

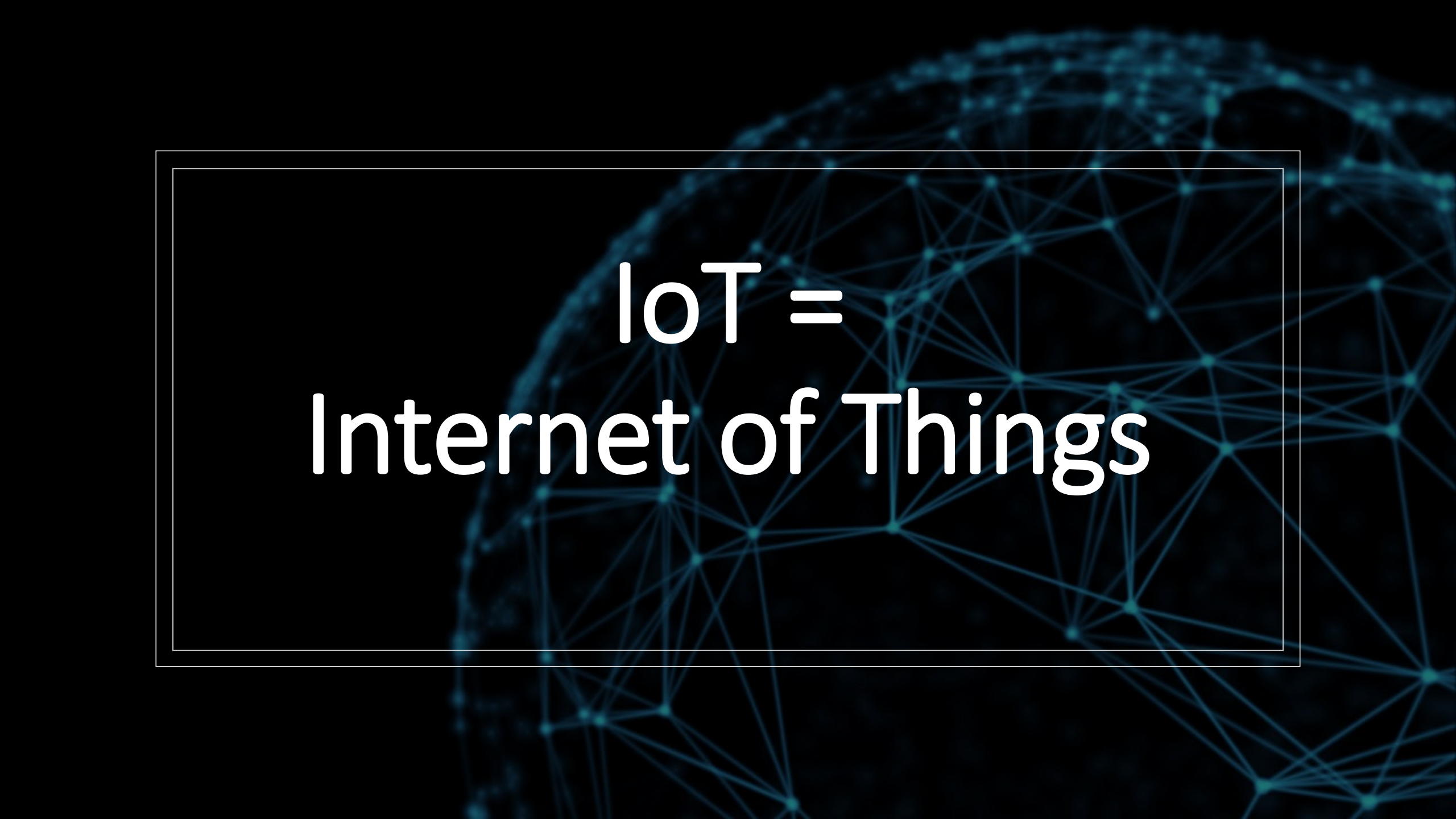
# What is IoT

Salu Ylirisku

1.11.2021

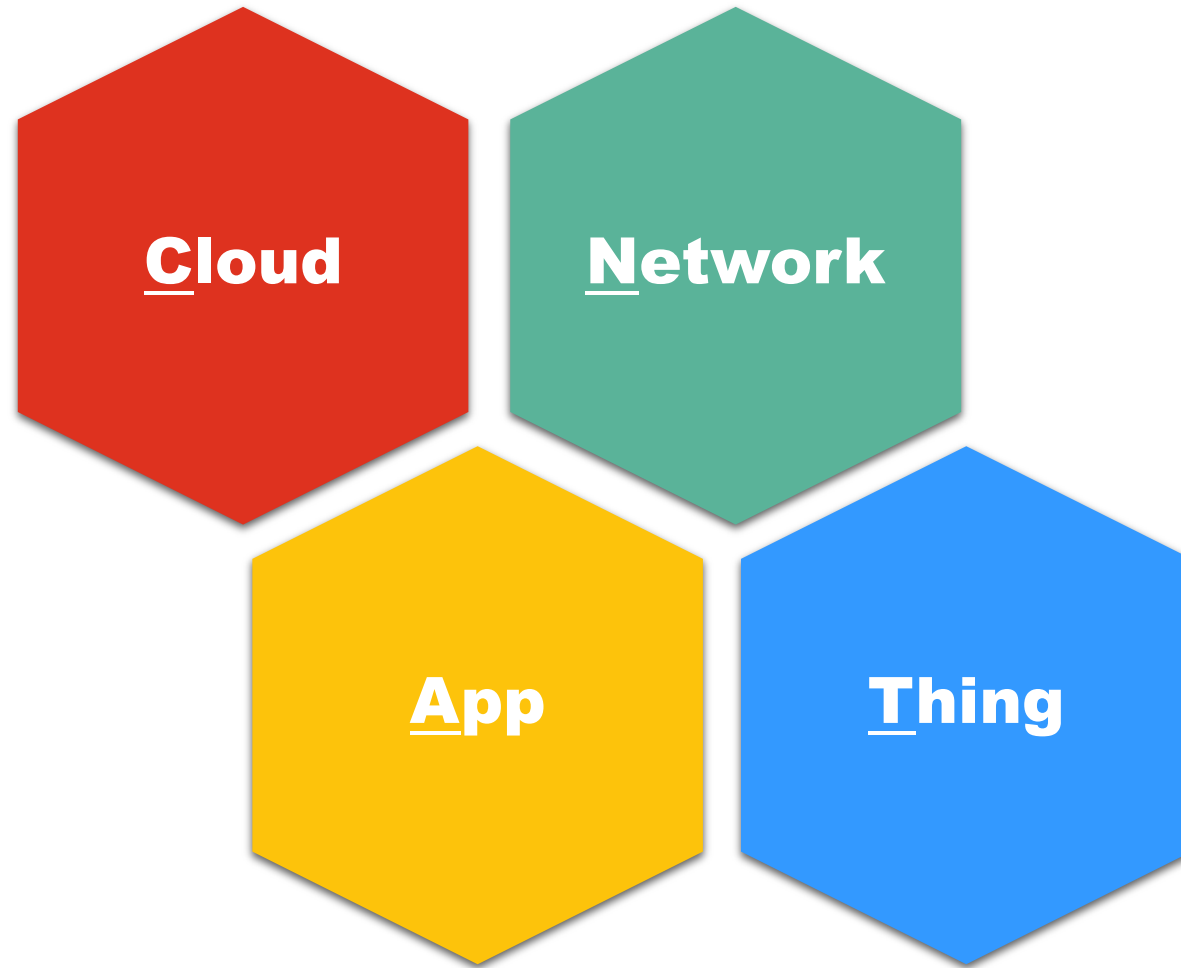
# Learning Goals

- What is meant by the term IoT, what are the typical main components of an IoT application



