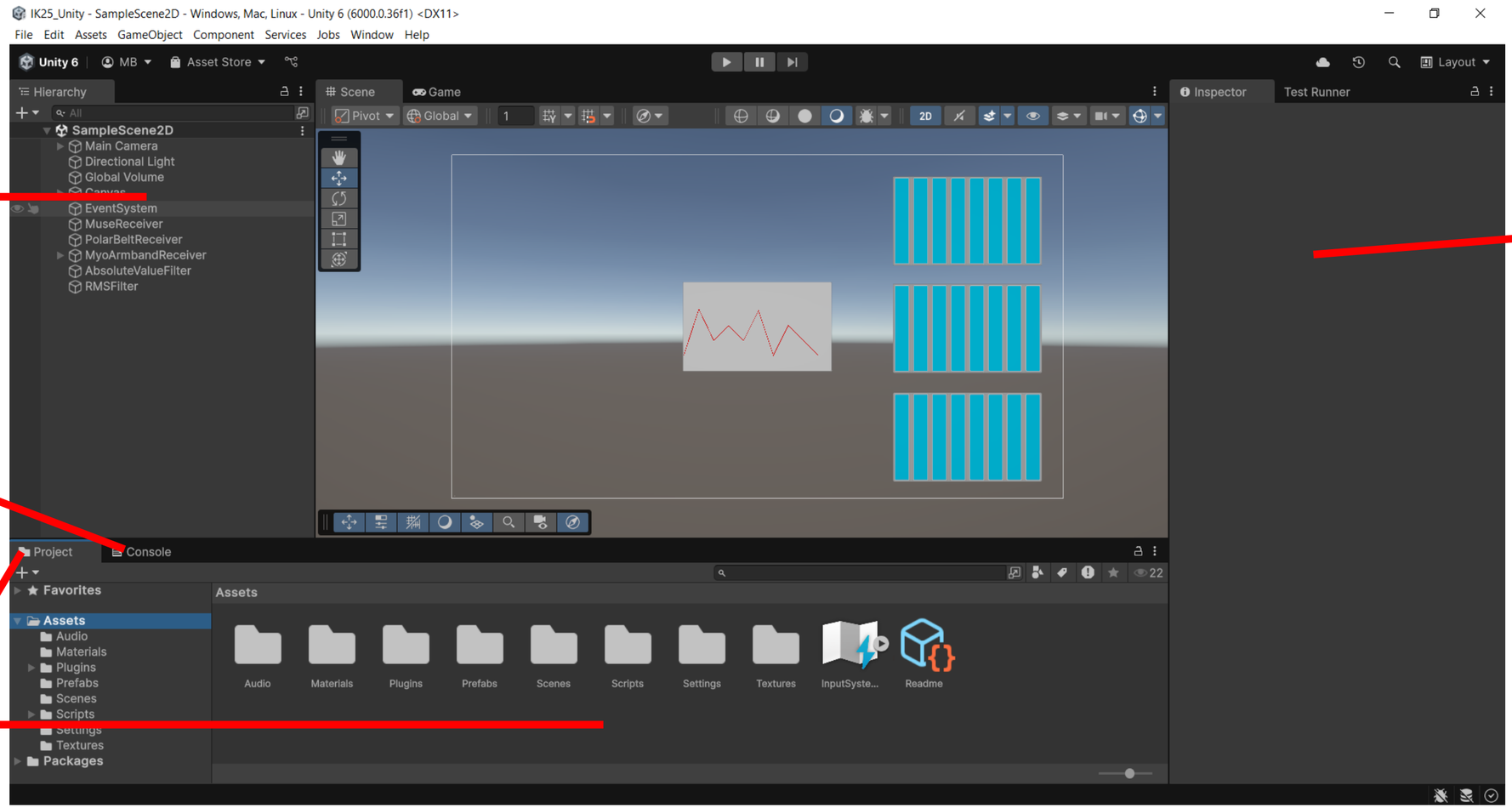
PLAY BIONIC www.playbionic.

