### Citation:

Laura Newman, David LoBue, Arianna Zuanazzi, Florian Rupprecht, Luke Mears, Roxanne McAdams, Erin Brown, Yanyi Wang, Camilla Strauss, Arno Klein, Lauren Hendrix, Maki Koyama, Josh To, Curt White, Yuki Kotani, Michelle Freund, Michael Milham, Gregory Kiar, Martyna Plomecka, Sohier Dane, and Maggie Demkin. CMI - Detect Behavior with Sensor Data. https://kaggle.com/competitions/cmi-detect-behavior-with-sensor-data, 2025. Kaggle.

### About the Child Mind Institute:

[**The Child Mind Institute (CMI)**](https://childmind.org/) is the leading independent nonprofit in children’s mental health providing gold-standard, evidence-based care, delivering educational resources to millions of families each year, training educators in underserved communities, and developing open science initiatives and tomorrow’s breakthrough treatments.

[**The Healthy Brain Network (HBN)**](https://healthybrainnetwork.org/) is a community-based research initiative of the Child Mind Institute. We provide no-cost, study-related mental health and learning evaluations to children ages 5–21 and connect families with community resources. We are collecting the information needed to find brain and body characteristics that are associated with mental health and learning disorders. The Healthy Brain Network stores and openly shares de-identified data about psychiatric, behavioral, cognitive, and lifestyle (e.g., fitness, diet) phenotypes, as well as multimodal brain imaging (MRI), electroencephalography (EEG), digital voice and video recordings, genetics, and actigraphy.

### Collection Methodology:

This dataset contains sensor recordings taken while participants performed 8 BFRB-like gestures and 10 non-BFRB-like gestures while wearing the Helios device on the wrist of their dominant arm. The Helios device contains three sensor types:

1. 1x Inertial Measurement Unit (IMU; [BNO080/BNO085](https://fcon_1000.projects.nitrc.org/indi/cmi_healthy_brain_network/Competitions/Helios2025/IMU_Sensor.pdf)): An integrated sensor that combines accelerometer, gyroscope, and magnetometer measurements with onboard processing to provide orientation and motion data.
2. 5x Thermopile Sensor ([MLX90632](https://fcon_1000.projects.nitrc.org/indi/cmi_healthy_brain_network/Competitions/Helios2025/Thermopile_Sensor.pdf)): A non-contact temperature sensor that measures infrared radiation.
3. 5x Time-of-Flight Sensor ([VL53L7CX](https://fcon_1000.projects.nitrc.org/indi/cmi_healthy_brain_network/Competitions/Helios2025/Time_of_Flight_Sensor.pdf)): A sensor that measures distance by detecting how long it takes for emitted infrared light to bounce back from objects.

Half of the hidden-test sequences are recorded with IMU only; the thermopile (*thm\_*) and time-of-flight (*tof\_*\_v\*) columns are still present but contain null values for those sequences.  
This will allow us to determine whether adding the time-of-flight and thermopile sensors improves our ability to detect BFRBs. Note also that there is known sensor communication failure in this dataset, resulting in missing data from some sensors in some sequences.