IoT =  
Internet of Things

# Key parts of IoT



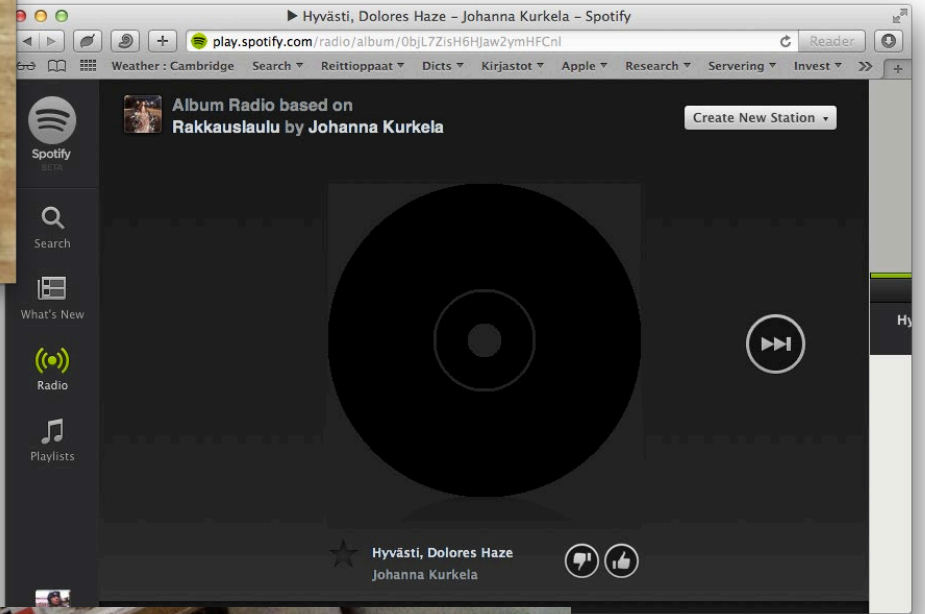
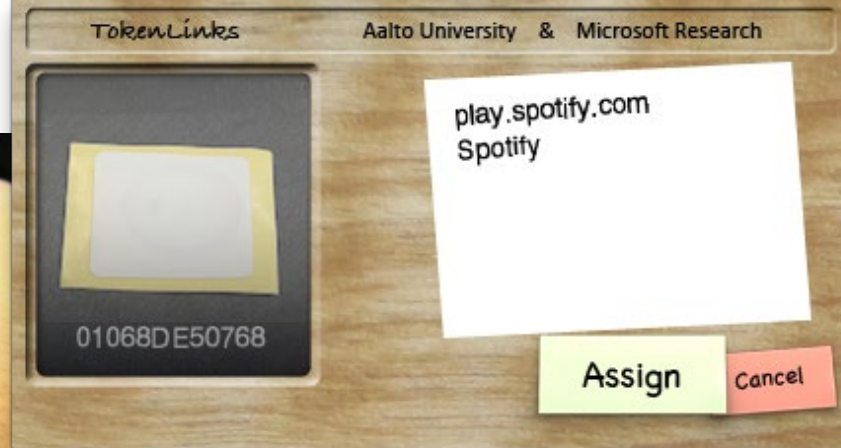
# Examples of IoT applications

- Tokens of Search
- Smart Mökky (Pin2Pin)
- NEPPI pilot
- Timeular
- Nest (now Google Nest Thermostat, Google Nest Doorbell)
- Ruuvi Tag
- MoveSense (Suunto)
- Nadi X
- Google Jacquard
- Fitbit
- Sensoria AI Sports Wear
- Oura
- Roomba
- Auto mower
- Autostorage
- Tesla AI

# Tokens of Search



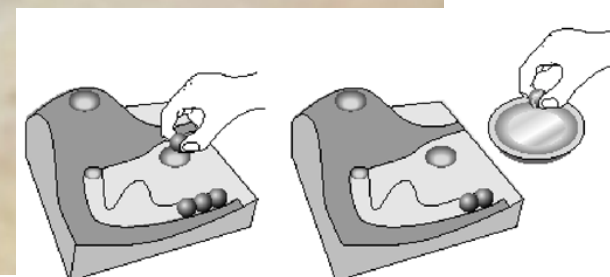




# The birth of the idea



Inspiration

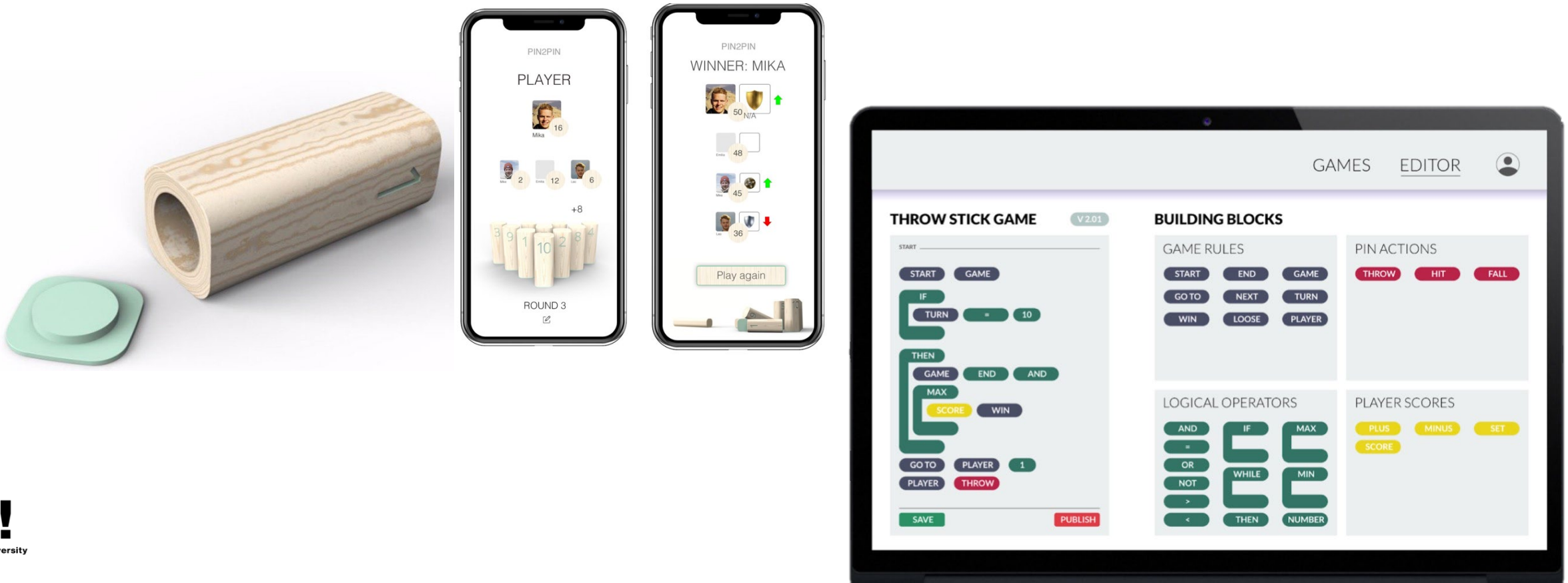


Durrell Bishop's Marble Answering Machine



# Pin2Pin

- This was done in the first NEPPI project, and implemented in the AEE Project Work course by the approval of the NEPPI student team.

