MyoPose

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Title slide with the project title and names of all team members.

One slide titled "Motivation and Objectives"

What are you trying to do? Articulate your objectives using no jargon.

Who cares? If you are successful, what difference will it make?

What are the goals and deliverables of your project?

One slide titled "Technical Approach and Novelty"

How is it done today, and what are the limits of current practice?

What is your approach (at a high level) and what is new about it?

One slides titted "Methods" where you describe algorithms, data set, platform, etc.

One slide title "Evaluation and Metrics" where you describe the various metrics by which you will evaluate the success/failure of your project.

One slide titled "Current Status and Next Steps" with the current accomplishments/status, any initial results, and remaining steps for project completion.

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

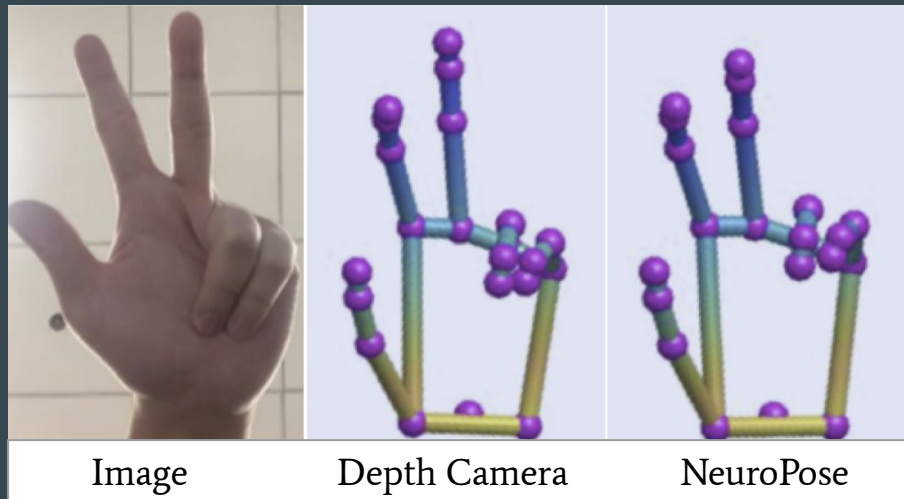Open source framework for finger pose detection with

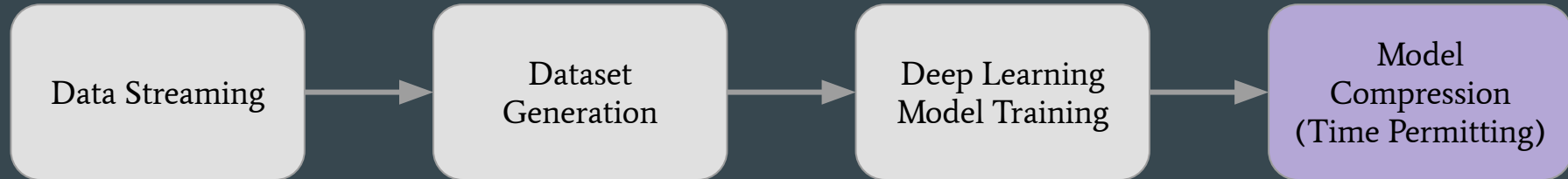# Technical Approach and Novelty

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

| Image | Depth Camera | NeuroPose |

Methods

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┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│              │     │              │     │              │     │    Model     │
│     Data     │ ──> │   Dataset    │ ──> │ Deep Learning│ ──> │ Compression  │
│   Streaming  │     │  Generation  │     │Model Training│     │(Time Permitting)│
│              │     │              │     │              │     │              │
└──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘
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- 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
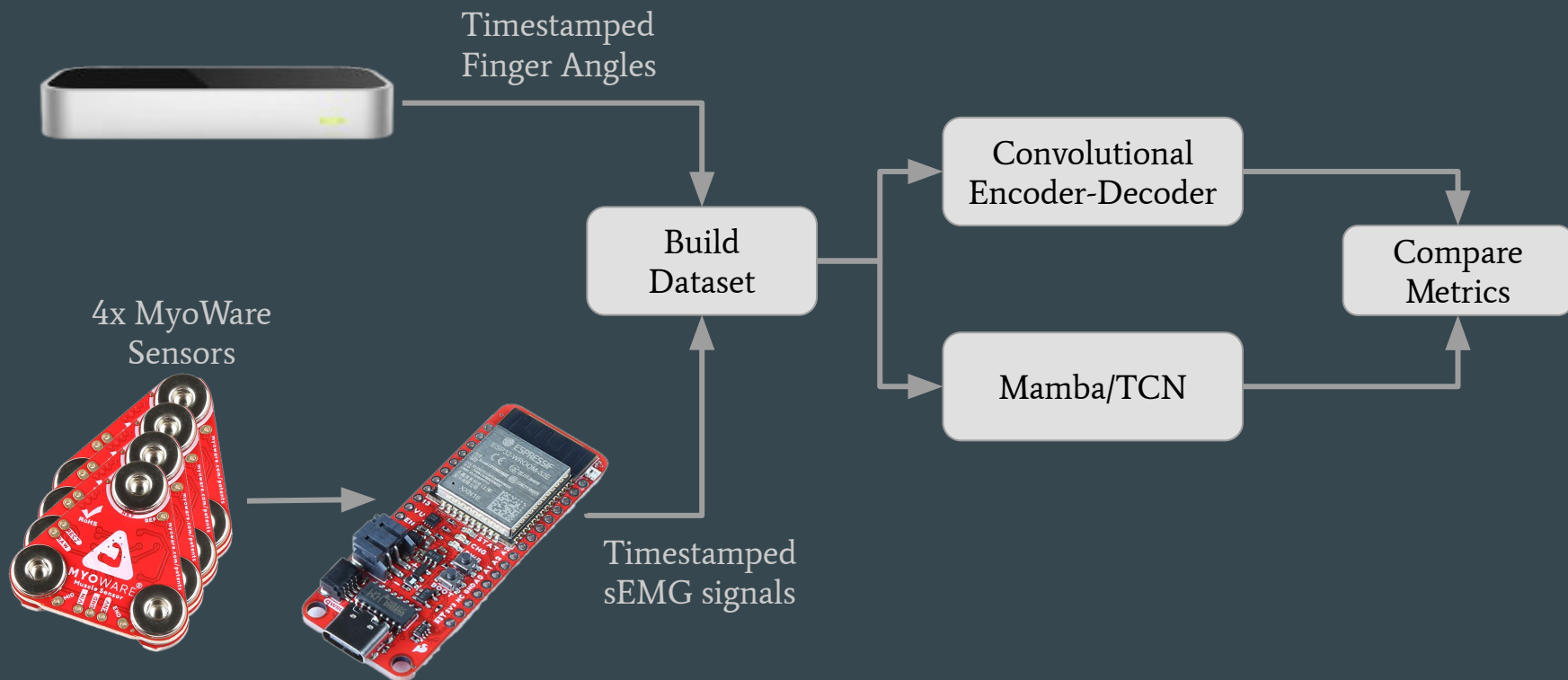
Evaluation and Metrics

describe the various metrics by which you will evaluate the success/failure of your project.

- 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