

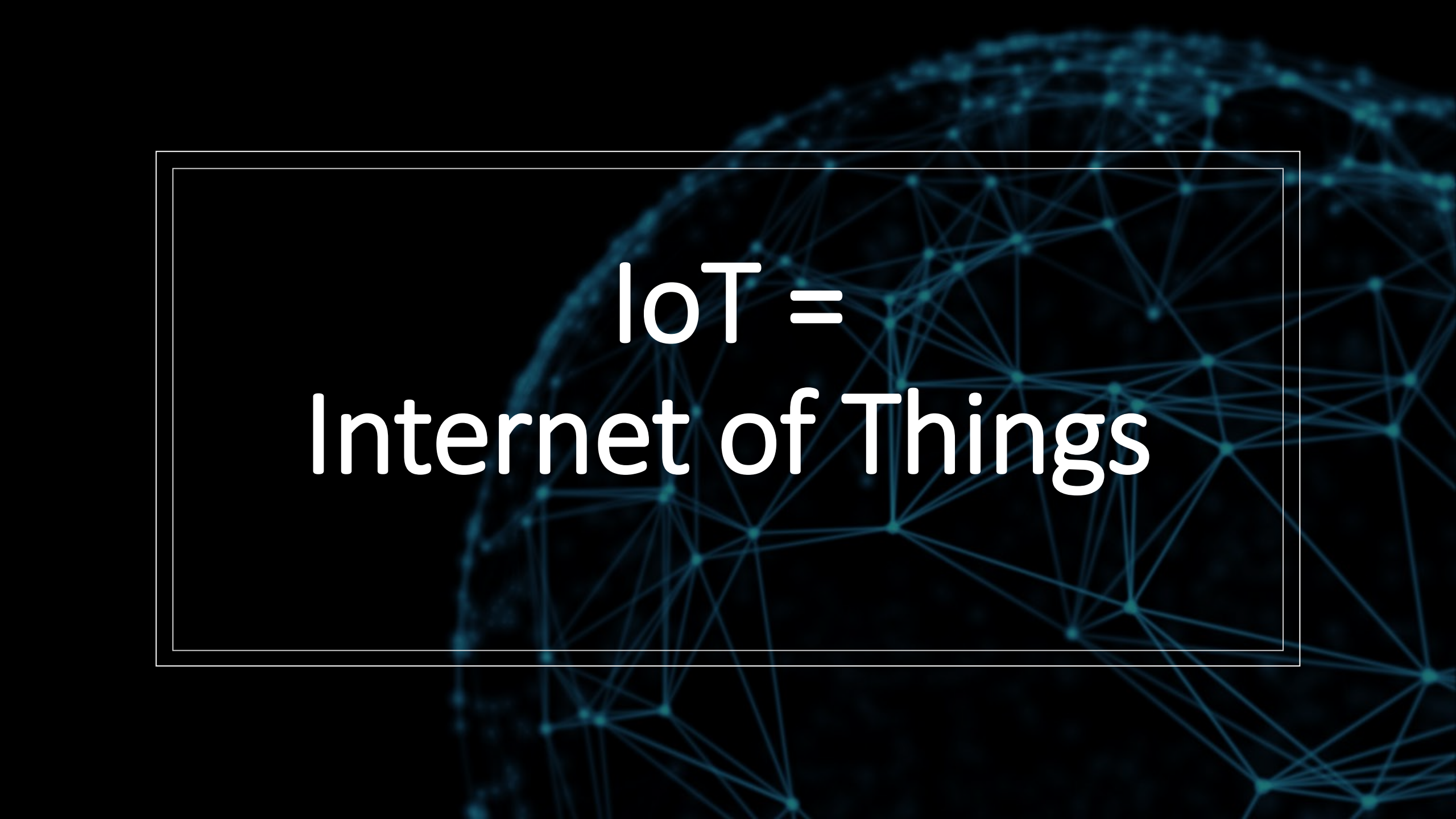
What is IoT

Salu Ylirisku

23.10.2022

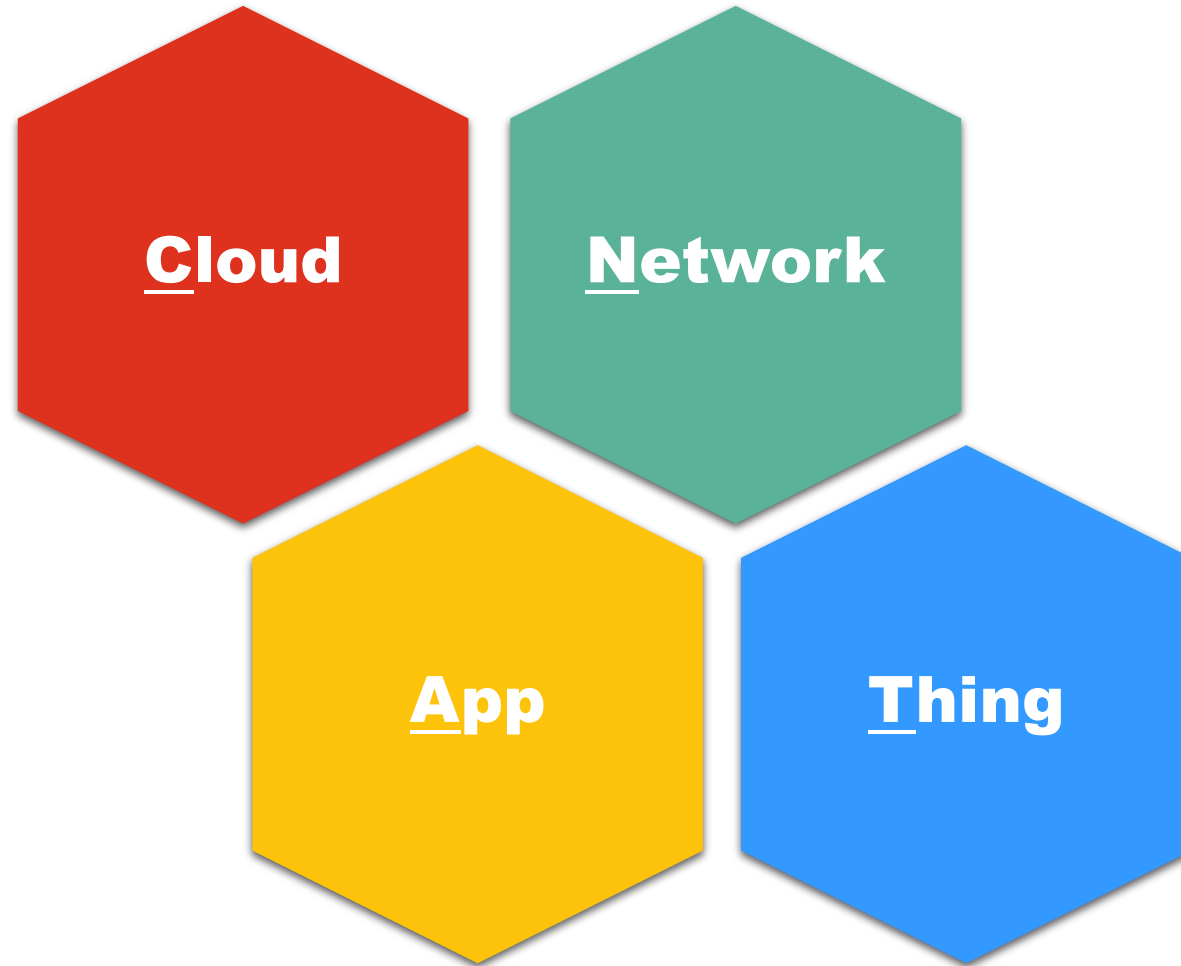
Learning Goals

- 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

