main | Go to file | Code

olvvier Rename project to apple-silico... 114b4c7 · 12 hours ago

assets	initial release	yesterday
.gitignore	initial release	yesterday
LICENSE	initial release	yesterday
README.md	Rename project to a...	12 hours ago
motion_live.py	initial release	yesterday
requirements.txt	initial release	yesterday
spu_sensor.py	initial release	yesterday

README | MIT license

apple-silicon-accelerometer

More information: read the article on Medium

reading the undocumented mems accelerometer on apple silicon macbooks via iokit hid

what is this

apple silicon chips (M1/M2/M3/M4) have a hard to find mems accelerometer managed by the sensor processing unit (SPU). it's not exposed through any public api or framework. this project reads raw 3-axis acceleration data at ~800hz via iokit hid callbacks.

only tested on macbook pro m3 pro so far - might work on other apple silicon macs but no guarantees

how it works

the sensor lives under AppleSPUHIDDevice in the iokit registry, on vendor usage page 0xFF00, usage 3. the driver is AppleSPUHIDDriver which is part of the sensor processing unit. we open it with IOHIDDeviceCreate and register an asynchronous callback via IOHIDDeviceRegisterInputReportCallback. data comes as 22-byte hid reports with x/y/z as int32 little-endian at byte offsets 6, 10, 14. divide by 65536 to get the value in g. callback rate is ~100hz

you can verify the device exists on your machine with:

```
ioreg -l -w0 | grep -A5 AppleSPUHIDDevice
```

quick start

```
git clone https://github.com/olvvier/apple-sil
cd apple-silicon-accelerometer
pip install -r requirements.txt
sudo python3 motion_live.py
```

requires root because iokit hid device access on apple silicon needs elevated privileges

code structure

- spu_sensor.py - the core: iokit bindings, device discovery, hid callback, shared memory ring buffer
- motion_live.py - vibration detection pipeline, heartbeat bcg, terminal ui, main loop

the sensor reading logic is isolated in spu_sensor.py so you can reuse it independently

heartbeat demo

place your wrists on the laptop near the trackpad and wait 10-20 seconds for the signal to stabilize. this uses ballistocardiography - the mechanical vibrations from your heartbeat transmitted through your arms into the chassis. experimental, not reliable, just a fun use-case to show what the sensor can pick up. the bcg bandpass is 0.8-3hz and bpm is estimated via autocorrelation on the filtered signal

notes

- experimental / undocumented AppleSPU hid path
- requires sudo
- may break on future macos updates
- use at your own risk
- not for medical use

tested on

- macbook pro m3 pro, macos 15.6.1
- python 3.14

license

MIT

About

reading the undocumented mems accelerometer on apple silicon macbooks via iokit hid

macos apple research hid macbook sensor accelerometer m4 m2 iokit m3 m1 mems spu applespu

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Releases 1

v0.1.0 Latest
yesterday

Packages

No packages published

Contributors 2

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Languages

Python 100.0%

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