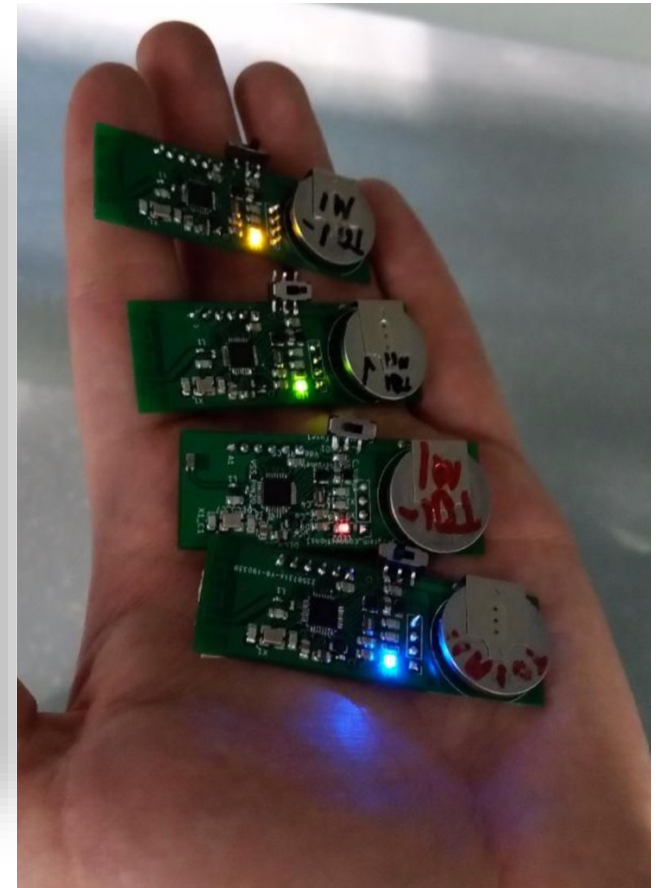
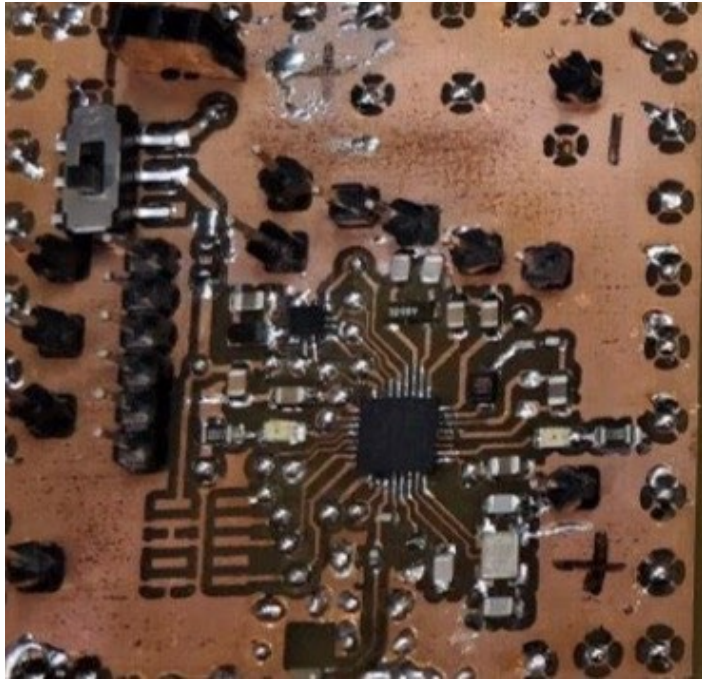


# Pin2Pin

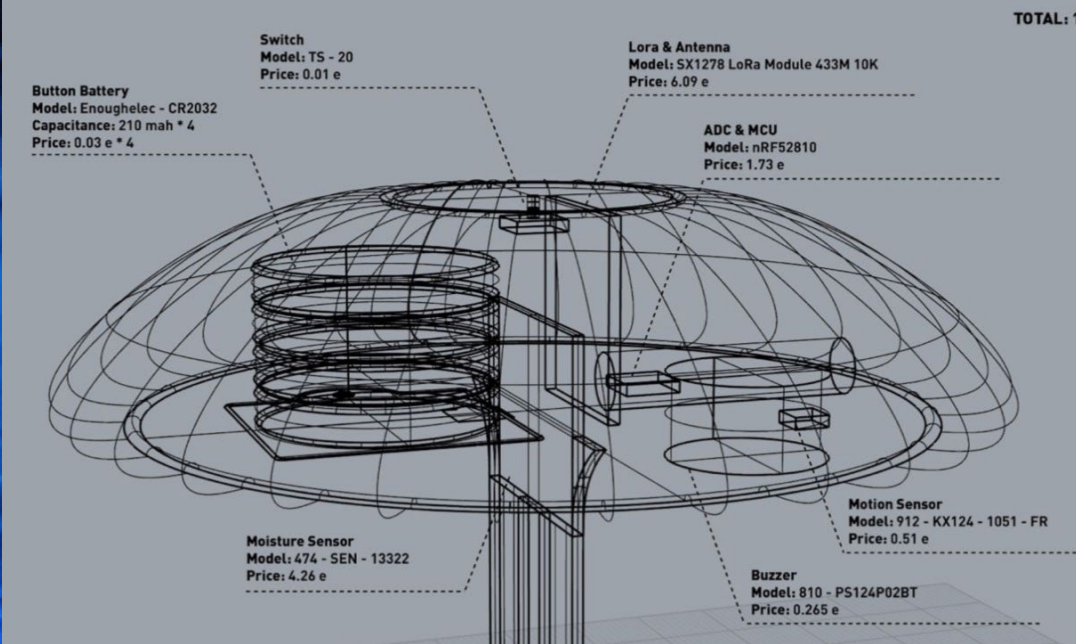
- This was done in the first NEPPI project, and implemented in the AEE Project Work course by the approval of the NEPPI student team.