Unity Fundamentals Editor

Scene Hierarchy

Debug Console

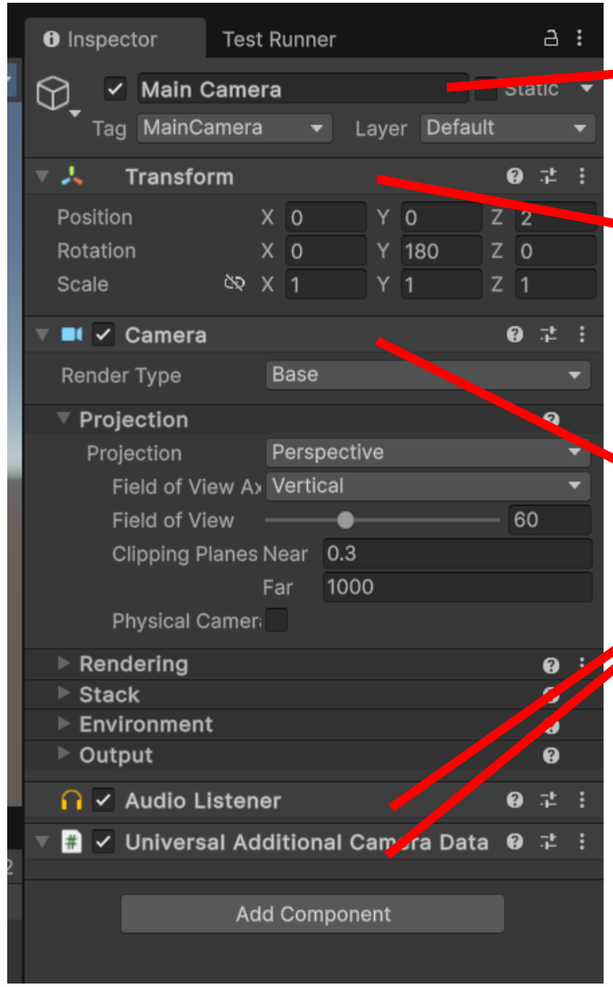
Project Folder



Scene Object Inspector

EBERHARD KARLS UNIVERSITÄT TÜBINGEN
BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen
CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN
Unfallkrankenhaus Berlin
PLAY BIONIC www.playbionic.

Unity Fundamentals GameObjects



GameObject
Name

Transform Component
(mandatory)

Further
components
(including self-
made)

Unity Fundamentals Components

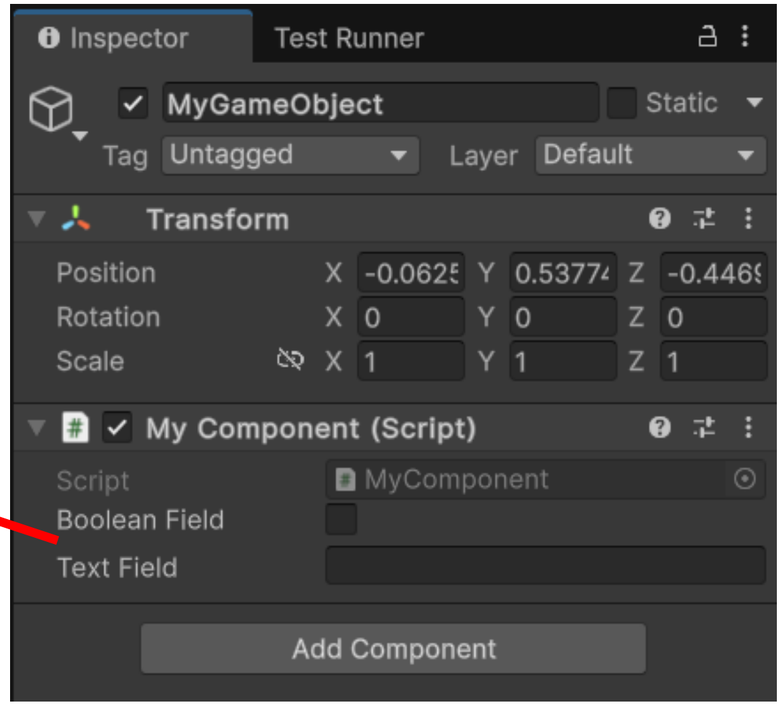
```
public class MyComponent : MonoBehaviour {

    public bool booleanField;

    [SerializeField]
    private string textField;

    // Start is called once before the first execution
    // of Update after the MonoBehaviour is created
    void Start() {
        name = "MyGameObject";
        transform.position = new Vector3(1f, 2f, 3f);
        Camera camera = GetComponent<Camera>();
    }

    // Update is called once per frame
    void Update() {
        //Rotate around the y-axis in world space
        transform.Rotate(new Vector3(0f, Time.deltaTime, 0f), Space.World);
    }
}
```