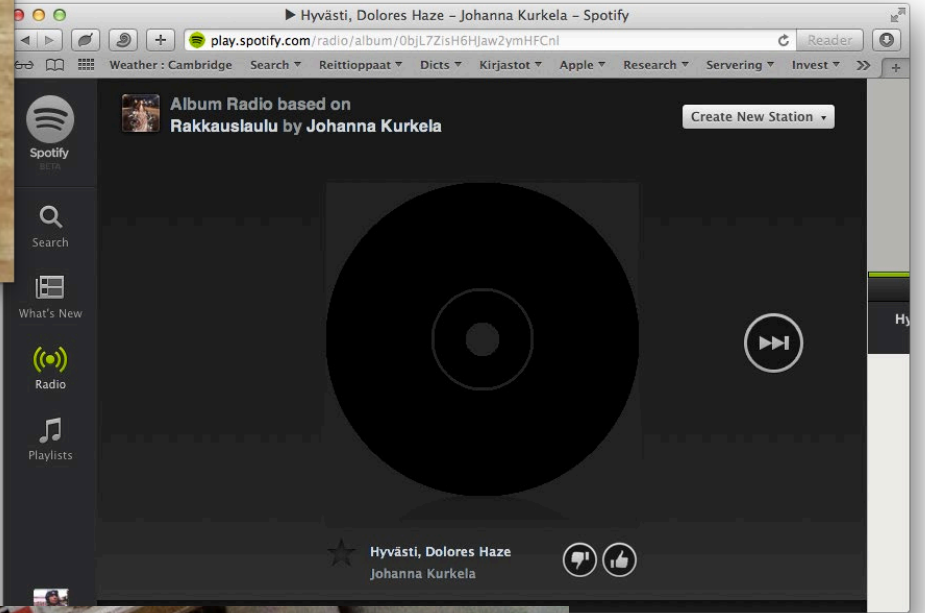
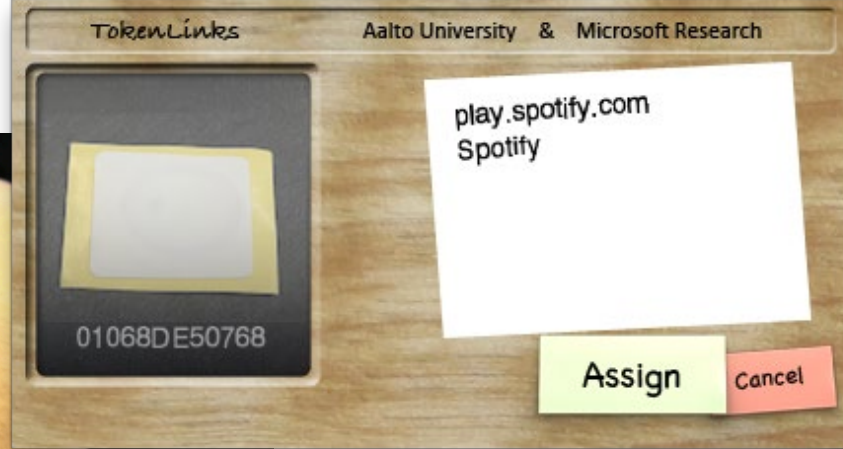


Examples of IoT applications

- Tokens of Search
- Smart Mөлkky (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