# Miniaturizing & cost- and power-optimization is a slow and expensive process







## Find a bench

Next free bench  
Toukolan rantapuisto | 6 min



## Product Life



**20** Seconds / Time

**3** Times / Day

**150** Days / Year

**3** Years



# NEPPI - Vallisaari

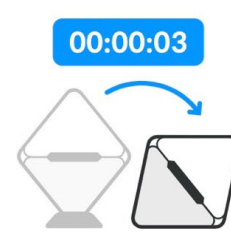


# Timeular



1

Define



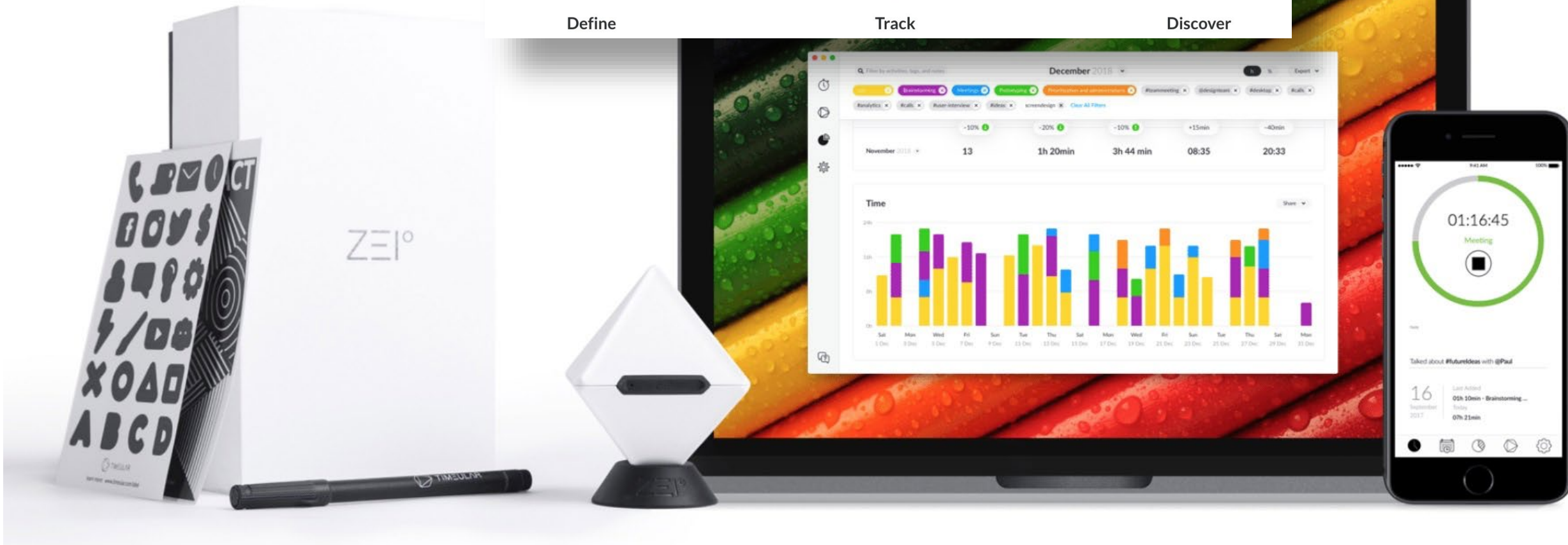
2

Track



3

Discover



# Timeular





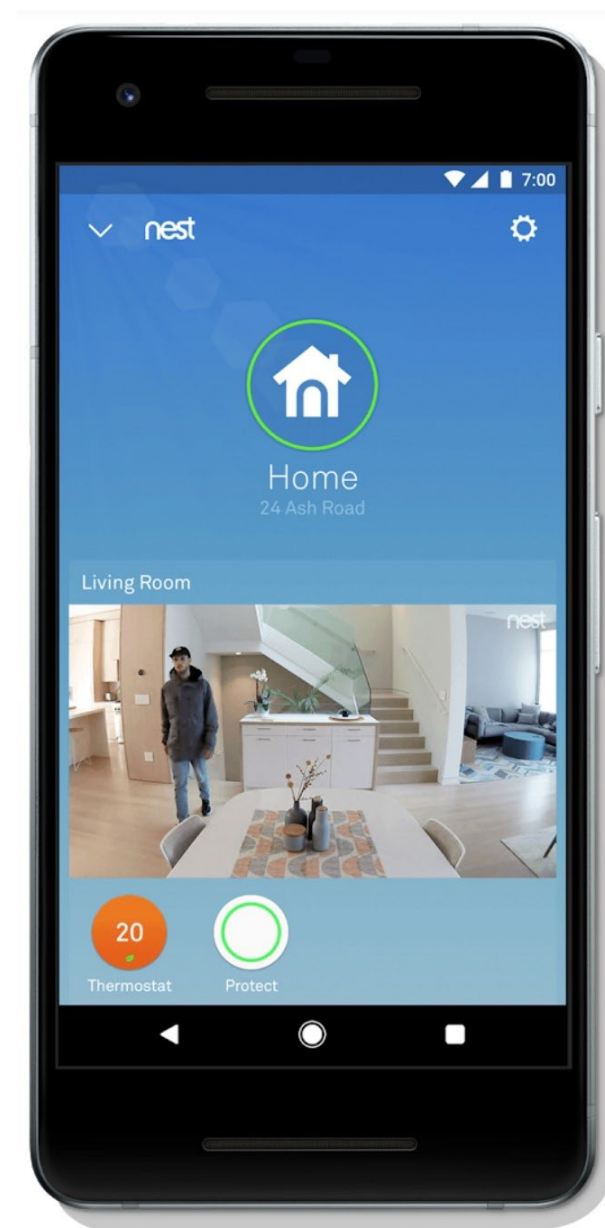


## Technical details

- Case color white, button color black
- Size 100 x 74 x 74 mm
- Weight 70g
- Bluetooth LE 4.0
- Battery 1x CR2032
- Material — Case made of polyamid. Black button made of silicon.







**Installation**

Nest Labs claims that most customers can install the device in 30 minutes or less.

**MAIN UNIT**  
Contains display, sensors and controls. Plugs into the base unit.

**BASE UNIT**  
Mounts on wall and connects to heating and cooling system wiring.

**STAINLESS STEEL RING**  
Used to set the temperature and control the interface.

**RF SHIELD FRAME**  
(shield removed to show components)

**WIRING CONNECTORS**

**TEMPERATURE AND HUMIDITY SENSOR**

**BUBBLE LEVEL**  
For levelling during installation.

**BATTERY**  
**MICROPROCESSOR**

**WI-FI ANTENNA**

**RADIO**  
Connects with home Wi-Fi network

**NEAR-FIELD MOTION SENSOR**

**FAR-FIELD MOTION SENSOR**

**AMBIENT LIGHT SENSOR**

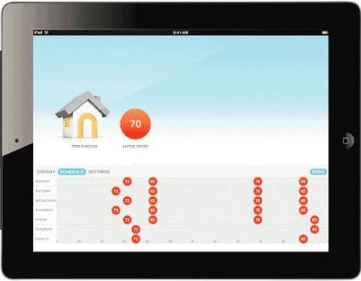
**TEMPERATURE SENSOR AND RING MOTION DETECTOR BOARD**

**L.C.D. DISPLAY**

**SENSOR WINDOW AND LENS**

**Remote Operation**

Mobile apps enable Nest to be operated remotely via Wi-Fi using a smartphone, tablet or laptop. The iPad app is shown below.





# Ruuvi Tag



# Google Nest Doorbell



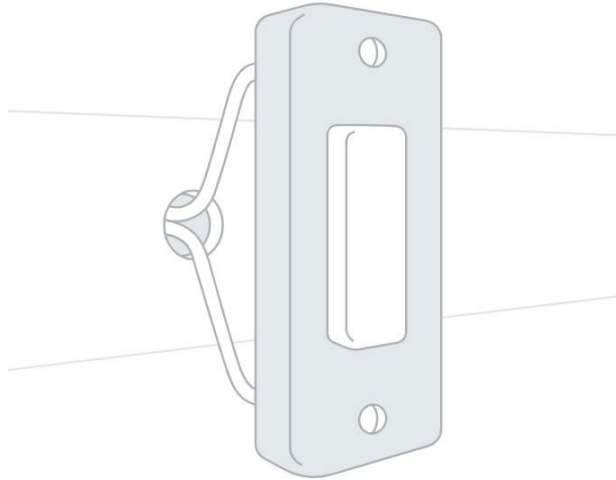




Workplaces and Wi-Fi required. Recommended. Features enhanced.  
The Nest app is currently available in English, French, Dutch, German, Italian and Spanish.

## Let's begin.

Does your home have a wired doorbell?



Yes

No

I'm not sure

## Find your chime.

Ring your bell and follow the ding-dong sound.

Pro tip: Many chimes are simply box-shaped, but some have metal tubes hanging from them. Check near your front door – they're usually mounted on the wall.



Found it, let's continue

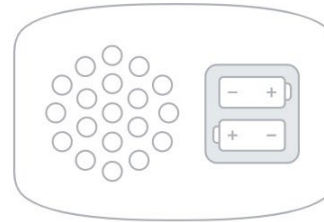
Can't find it

## Now pop the top. let's see what's under the hood.

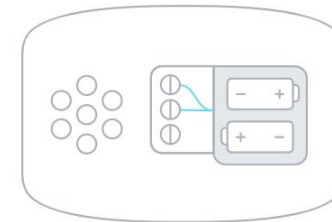
What do you see when you remove the cover? Select one.

