



EMC - GUI

External Motion Control—Graphical User Interface



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A model of the Motion Control

The Problem

Flight simulations run using a Motion Control (MC) system operated using an External Motion Control (EMC) server.

Configuration for a simulation run is done by the user through the server.

Data is sent between the MC and EMC using UDP and TCP message passing.

Access to the server requires the user to use SSH to manually run and interact with the app. This method is not cohesive with the flow of operations for EMC based research.

The Solution

A client application that uses UDP messages to communicate with the EMC server.

Client UI for user to input commands. Commands sent directly to the server.

Server sends runtime data back to the client, which displays the data to the user.

Can be done with minimal modifications to server code.

The client never interacts directly with Motion Control.

All communication with MC still done by server.

Challenges

Complexity: Client application was built from scratch, but existing server code was modified to interact with the client.

Flow of operations: Communication must be done in a specific order.

Location: The Motion Control device cannot be accessed outside of the research facility. Server sends simulated data for testing.

Communication: Server and EMC-GUI are built off different UDP frameworks. They use different data types to send data structures.

Results

The client and server can reliably communicate with each other. The user can send commands to the server using the buttons on the UI. The server sends its runtime data to the client at a rate of once every 8 milliseconds, meaning data is being displayed in real time.

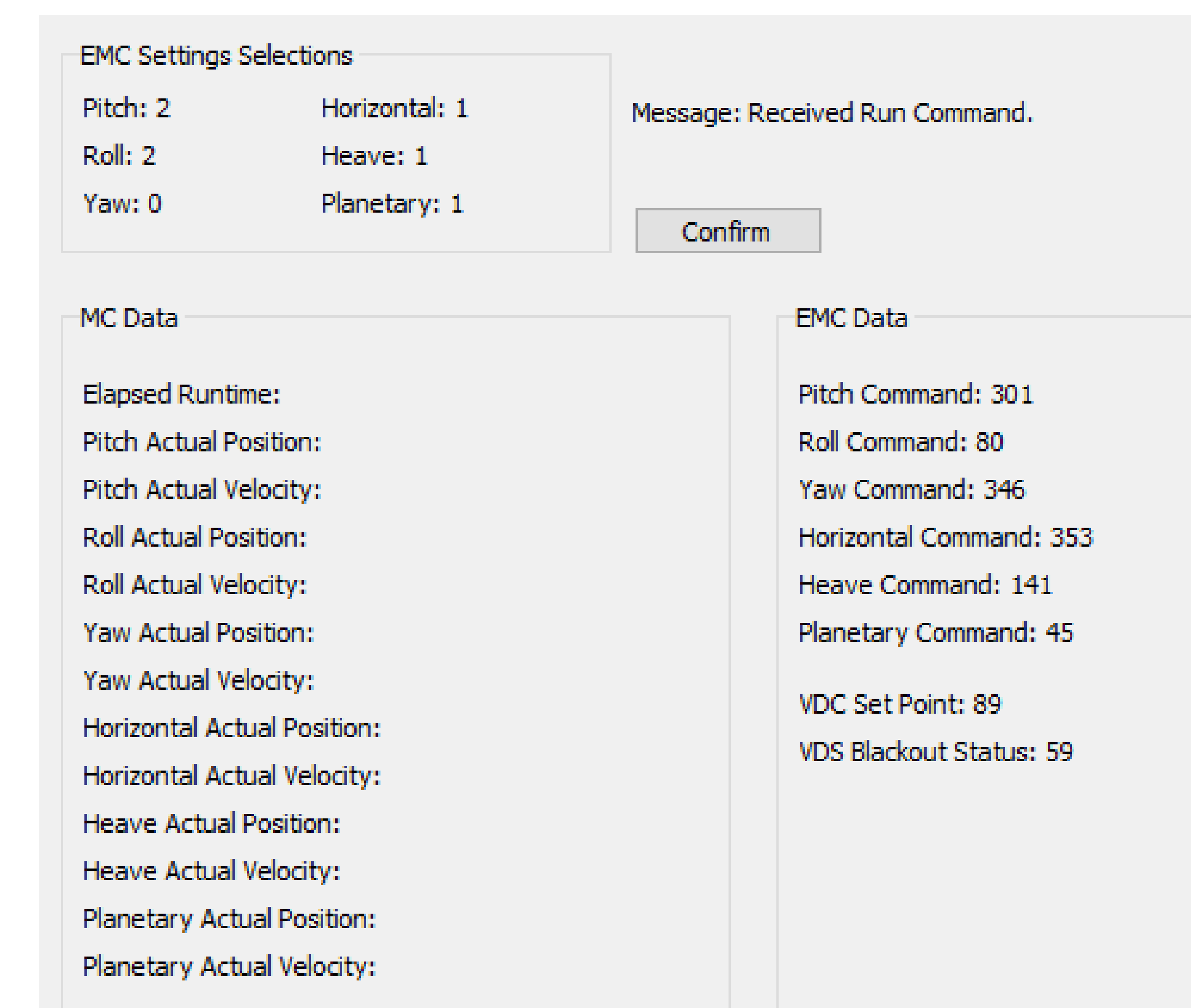
Future Plans

Test client and server again with connection to Motion Control.

