Design Process for Human-Centric Systems

Fall Detection Design Process

Knowledge of Situation

Sensors

Falls

3 Axis Magnetometer

3 Axis Accelerometer (Kionix KX023)

Heart rate monitor (Vcare VC31 / VC31B)

Note: all in one bangle watch

Sensors   **Raw Sensor Data**
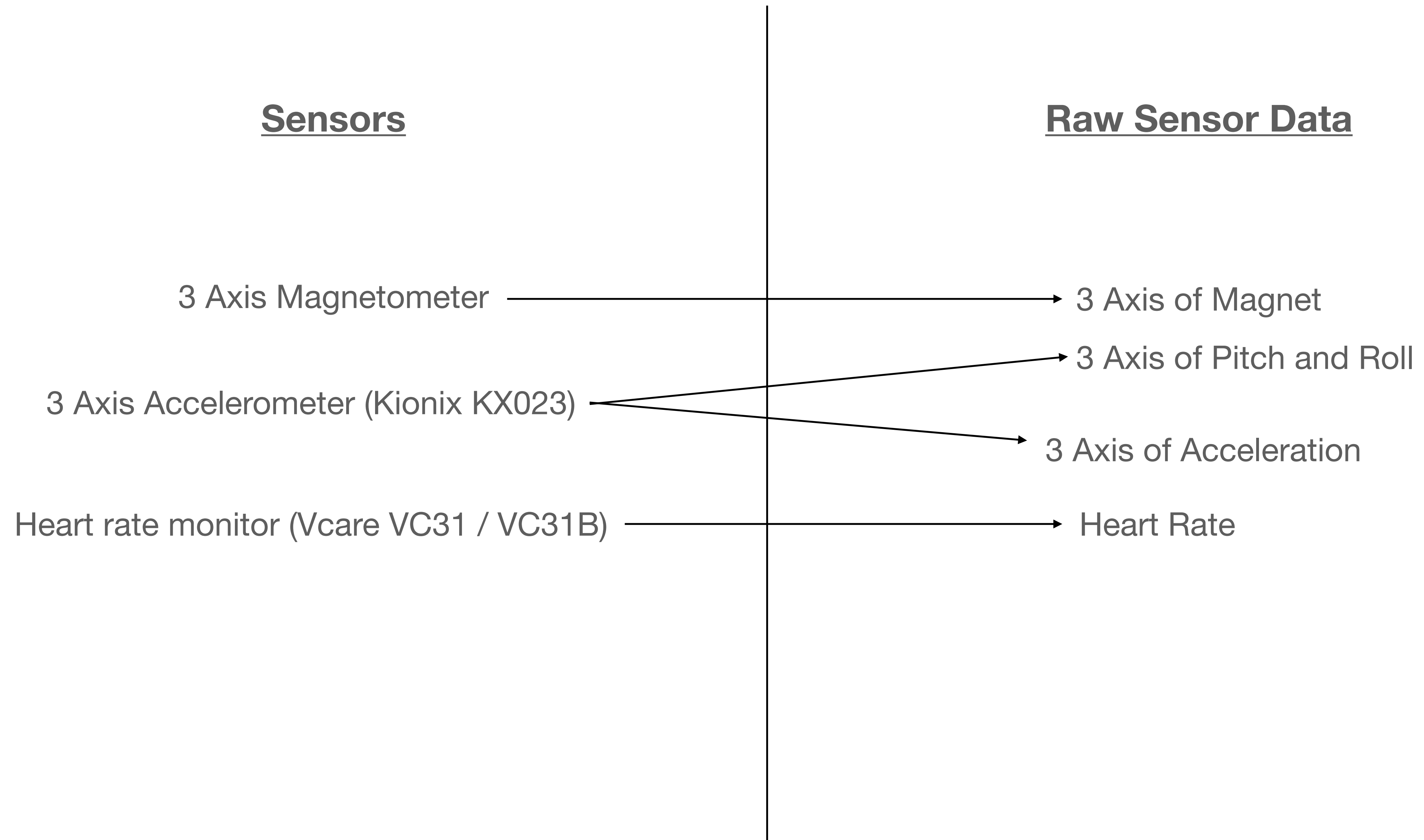
3 Axis Magnetometer ————————————————→ 3 Axis of Magnet