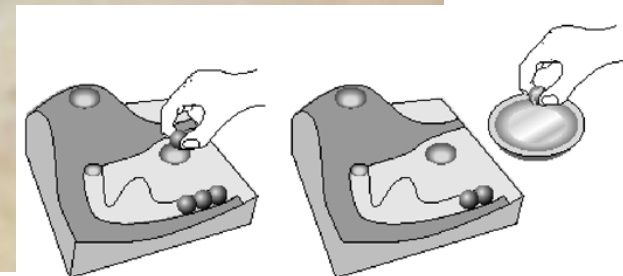




The birth of the idea



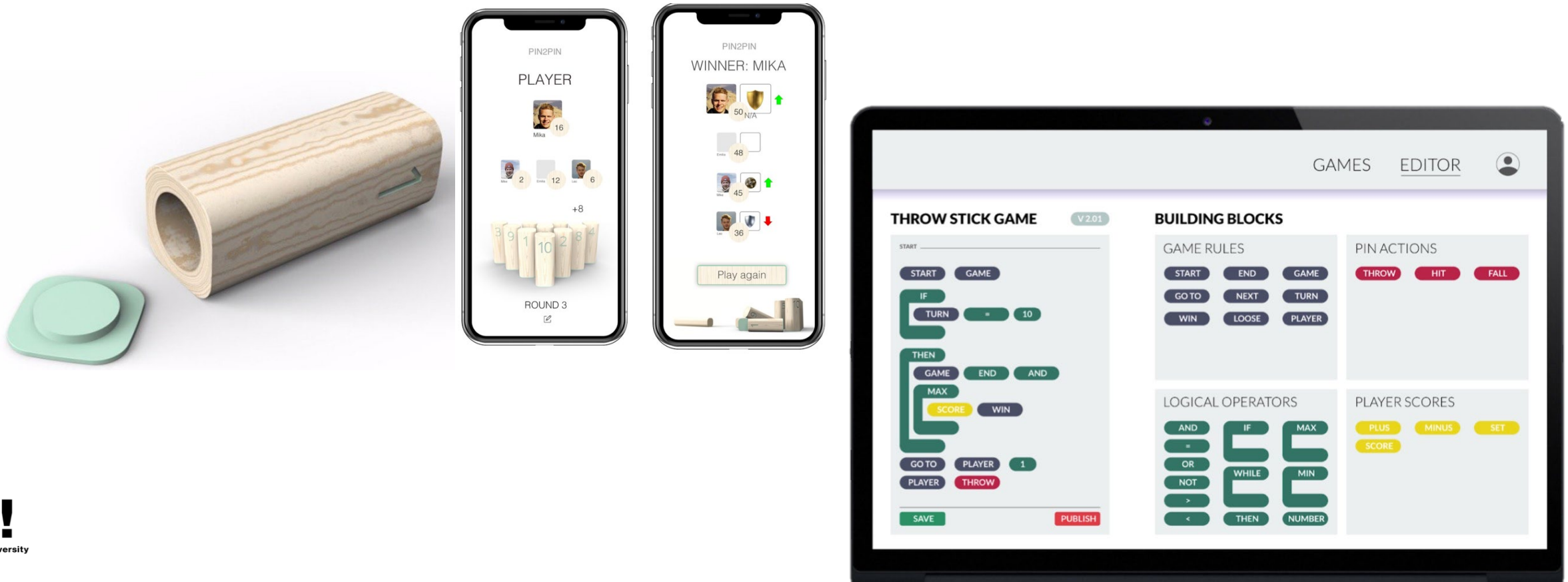
Inspiration



Durrell Bishop's Marble Answering Machine

