

tinyML[®] Summit

Enabling Ultra-low Power Machine Learning at the Edge

Products and applications enabled by tinyML

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www.tinyML.org

Killer App: Human Health Analysis



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Diabetes around the world in 2021



537 million adults (20-79 years) are living with diabetes - 1 in 10. This number is predicted to rise to **643 million** by 2030 and **783 million** by 2045.






Diabetes is responsible for **6.7 million** deaths in 2021 - 1 every 5 seconds.



541 million adults have Impaired Glucose Tolerance (IGT), which places them at high risk of type 2 diabetes..

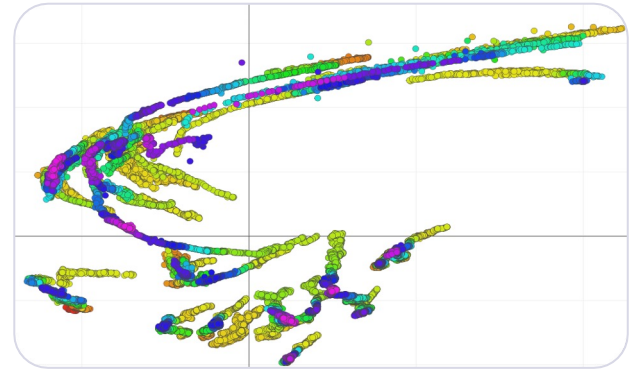


Available devices (2021)

	Medtronic 670G-Guardian 3 sensor Medtronic 780G- Guardian 3 sensor	Tandem t:slimX2-Dexcom G6 -control IQ	CamAPS FX DanaRS-Dexcom G6
Hybrid closed-loop systems			
Integrated pump	670G, 780G (coming soon)	Tandem t:slimX2	Dana RS pump
Sensor	Guardian 3	Dexcom G6	Dexcom G6
Sensor duration	7 days	10 days	10 days
Number of fingersticks	4 to 6 per day, may be less for 780G	Rarely (factory calibrated)	Rarely (factory calibrated)
Approximate yearly cost in UK NHS ^a	Pump = £612.50 Consumables = £1400 Medtronic sensor = £3186 SMBG = £500 App = £0 Total yearly cost if new to pump = £5698.50	Pump = £838 Consumables = £1588 Dexcom G6 sensor = £2645 SMBG = £100 App = £0 Total yearly cost if new to pump = £5171	Pump = £575 Consumables = £1400 Dexcom G6 sensor = £2645 SMBG = £100 App = £840 Total yearly cost if new to pump = £5560

[Leelarathna, L. et al. Hybrid closed-loop therapy: where are we in 2021? *Diabetes Obes. Metab.* 23, 655–660 \(2021\).](#)

Achieving non-invasive glucose



Bio

Biomarker

RF

Radio frequency

ID

Identification



A wide variety of use cases

Drive valuable health insights with diagnostic and predictive algorithms

ECG/PPG

EEG

Skin

Motion

Temperature

Life Quality



Performance



Safety



Health



NOWATCH



ŌURA

SLATE SAFETY



Hyfe



How are they doing it?

Data validation

Catch errors early

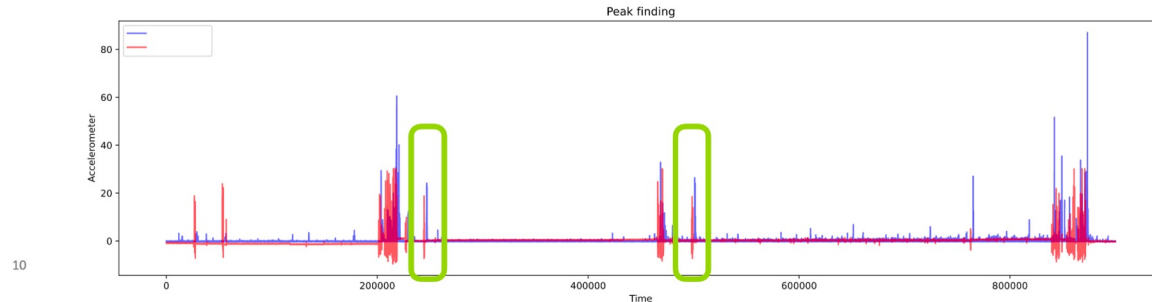
Checklists are already very powerful.