                                                         3 Axis of Pitch and Roll

3 Axis Accelerometer (Kionix KX023)

                                                         3 Axis of Acceleration

Heart rate monitor (Vcare VC31 / VC31B) ——————————→ Heart Rate

Raw Sensor Data

Features

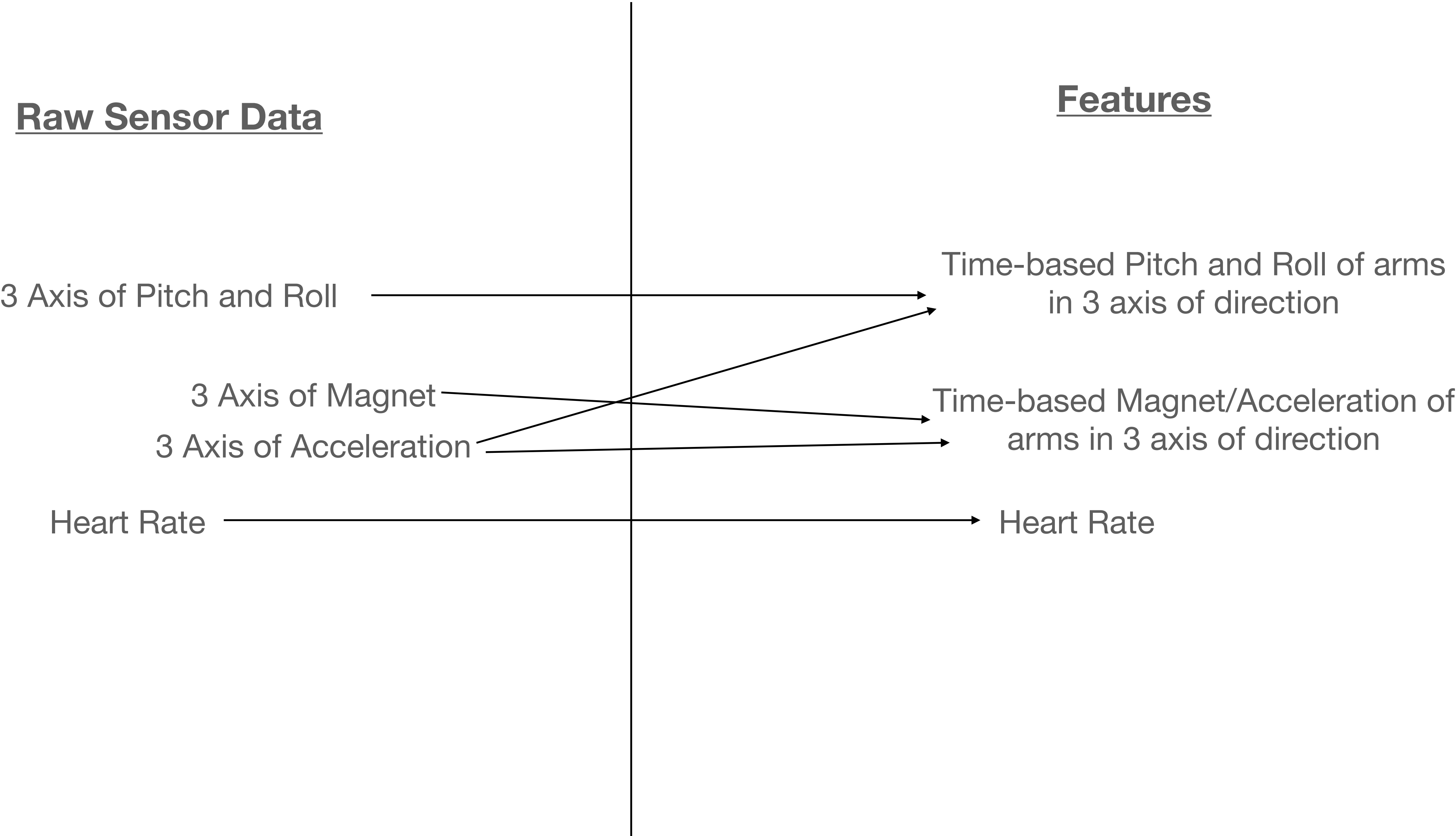3 Axis of Pitch and Roll → Time-based Pitch and Roll of arms in 3 axis of direction

3 Axis of Magnet

3 Axis of Acceleration → Time-based Magnet/Acceleration of arms in 3 axis of direction

Heart Rate → Heart Rate

Features

Time-based Pitch and Roll of arms in 3 axis of direction

Time-based Magnet/Acceleration of arms in 3 axis of direction

Heart Rate

Recognized Entities

- Fast Pitch of Arms
- Fast Roll of Arms
- Slow pitch
- Slow Roll
- Static

- Fast Repetitive Motion of Arms
- Slow Repetitive Motion of Arms
- Slow Non-Repetitive Motion of Arms
- Static