Pin2Pin

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

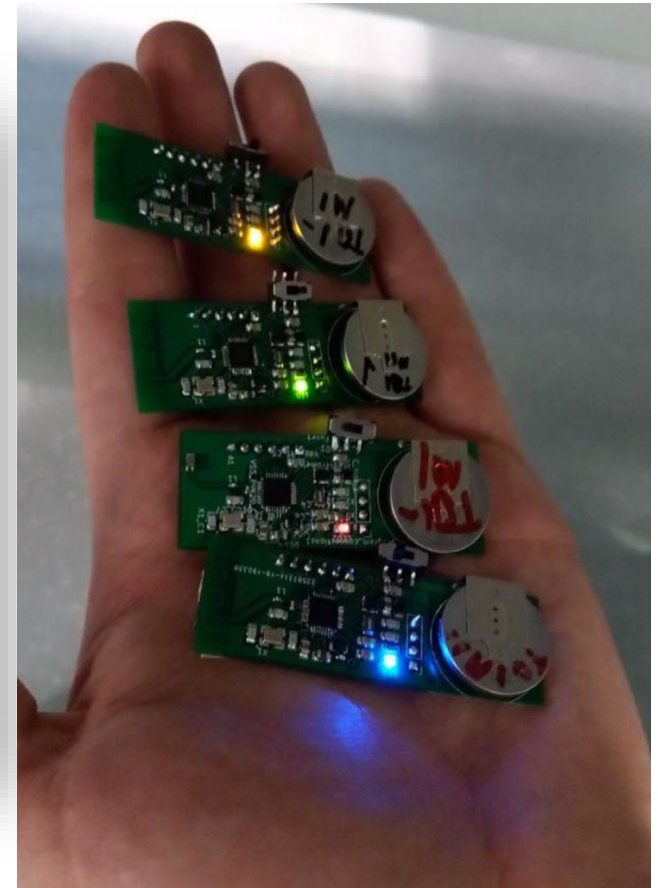
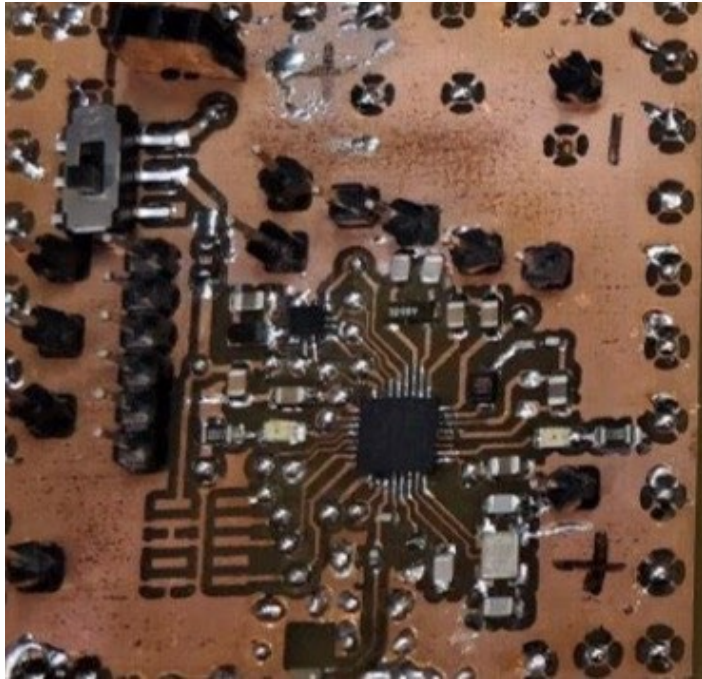