Multiple devices involved? Find correlation between similar data channels.

Correlation can also be used to time-sync files.

Checks

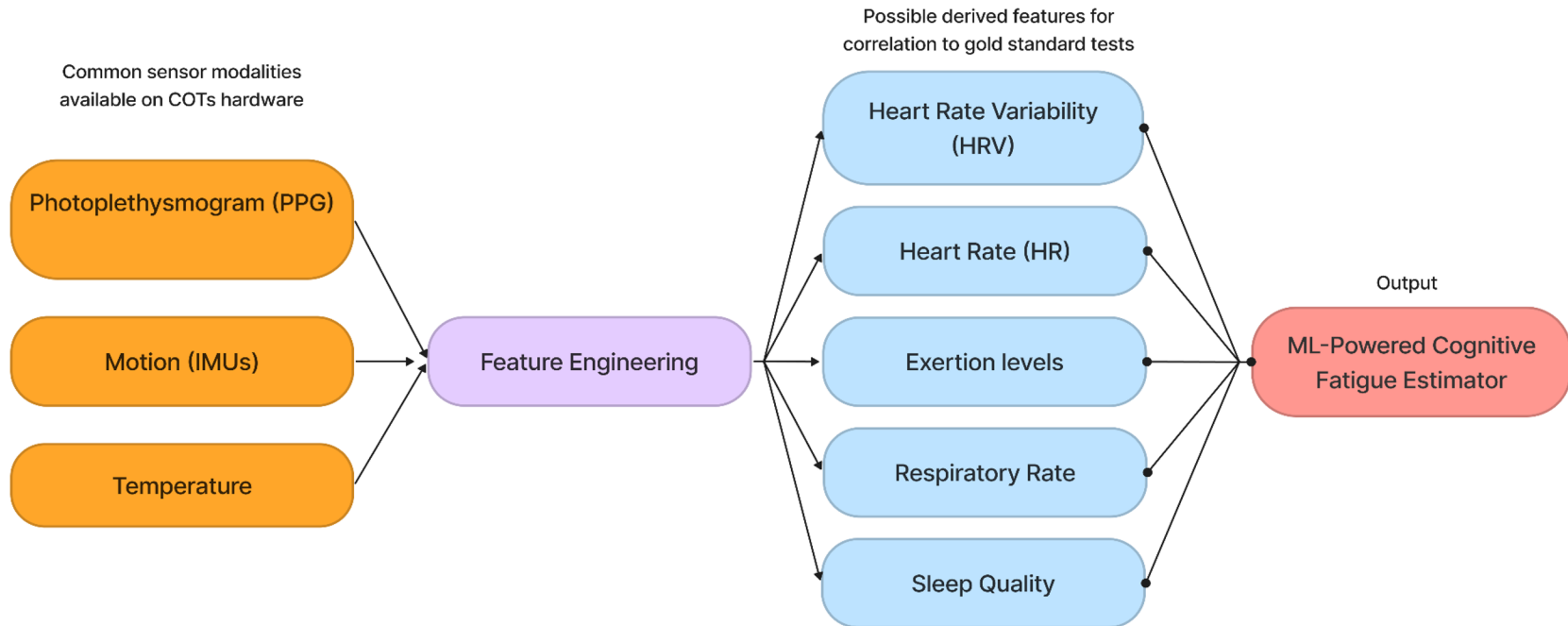
- ✓ Ring data present
- ✓ ECG/EEG files present
- ✓ Reference data and ring data start within 2 hours
- ✓ Ring data timezone matches expected (Asia/Singapore)
- ✗ Correlation between Reference Activity and Ring IMU