2.

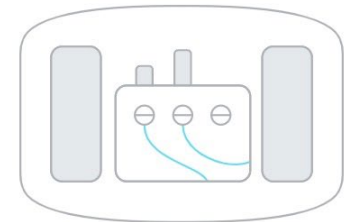
3.



Batteries, but no wires  
(Wireless chime)



Batteries and wires  
(Electronic chime)



Only wires  
(Mechanical chime)

Security

128-bit AES with TLS/SSL

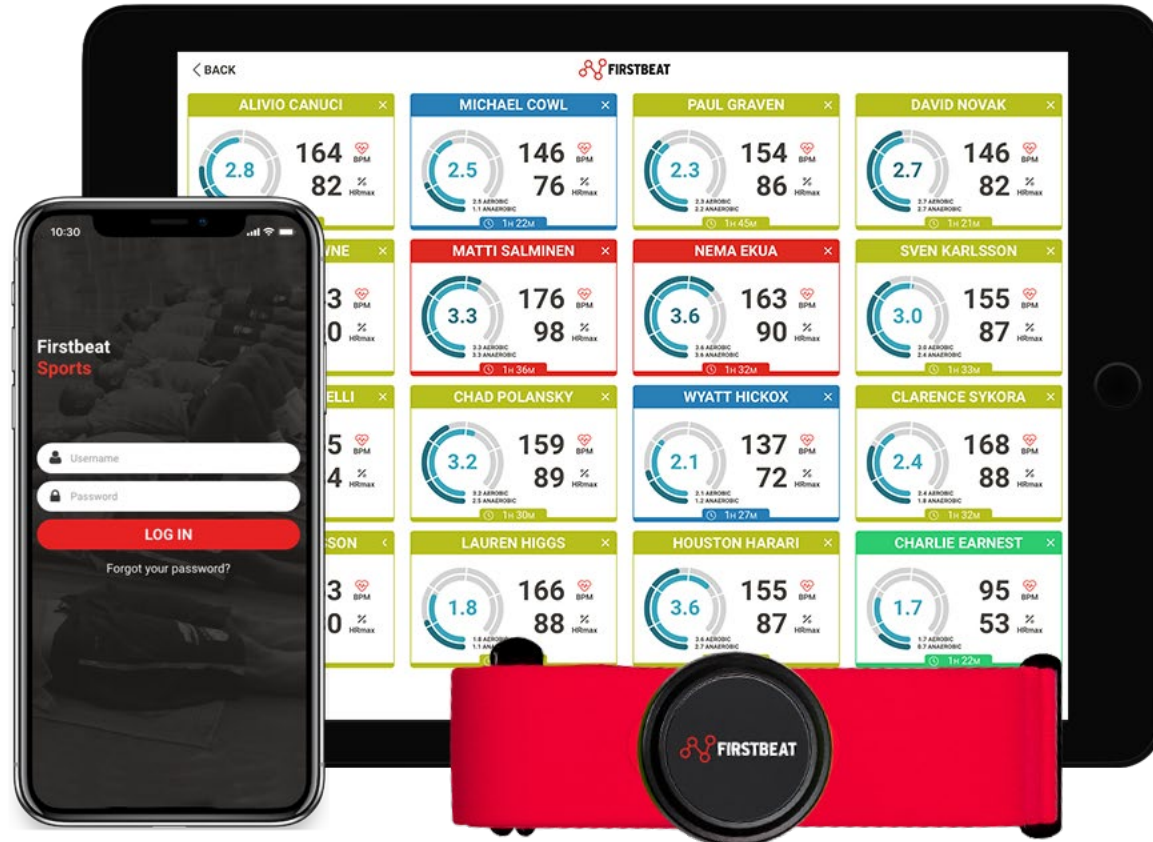
Wireless

Wi-Fi 802.11a/b/g/n/ac, 2.4 or 5 GHz (WEP, WPA, WPA2 encryption supported)  
Bluetooth Low Energy (BLE)  
802.15.4 at 2.4 GHz

# Movesense

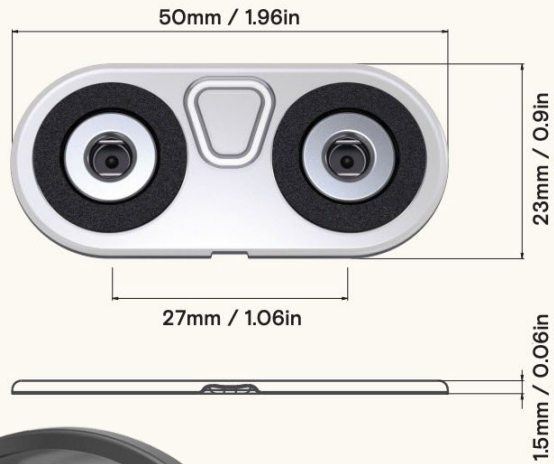


# Movesense - Business





# Movesense Connector



## DIMENSIONS

- Diameter: 36,6mm (1.44 in), thickness: 10,6mm (0.42 in)
- Weight 10g / 0.35oz with battery
- Water resistant to 30m/100ft

## MCU

- Nordic Semiconductor nRF52832 comprising 32 -bit ARM® Cortex®-M4 with 64kB on-chip RAM and 512kB on-chip FLASH
- Integrated Bluetooth Low Energy 4.0 radio, 2,4GHz

## MEMORY

- External memory: 3Mbit EEPROM

## SENSORS

- Accelerometer, range : $\pm 2/\pm 4/\pm 8/\pm 16$ g full scale, sampling frequency: 12.5/26/52/104/208Hz
- Gyroscope, range:  $\pm 125/\pm 245/\pm 500/\pm 1000/\pm 2000$  dps full scale, sampling frequency: 12.5/26/52/104/208Hz
- Magnetometer, range:  $\pm 4/\pm 8/\pm 12/\pm 16$  gauss full scale
- Temperature, accuracy:  $\pm 0.5^{\circ}\text{C}$  (max) from  $0^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$  and  $\pm 1.0^{\circ}\text{C}$  (max) from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- For heart rate and heart waveform: check [Movesense HR!](#)

## I/O

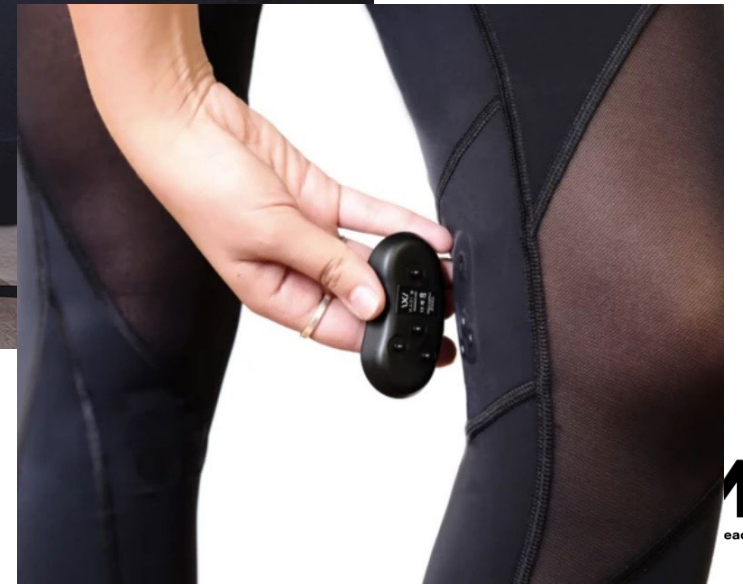
- Led (red) on the front
- 1 -wire interface master (accessible through Movesense connector)
- Debug UART, debug I/F, power & ground (inside the battery slot)

