

H.O.S.S - EECE Capstone Project

Haptics Object Sensor System || Object Detection for the Visually Impaired

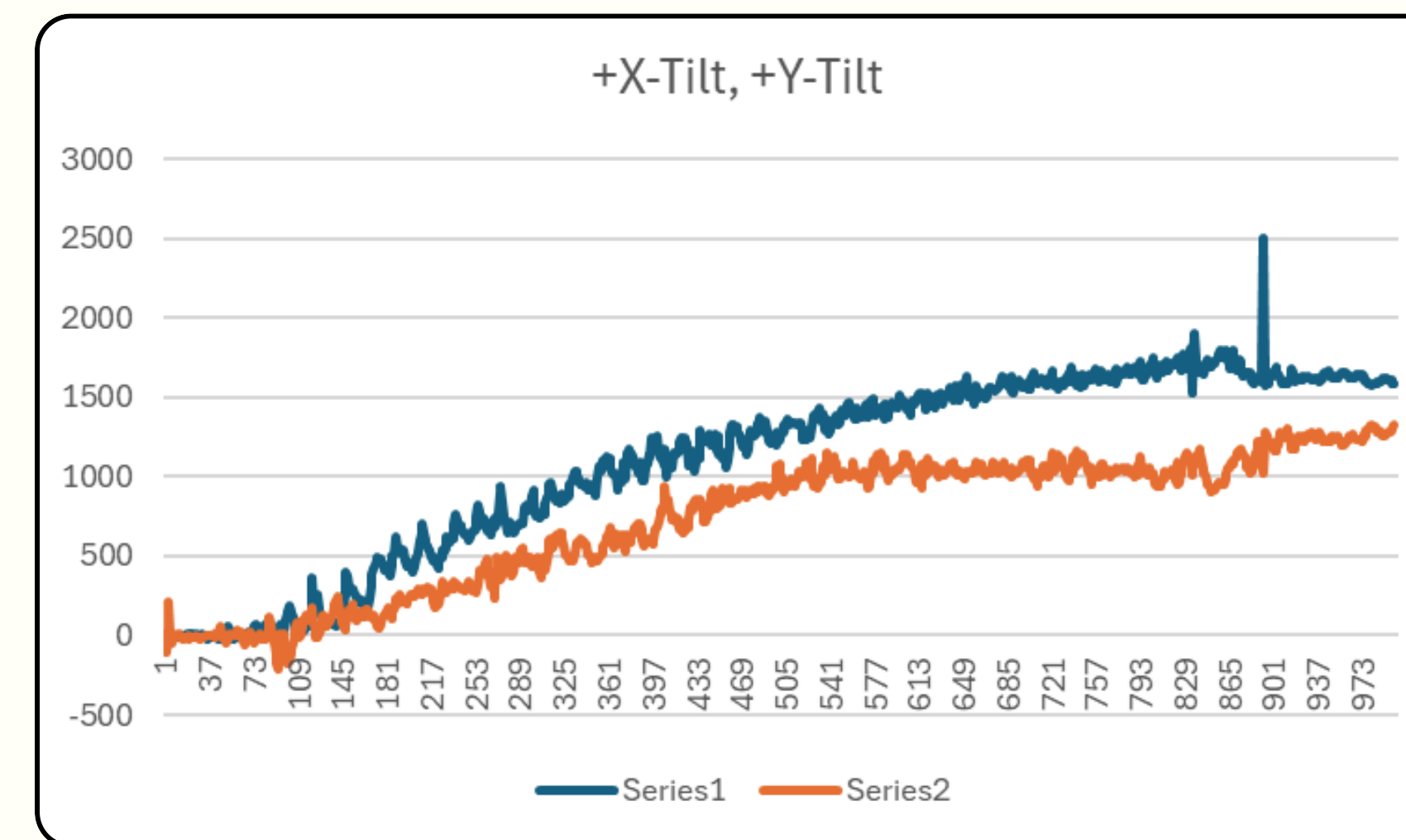
i Abstract

The H.O.S.S (Haptics Object Sensor System) is a device intended to detect objects at varying distance thresholds, with Eccentric Rotating Mass (ERM) motors to provide haptic responses for each of the thresholds. The HOSS features a repurposed millimeter wave object detection module used to estimate the Time of Arrival (TOA) of the reflected waves detected from objects. The HOSS is powered by coin cell batteries so that it can be replaced by the user. An accelerometer is included to ensure that the device is parallel to the ground when reading for reflected waves.