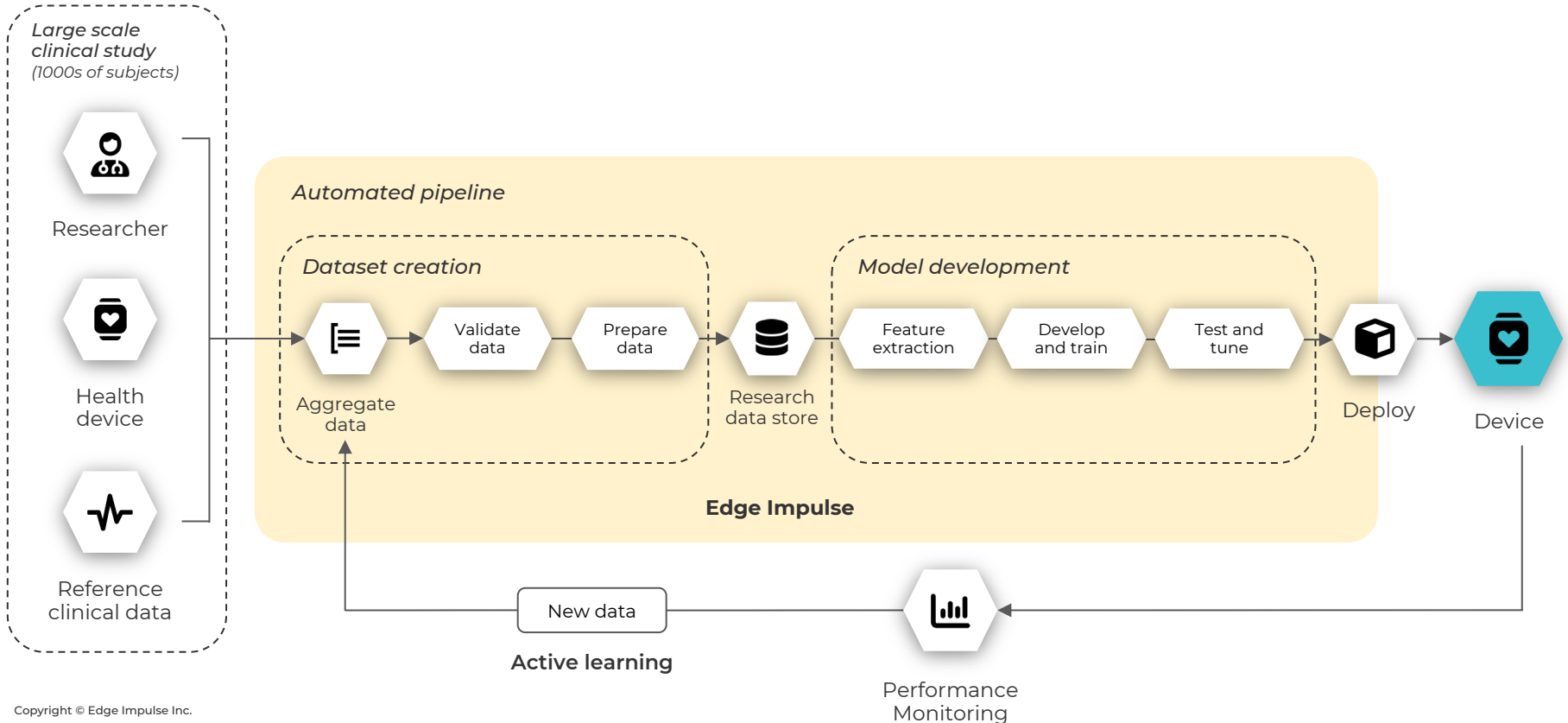
Spot trends in the data between your device and the gold standard tests

Feature engineering

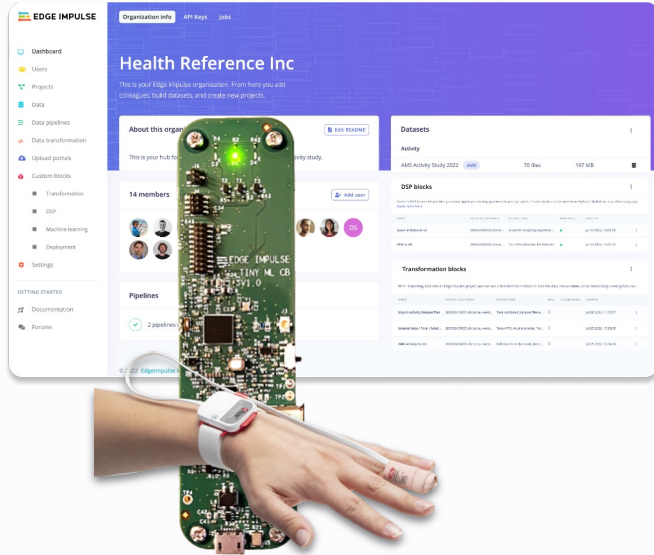
Example: Cognitive fatigue detection algorithms