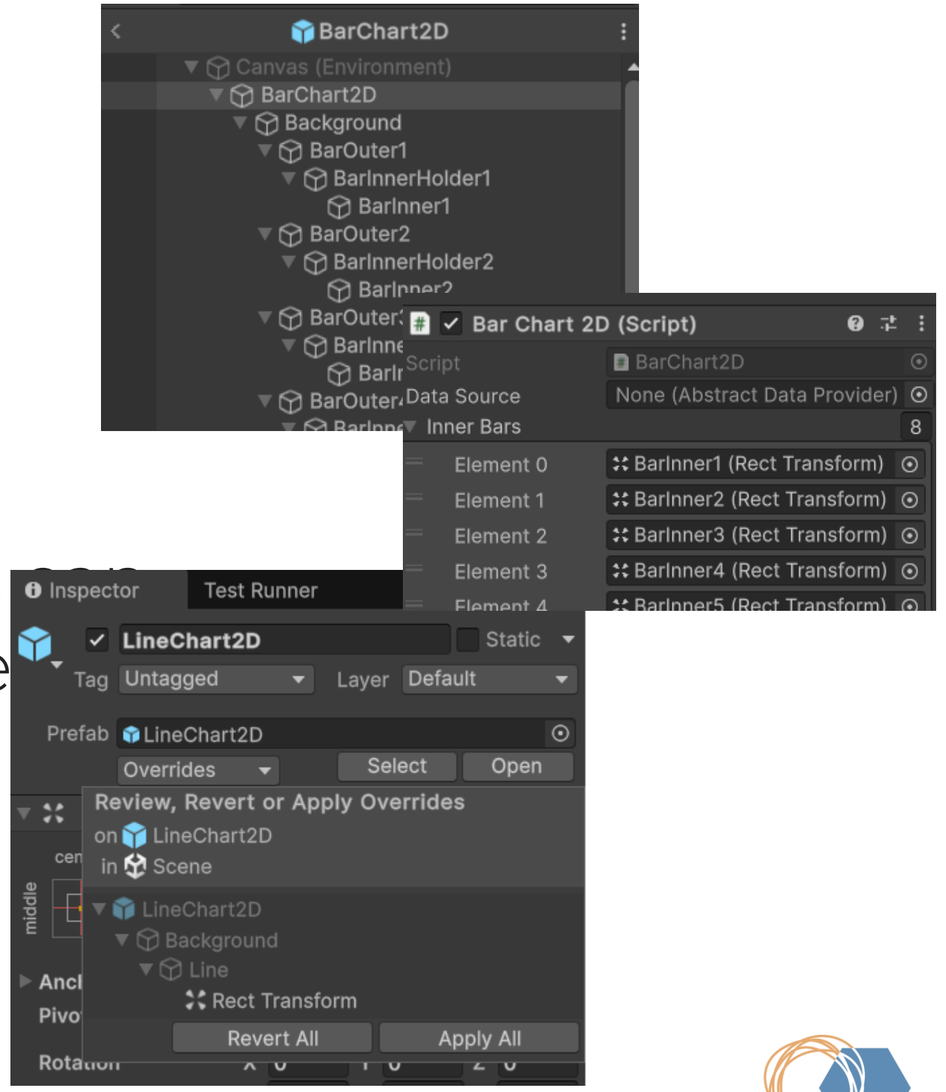
Part of the GameObject Life Cycle

Unity Fundamentals Prefabs

- “Blueprints” of Unity

- A Prefab consists of a hierarchy of GameObjects
  - which in turn contain Components
  - Inspector fields of the Components can be assigned within the scope of the prefab.

- Prefabs added to a scene can be overridden,
changes can be reverted.



EBERHARD KARLS UNIVERSITÄT TÜBINGEN
BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen
CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN
Unfallkrankenhaus Berlin
PLAY BIONIC www.playbionic.

Repository Walk Through
Overview

- Unity Project (C#)
  - “Assets/Plugins” contains
    - IXRSuite.exe
    - MyoArmbandAPI/Bridge.exe

- VS Code Project (Python)
  - Python Script main.py

EBERHARD KARLS UNIVERSITÄT TÜBINGEN

BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

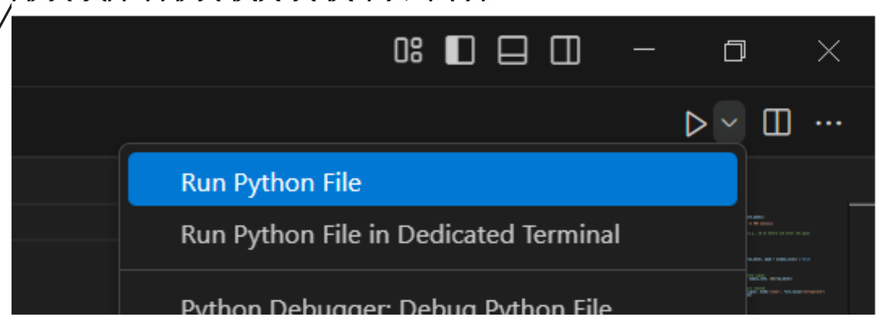
Unfallkrankenhaus Berlin

PLAY BIONIC www.playbionic.