## ENERGY SOURCE

- CR 2025 3V lithium coin cell battery



# Nadi X



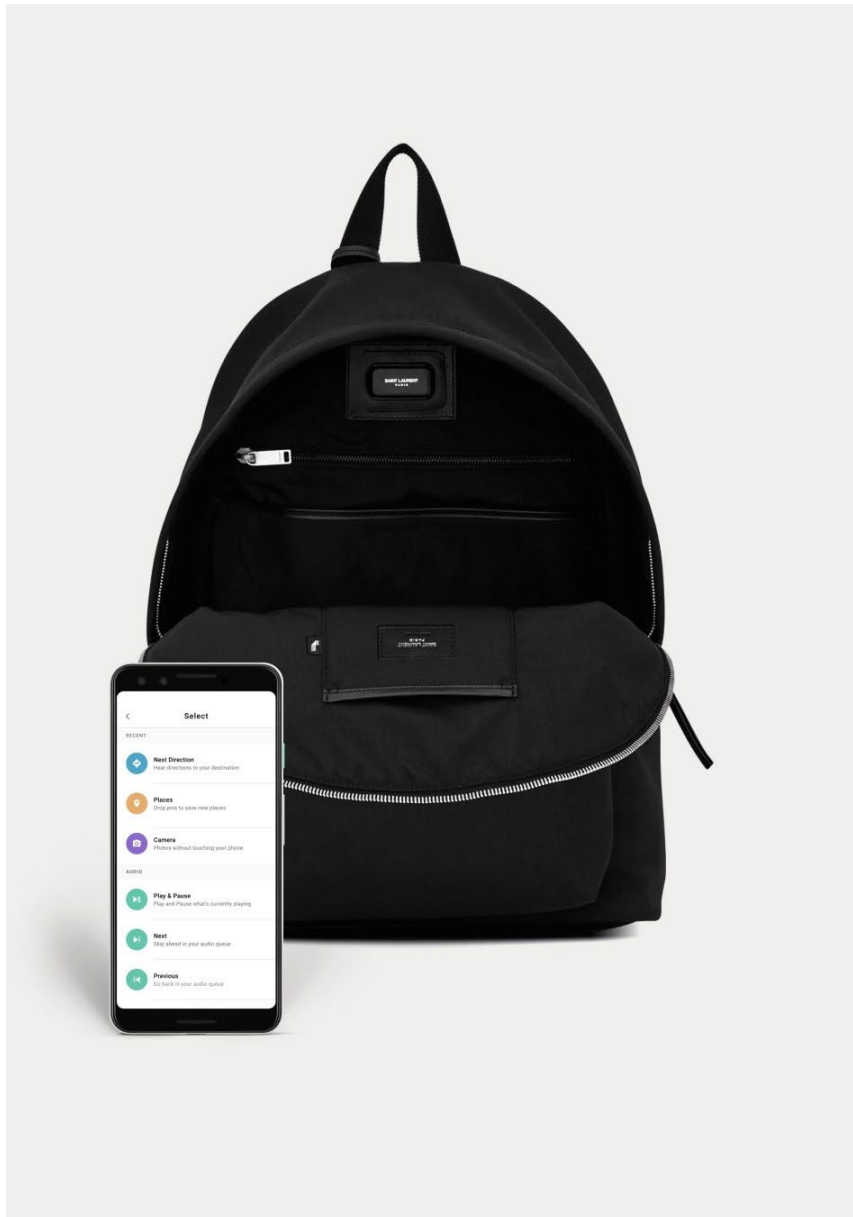


# Jacquard

It's a new  
**Every Thing.**



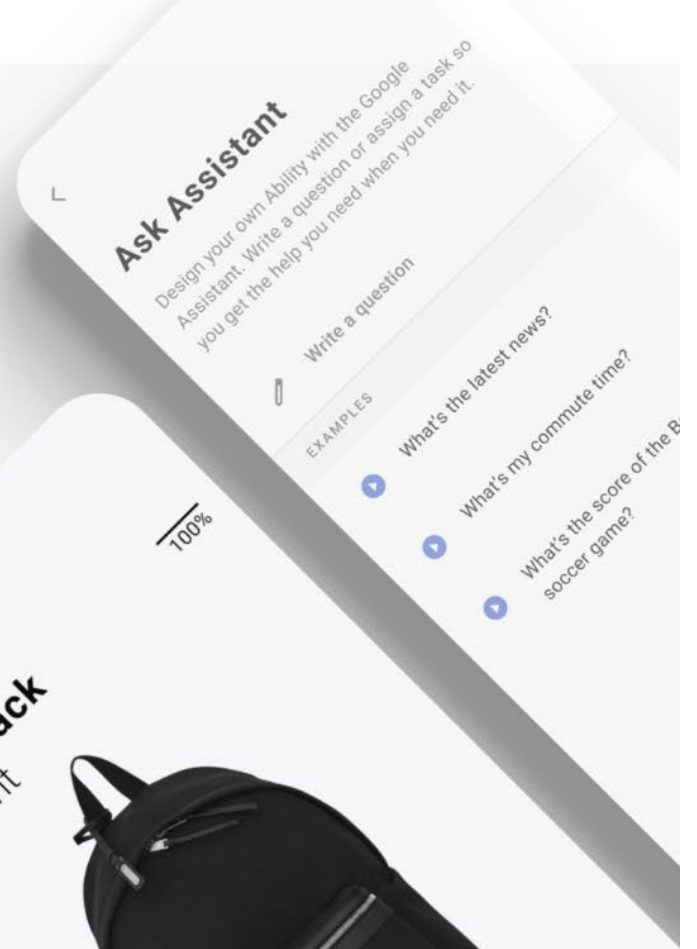
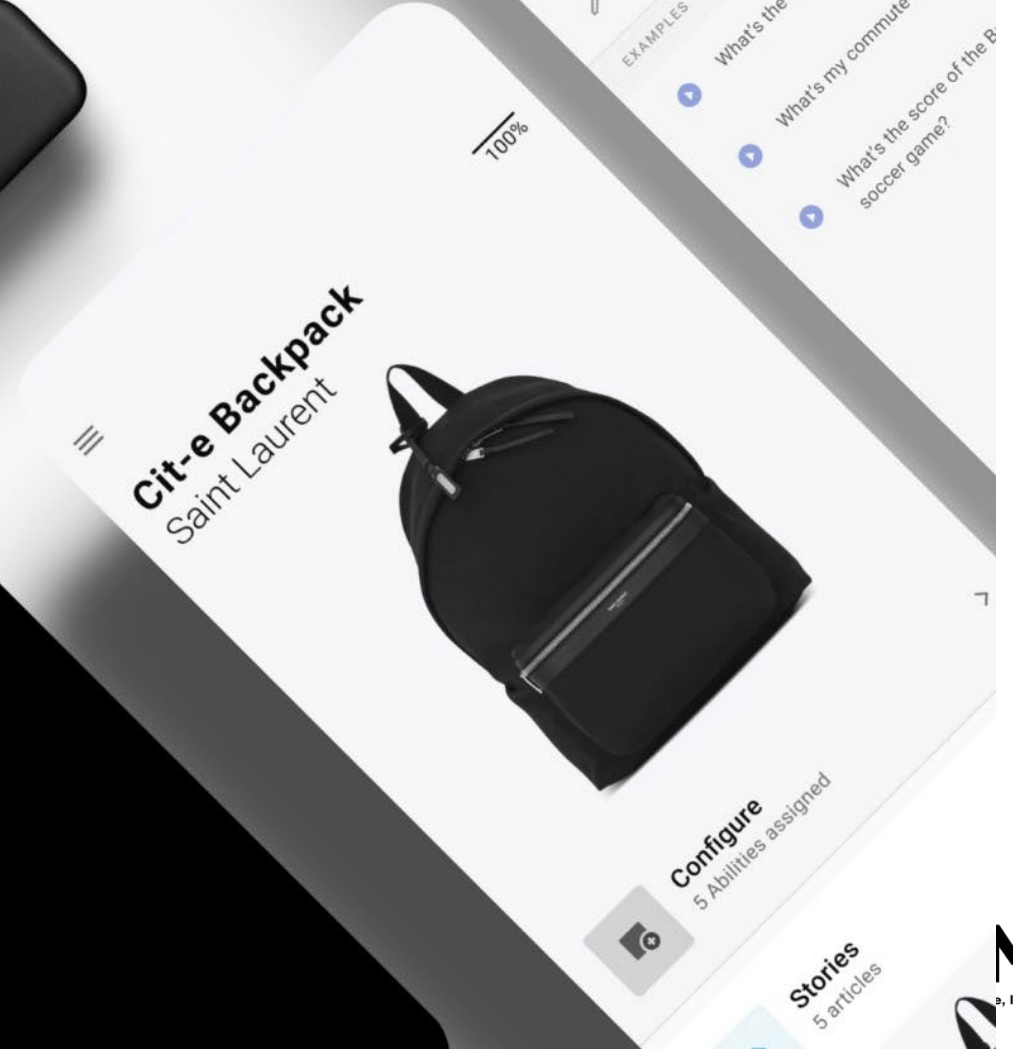