Large scale clinical trials



HEALTH REFERENCE DESIGN



Accelerating human health

- Infrastructure to scale clinical studies
- Reference datasets
- Nordic nRF5340 BLE SoC
- Syntiant NDP-101 ML Processors
- PPG, Vibration, Temp, Audio

TRUSTED BY



NOWATCH



OURA



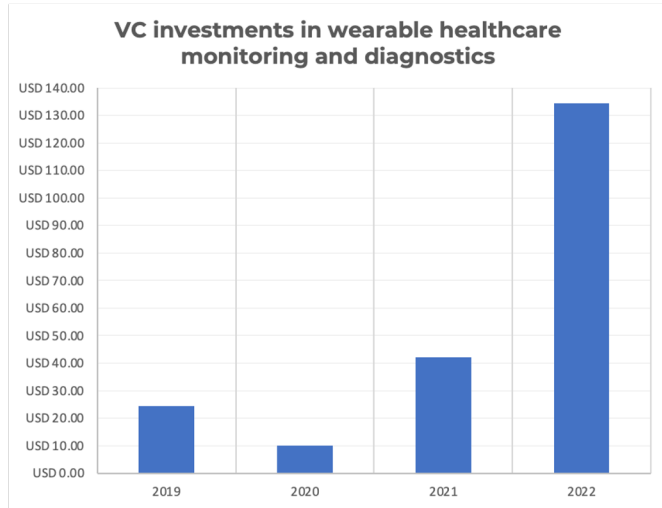
SYNTIANT

TESSOLVE

What we know



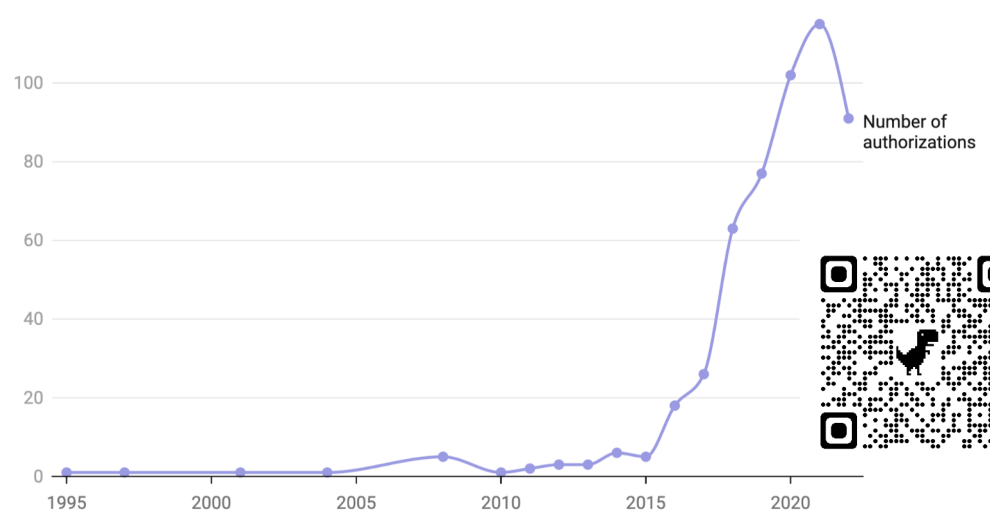
Where are we today?



64 investments (2019-2022) for health monitoring related to blood glucose, blood oxygen, brain activity detection and real-time energy monitoring

Gartner®, "Emerging Tech: Venture Capital Growth Insights for Biosensor Technology", 1 November 2022, Stacey Yin

FDA approved AI-enabled medical devices



Data is through Oct. 5, 2022.

Chart: Elise Reuter Source: [The Food and Drug Administration](#) [Get the data](#) Created with [Datawrapper](#)



To improving more lives together!

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