Repository Walk Through VS Code

Polar Belt Python Script

1. Open the project in VS Code
2. Create a virtual Python environment (VENV)
   CTRL+SHIFT+P-> Python: Create Environment
3. Install lib dependencies
   Terminal: pip install -r /path/to/requirements.txt
4. Open & run *main.py*



Repository Walk Through Unity

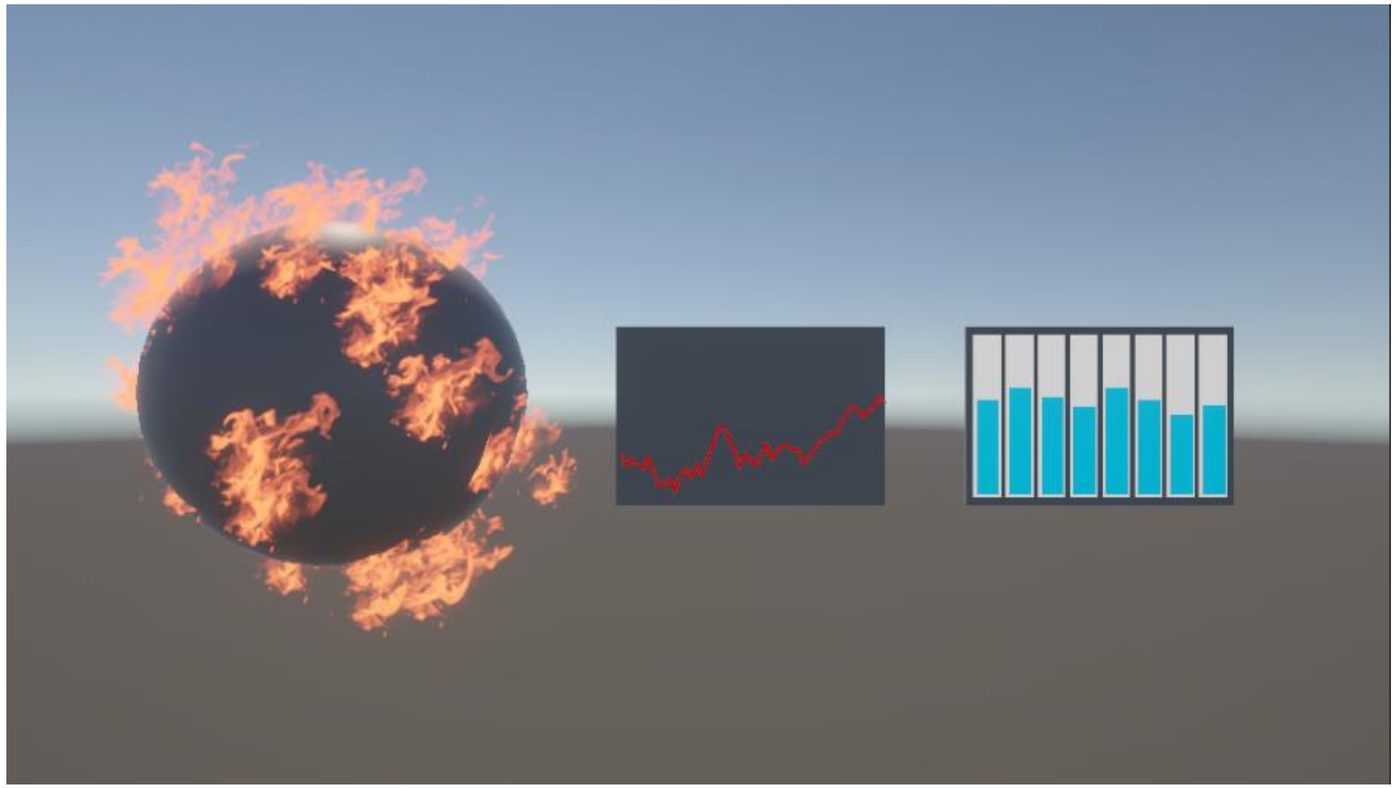
Sample Prefabs

Four Prefabs

1. Burning Sphere
2. Line Chart
3. Bar Chart
4. Heartbea

One Interface to serve them all

- Data Receivers provide data samples
  as float[]
- Prefabs receive data samples
  as float[]



EBERHARD KARLS UNIVERSITÄT TÜBINGEN

BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN

Unfallkrankenhaus Berlin

PLAY BIONIC www.playbionic.