- Above Resting
- Resting

Recognized Entities

- Fast Pitch of Arms
- Fast Roll of Arms
- Slow pitch
- Slow Roll
- Static

- Fast Repetitive Motion of Arms
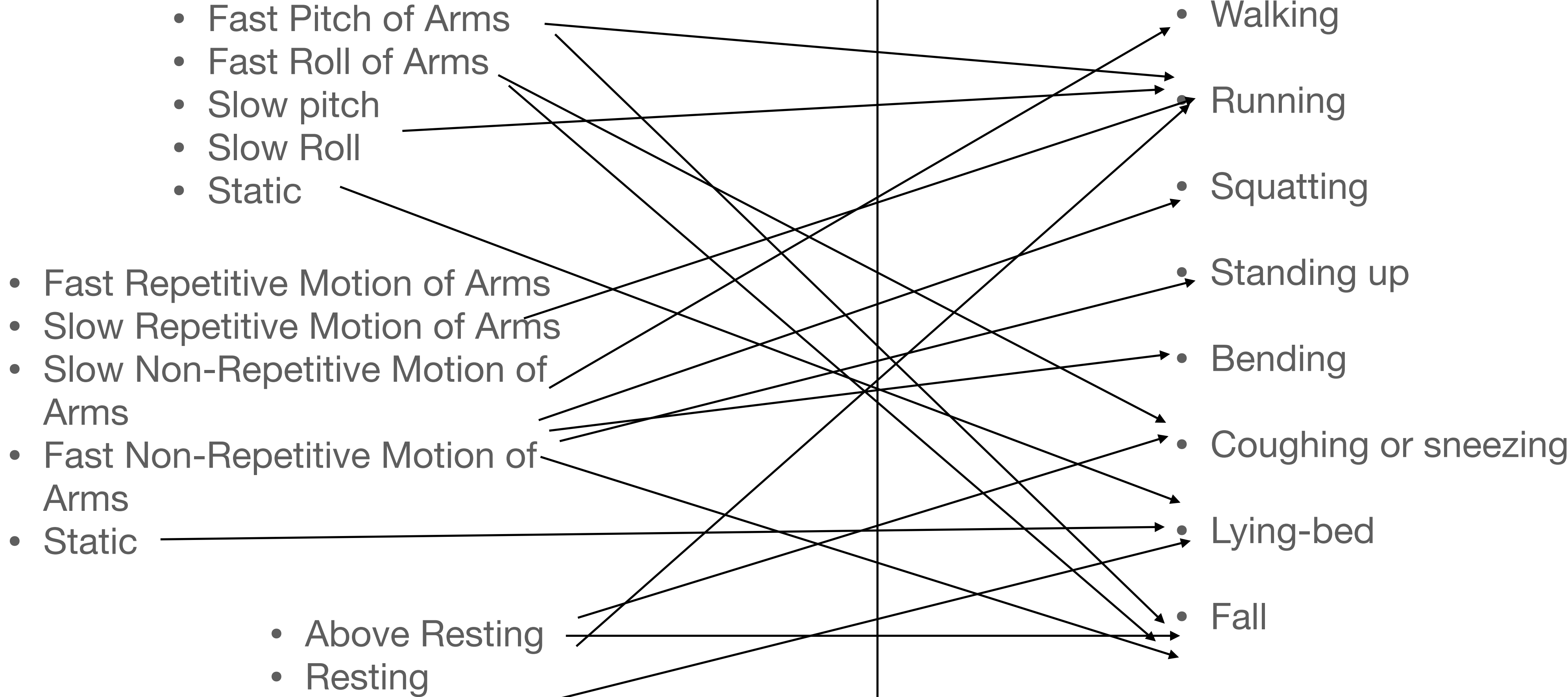- Slow Repetitive Motion of Arms
- Slow Non-Repetitive Motion of Arms
- Fast Non-Repetitive Motion of Arms
- Static

- Above Resting
- Resting

Semantic Relationships

- Walking
- Running
- Squatting
- Standing up
- Bending
- Coughing or sneezing
- Lying-bed
- Fall

Semantic Relationships   **Contextual**

- Walking

- Running

- Squatting   • Adults' Non-fall daily movements

- Standing up

- Bending

- Coughing or sneezing   • Elder People falls down

- Lying-bed

- Fall