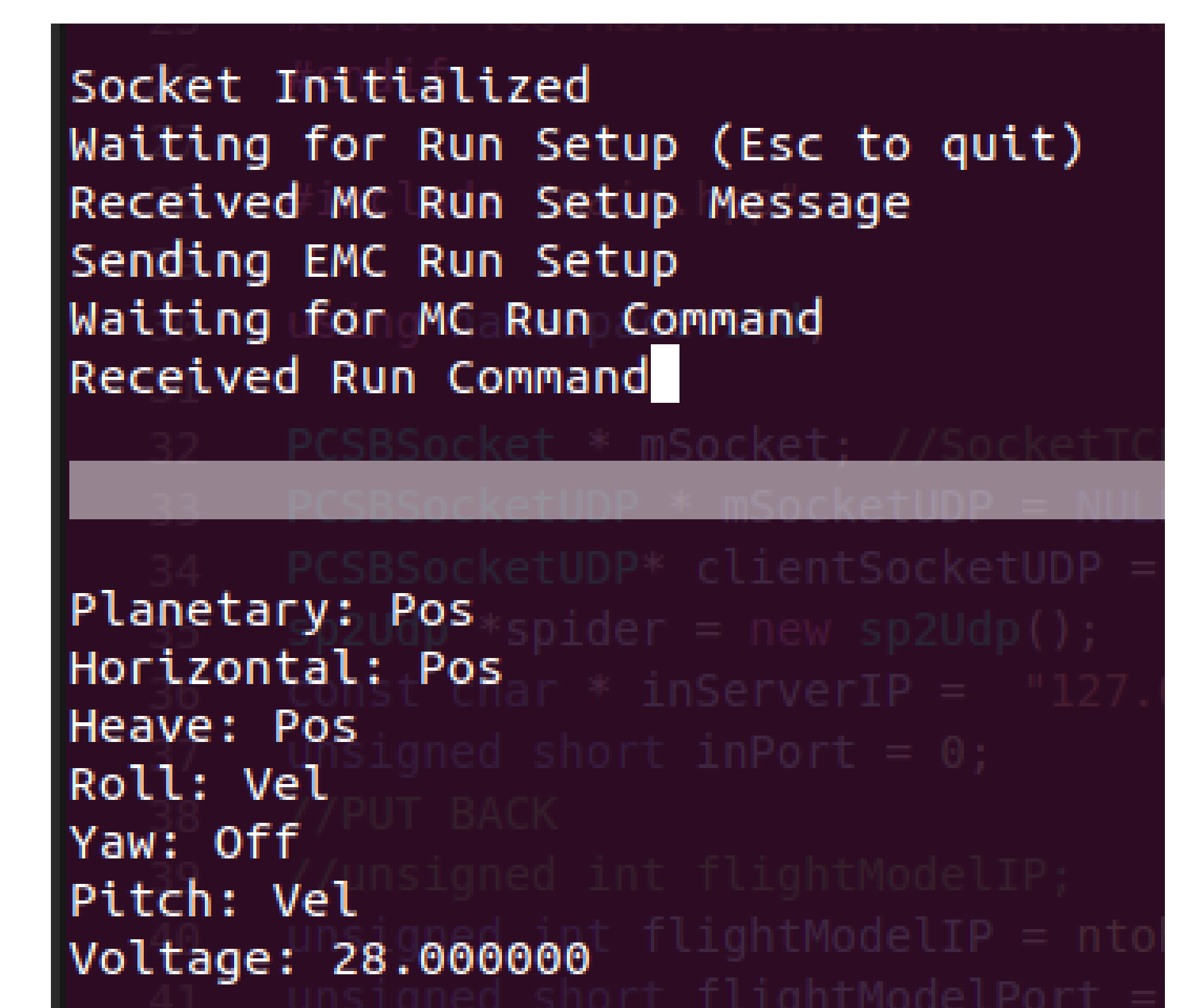
Send commands received by the server from EMC-GUI to MC.

Send MC runtime data to EMC-GUI alongside EMC data.

EMC-GUI will be used in future NAMRU-Dayton flight simulation research.



EMC-GUI client window during runtime.



Server output.