Qualisys/MaxMSP Real time feedback setup

Brief Background

Qualisys allows streaming of 3D /Analog data via the Qualisys DHCP server (QDS). The QDS provides a proxy for transferring data from Qualisys to external programs. In our case, we are interested in streaming data to MaxMSP. The QDS is launched automatically when Qualisys Track Manager is launched.

On the MaxMSP side, we use the “QTM Real-time Server Protocol” (QTM RT protocol). The QTM RT protocol provides a set of commands for receiving data from the QDS. The full documentation for the QDS can be found on GitHub at:

[https://github.com/beveridges/AUGMENTED\_FEEDBACK\_DRUMMERS/docs/QTM RT protocol.pdf](https://github.com/beveridges/AUGMENTED_FEEDBACK_DRUMMERS/docs/QTM%20RT%20protocol.pdf)

Current tasks

In our meeting on 20/10/21 we discussed the three main stages for the project:

1. The ‘technical stuff’. Development of a minimum working example (MWE) and supporting documentation (this document)
2. The background literature that will guide the experimental design. Chapter 11 Augmented Feedback, Motor Control and Learning.
3. Deciding how best to present the feedback to our participants. The fun part.

MWE protocol

Please follow these steps to run the Minimum Working Example (MWE).

1. Launch the Qualisys file. This can be found at:

\AUGMENTED\_FEEDBACK\_DRUMMERS\Qualisys\MuscleMonitorv0.1\Data\120BMP\_240HPM\_09.08.17.qtm

1. Play the Qualisys file with real time output. You can find this option at the bottom of the *Play* menu, under *Play with Real-Time Output*.
2. Launch the Max patch. This can be found at:

\AUGMENTED\_FEEDBACK\_DRUMMERS\MaxPatches\MuscleMonitor\_v0.1.maxpat

1. Click on the button named */qtm Connect 45454.* Thisestablishes a connection between the QTM Manager, QDS, and Max.
2. Click the button named */qtm StreamFrames AllFrames AnalogSingle[:1-6].* This streams the 6 analog EMG streams. A this point, the EMG data will be displayed in the 6 plot windows on the left side of the patch.

Some limitations of the current system

1. Although we can be confident that we are capturing all 6 EMG signals (EMG 1 - EMG 6) in Max, the waveforms in Max look a little ‘sparse’ when compared to the waveform visualisations in Qualisys (to view the analog data in Qualisys got to View > Data Info 1, this will show you the *Analog Data* window. To view the waveforms right click on one of the EMG signals in the *Analog Data* window, select Plot > channel(s).

*Possible causes: This disparity is most likely cause by the downsampling factor between Qualisys and Max. In our setup downsampling ensures low latency between Qualisys and Max. It is not clear if the Max waveform sparseness will have a detrimental effect on the system. We need to perform some testing to better understand this (preferably during real-time participant testing and not real-time playback).*