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### Big tech, small Tag.

The discreet Jacquard Tag connects your physical things to digital services and information. It's connected via Bluetooth® and communicates with the Jacquard app.



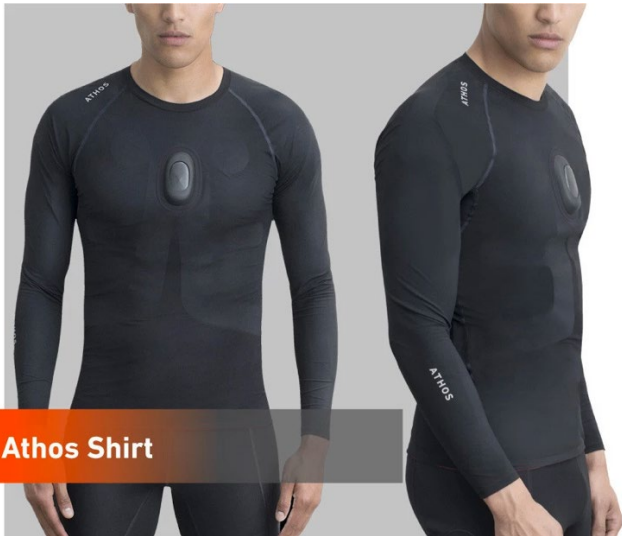


JACQUARD™  
by Google





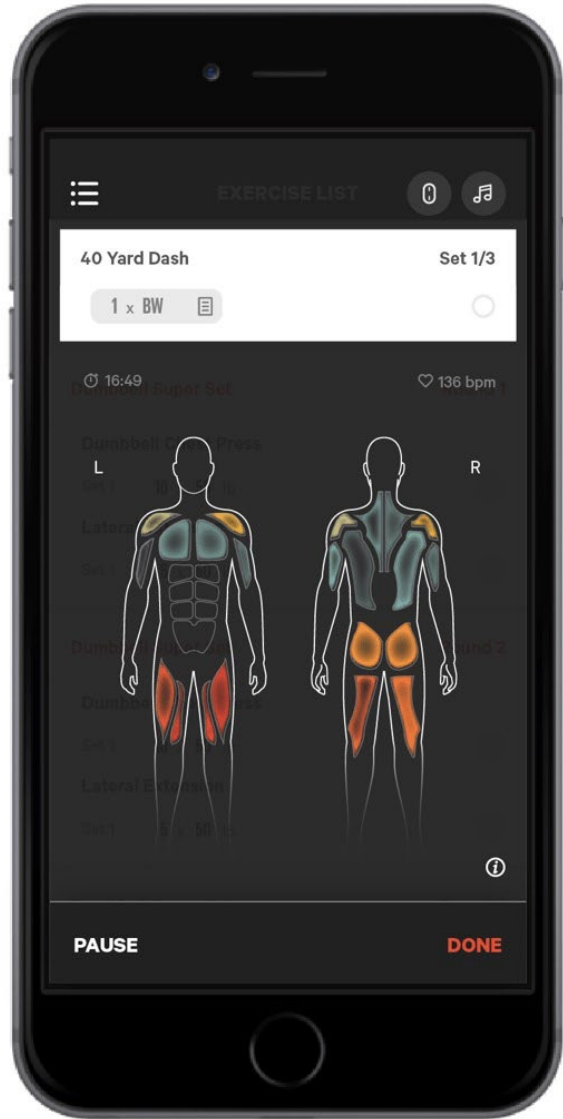
# Athos



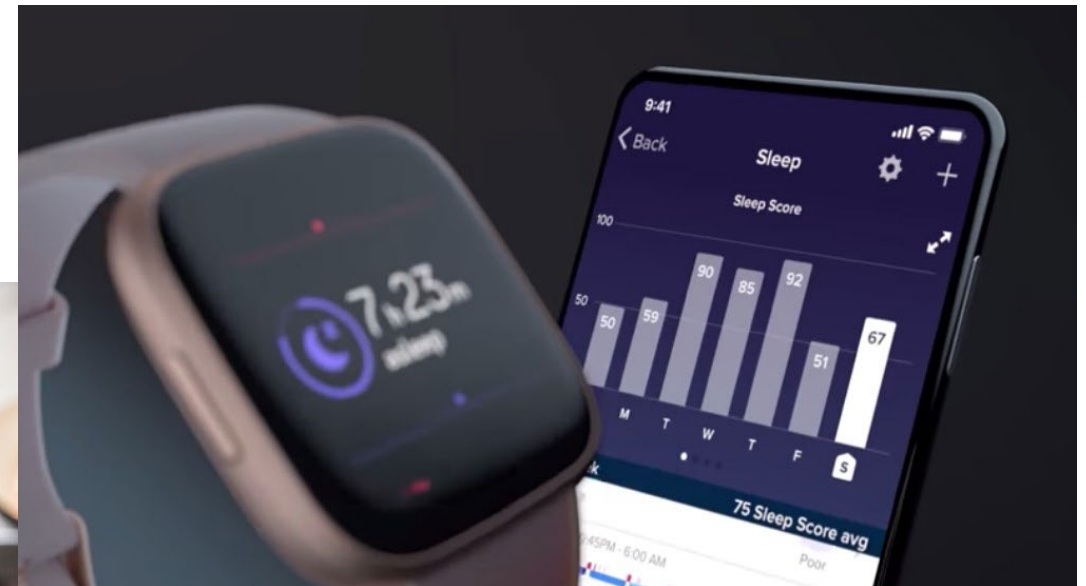
Athos Shirt



Athos Core



# Fitbit



## Activity & Workouts

Find more insights on your performance and the motivation to keep moving.



### MobileRun®

Enhance runs, walks and hikes by using the Fitbit app on your smartphone to track pace, time and distance. You can also control your music and use voice cues to stay in command. [Learn more.](#)



### Exercise Calendar

Logged workouts will pop up in your exercise calendar so you can look back on what you've accomplished, and use data & trends to make progress toward your goal.



