Embedded Challenge Fall 2024 Term Project

“Embedded Sentry”

Motivation:

In an age where security has become a center of focus for data storage, data access, and robust protection of personal property, many different approaches to “hack-free” protection of assets has emerged. These range from physical protection, to OTA, to biometrics. This challenge focusses on designing an embedded system, using your dev boards, to provides a mechanism to provide generic lock/unlock capabilities using your IMU (i.e. gesture control).

Objective:

- Use the data collected from a single accelerometer and/or gyro to record a hand movement sequence as a means to generally “unlock” a resource.
- Recorded sequence must be saved on the microcontroller, using a “Record Key” feature.
- User then must replicate the key sequence within sufficient tolerances to unlock the resource.
- A successful unlock must be indicated by a visual indication, such as an LED or similar indicator.

Restrictions:

- This is a group project to be done by groups of no more than 3 students
- Only one microcontroller and one accelerometer/gyro may be used, specifically the one integrated on your board.
- You must use PlatformIO as we have done throughout the class
- You will be allowed to use drivers/HAL functions available through the IDE
- The accelerometer/gyro must be held in a closed fist of either hand while performing the mechanical sequence.
- An “enter key” and ”record” functionality must be developed to so the user knows when to start the sequence of unlocking and recording respectively.

Grading Criteria:

- Ability to successfully achieve the objectives (40%)
- Repeatability and robustness of unlock sequence (via video demo) (20%)
- Ease of use (10%)
- Creativity (10%)
- Well written code (10%)
- Complexity (10%)