

MyoPose

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Motivation & Objective

Objective

Detect finger position with electrical signals from forearm muscles with hobby grade hardware and novel deep learning techniques

Motivation

Meta Orion AR glasses use sEMG wristband as controller

Project Impact

Framework for research in prosthetics and XR interaction

Goals and Deliverables

Open source framework for finger pose detection with



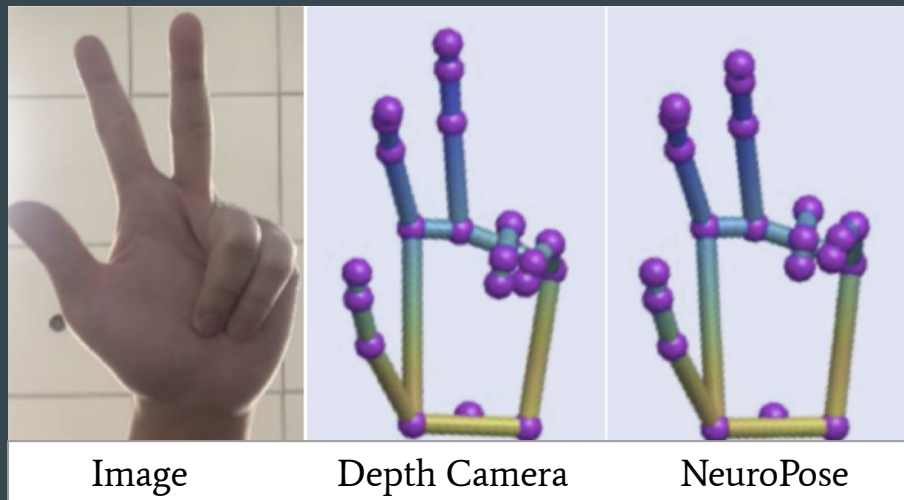
Technical Approach and Novelty

Current SotA: NeuroPose

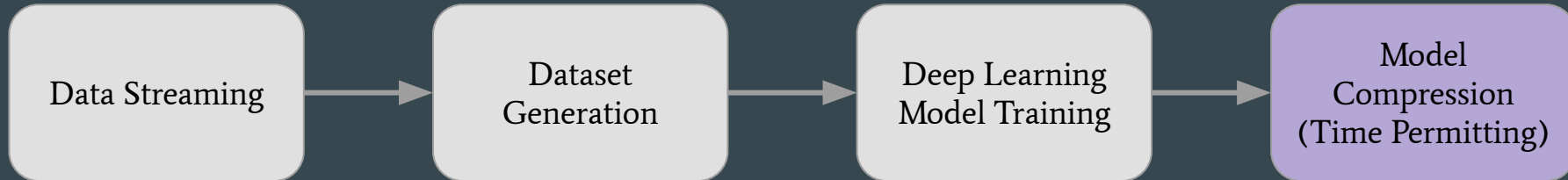
- Uses Myoband (deprecated) + biological model of finger positions
- Uses 5 second window input to encoder-decoder architecture
- Attempted to use RNN, but slower and more power draw

MyoPose:

- Uses open source MyoWare EMG
- Uses novel architectures (TCN or Mamba)
- Streaming input buffer vs 5s window

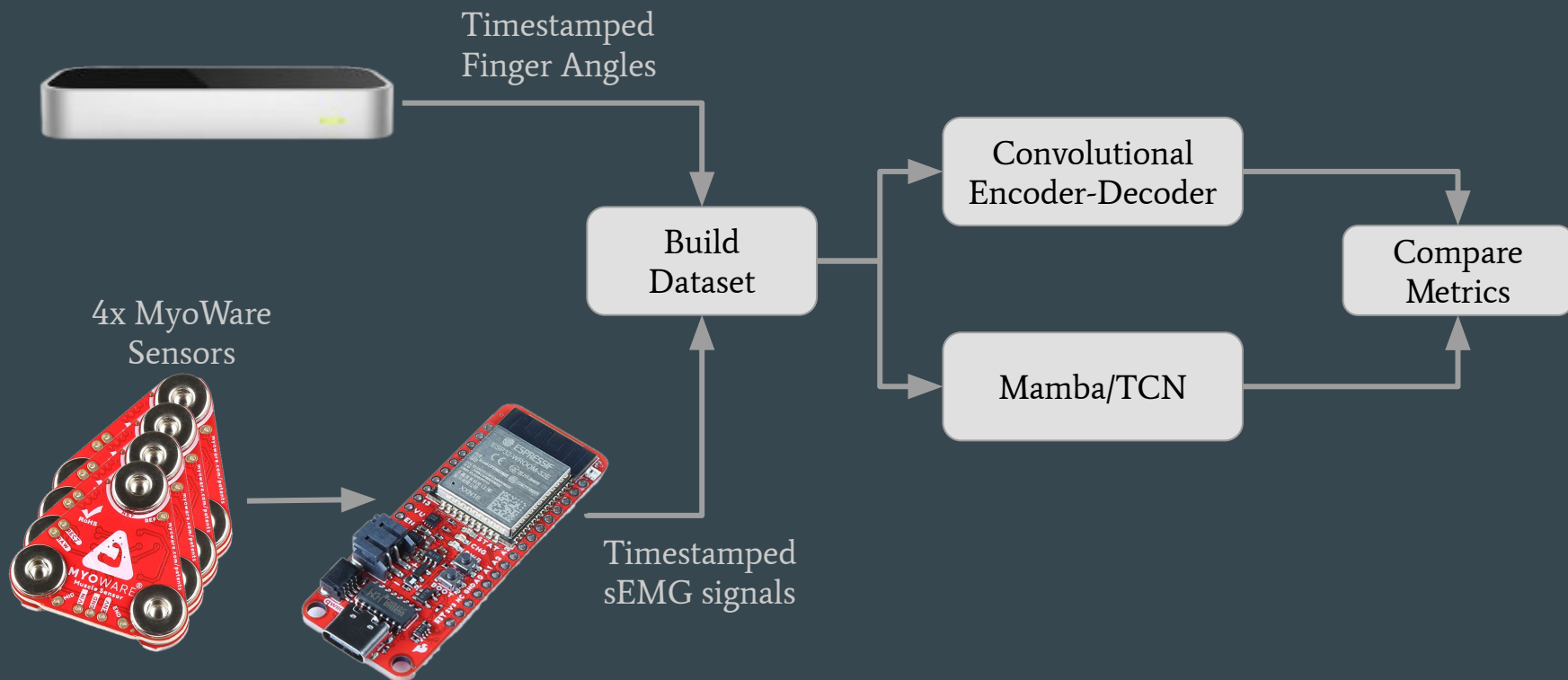


Methods



- No dataset, so I have to make my own
- Electrode placement is very finicky
- Implement NeuroPose convolution encoder-decoder and Mamba or Temporal Convolutional Network (TCN)
- If time permits, compress model to run on smartphone

Methods



Evaluation and Metrics

Metrics

Use custom loss function from NeuroPose to encode hand-skeletal constraints into the loss function.

Evaluation:

- Finger angle accuracy >90%
- Compare my novel model against NeuroPose model accuracy
- (Time Permits) Evaluate compressed models on smartphone

Current Status and Next Steps

- Read sEMG signals and publish to MQTT topic
- Subscriber writing to SQLite database
- Ultraleap hand tracking is there but finger angles do not make sense