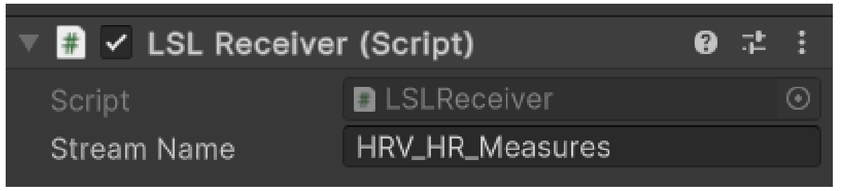
Repository Walk Through Unity

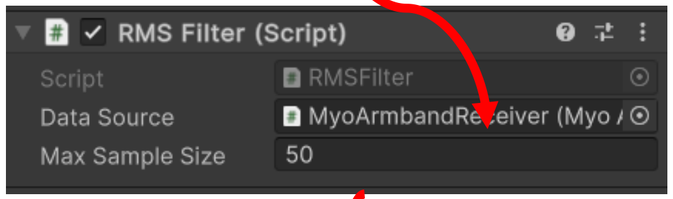
Data Receiver Components

You can Receive data from an LSL stream …

… or by using the MyoArmband Receiver

It is also possible to chain the data processing by adding an Absolute or RMS Filter

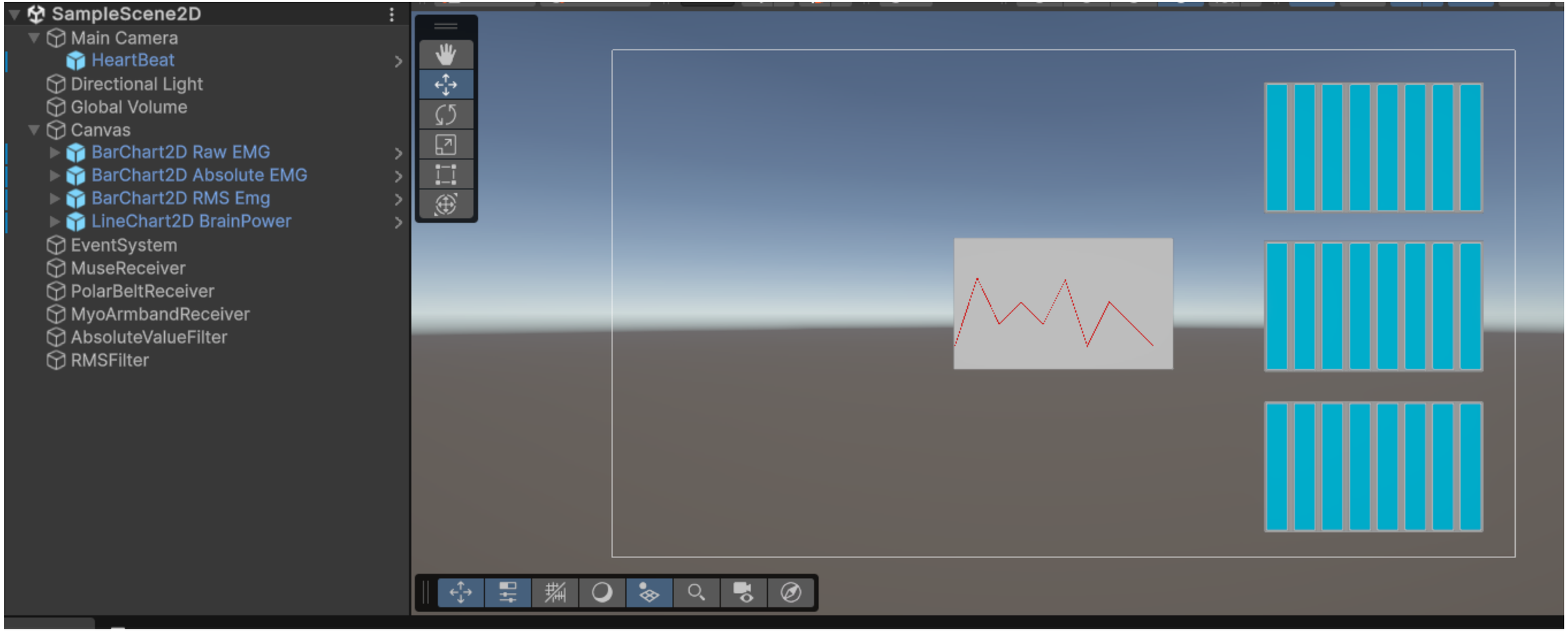




EBERHARD KARLS UNIVERSITÄT TÜBINGEN
BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen
CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN
Unfallkrankenhaus Berlin
PLAY BIONIC www.playbionic.