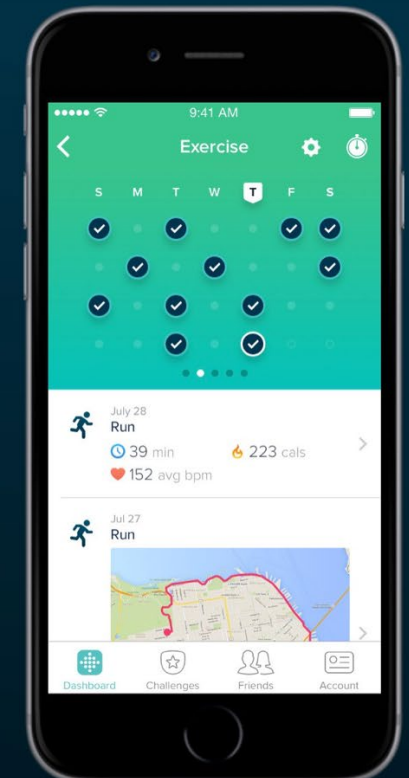
### Track Exercise

Use your Fitbit tracker to record workouts or log them in the app, then see all your exercise stats, their impact on your overall day, and how your performance is improving.



### Exercise Sharing

Use the Fitbit app to share a view or a selfie once you've reached the peak of your workout. Your pic and stats can be sent to friends and followers on any social channel, or through email and text.





# Sensoria AI Sports Wear



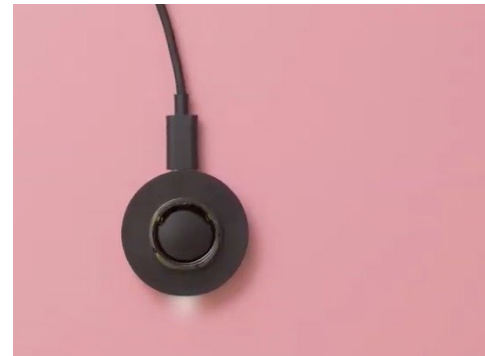
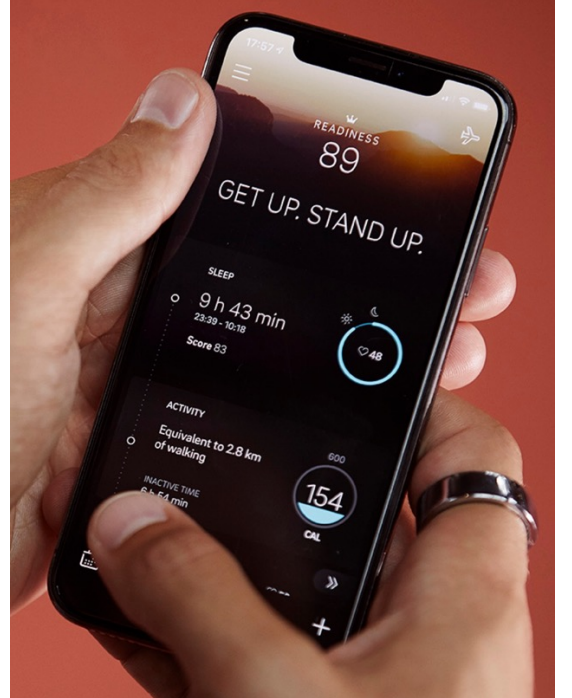


# OURA



Apple Health & Google Fit

Automatically sync your workouts from your favorite fitness apps through Apple Health and Google Fit.



**iRobot®**  
Roomba®

Roomba 800-serien e



TEST AF ROBOTSTØVSUGERE			TEST VINDER
1		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
2		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
3		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
4		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
5		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
6		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
7		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
8		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
9		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10
10		SAMLET DEKORATIONSSAT	1 2 3 4 5 6 7 8 9 10

**iRobot®**  
Roomba®

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WORLD  
LEADER  
IN ROBOTIC  
MOWING



THE FUTURE IS NOW



# Autostore logistics



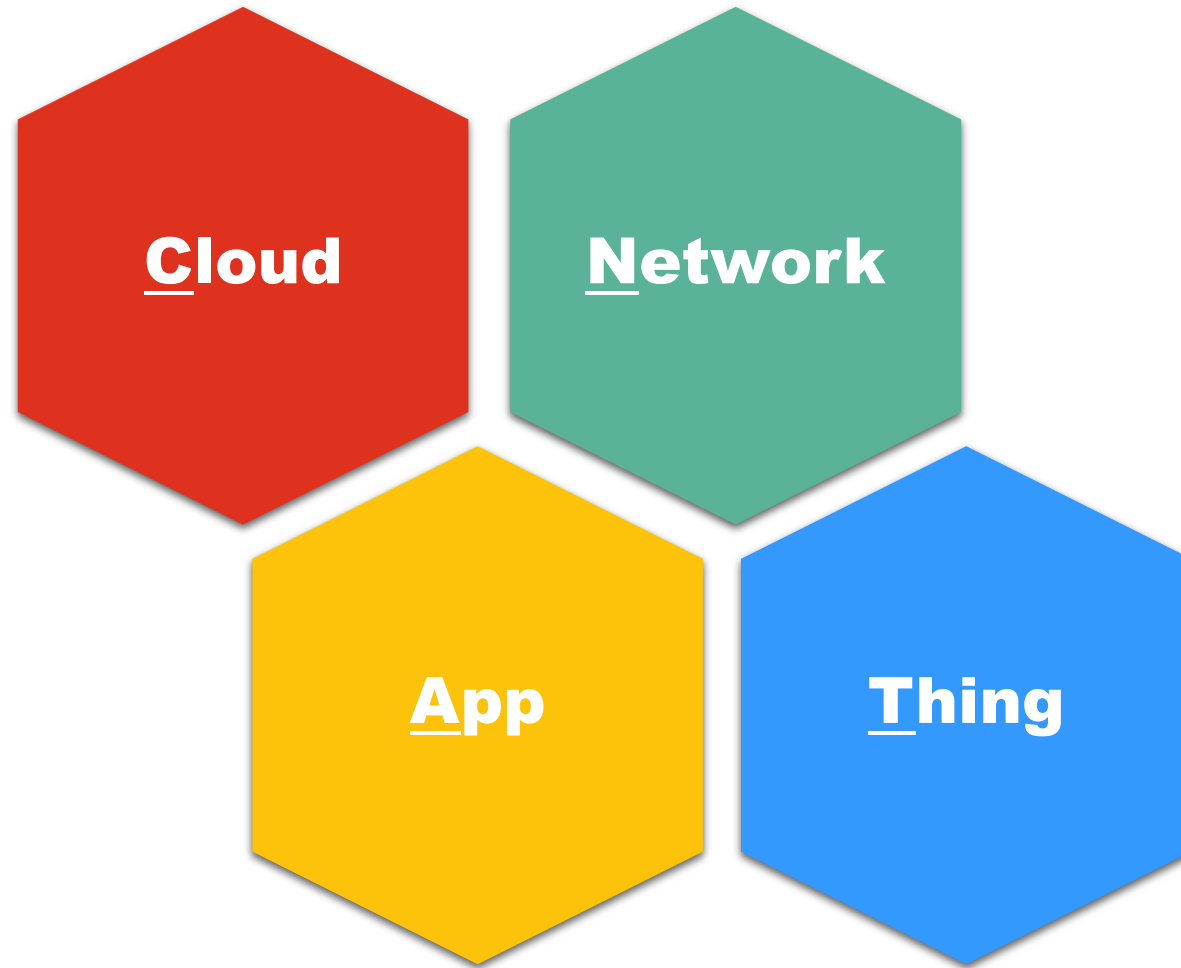
# Tesla AI



**So? What is IoT?  
And what are the  
typical main  
components?**



# Key parts of IoT



**[ C A N T ]**

**IDBM**