Features/Equipment

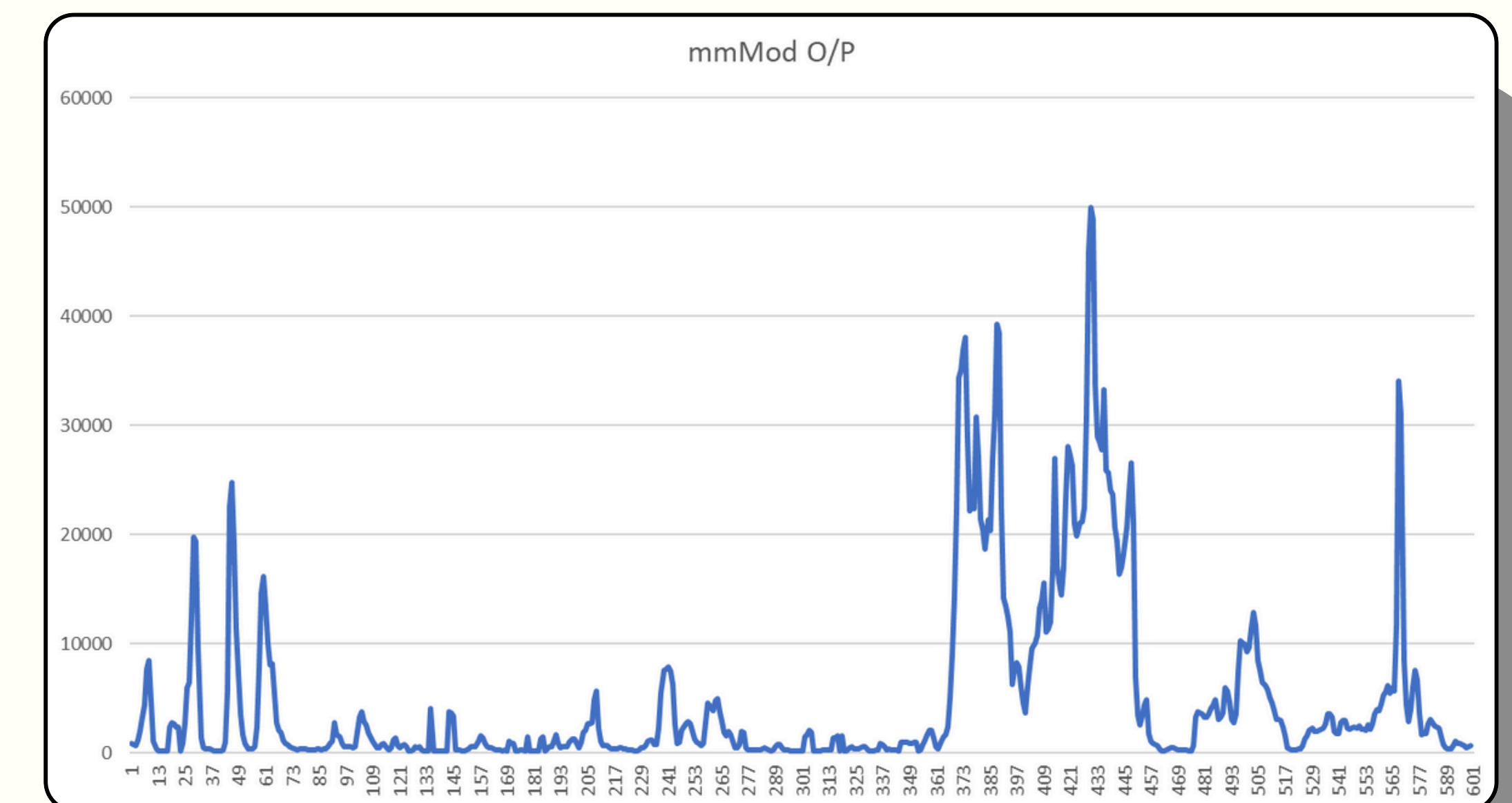
- LP-MSPMOG3507 -> FRDM-KL26Z
- ERM Vibration Motors
- HLK-LD1115H-24G
- Power Converters

Orientation



An on-board accelerometer from the FRDM-KL26Z estimates the orientation of the development board. While the board is determined parallel enough to the ground (using xy-plane measurements), the appropriate motors are turned on.

Distance



The HLK-LD1115H-24G is a millimeter wave object detection module that can estimate the Time of Arrival (TOA) for static and mobile objects. It sends these estimates to the FRDM-KL26Z, which help determine which motors to drive.

Motivation

Existing Body Area Networks (BANs) are often invasive and require a lot of surface area to service the user. The HOSS is compact and can be placed on a user's shoe.

Conclusion

The HOSS started with trying to use the MSPMOG3507 MCU from TI, but complications led to the decision to switch to the NXP KL26Z. Future plans are for the HOSS to get its stand alone PCB working where it will also feature a power supply which the user can replace. Ideally, the HOSS will be able to operate without the use of a development board.