Repository Walk Through Unity

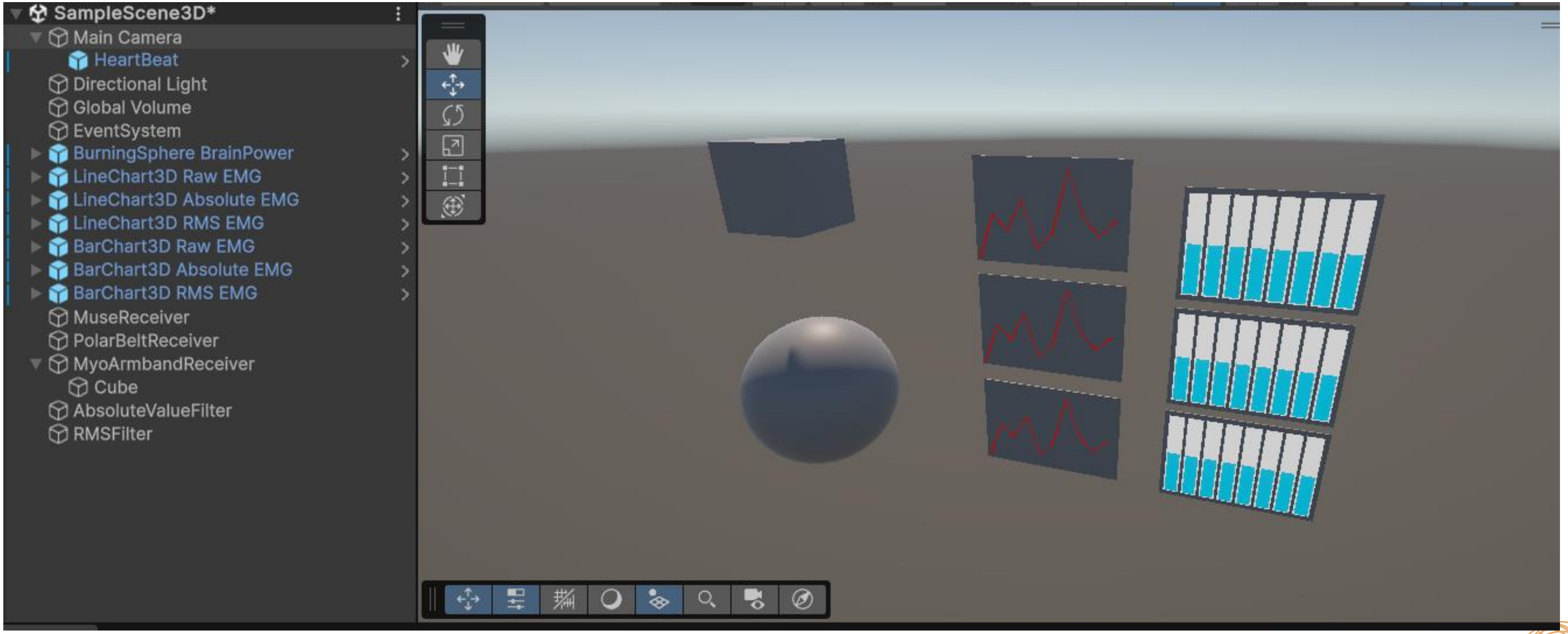
2D Sample Scene



EBERHARD KARLS UNIVERSITÄT TÜBINGEN
BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen
CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN
Unfallkrankenhaus Berlin
PLAY BIONIC www.playbionic.

Repository Walk Through Unity

3D Sample Scene



EBERHARD KARLS UNIVERSITÄT TÜBINGEN
BG Klinik Berufsgenossenschaftliche Unfallklinik Tübingen
CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN
Unfallkrankenhaus Berlin
PLAY BIONIC www.playbionic.