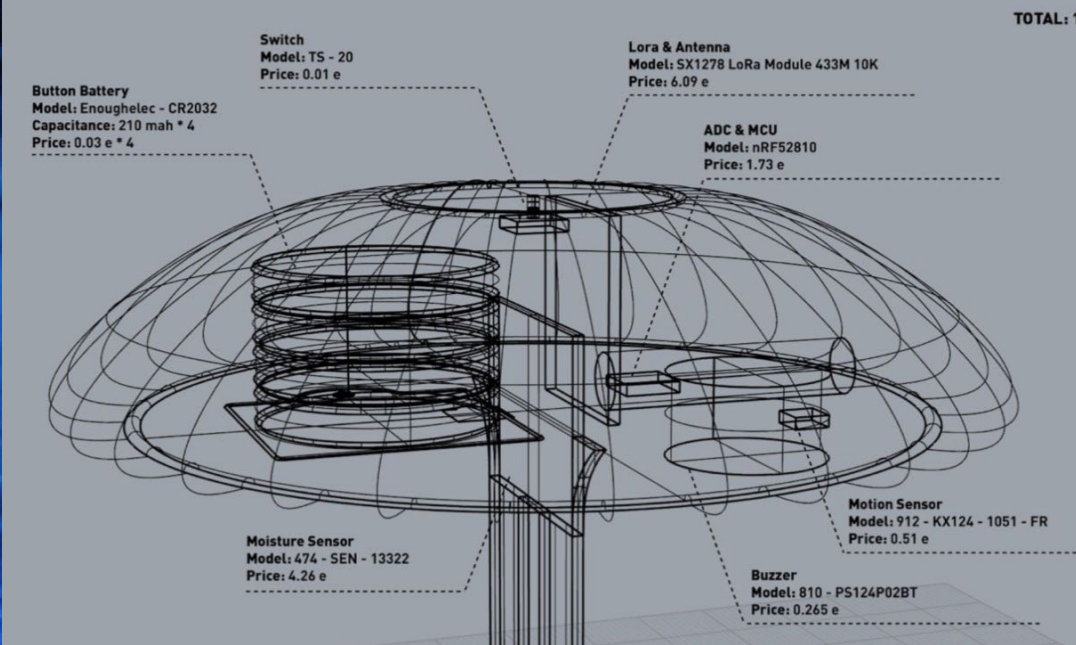
Pin2Pin

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



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





Find a bench

Product Life



Next free bench
Toukolan rantapuisto | 6 min →



20 Seconds / Time
3 Times / Day
150 Days / Year

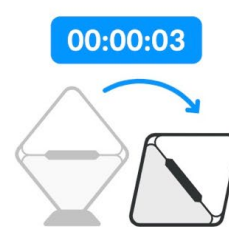
3 Years

Timeular



1

Define



2

Track



3

Discover



Timeular



Time tracking has never been easier

<https://youtu.be/bKWLAA1weqs>



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)



L.C.D. DISPLAY

SENSOR WINDOW AND LENS

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

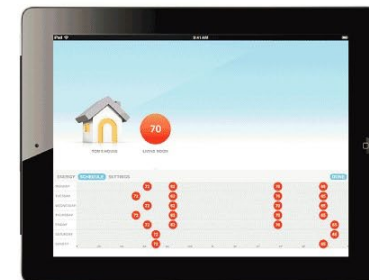
FAR-FIELD MOTION SENSOR

AMBIENT LIGHT SENSOR

TEMPERATURE SENSOR AND RING MOTION DETECTOR BOARD

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



<https://youtu.be/vEJcsYVG2BA>

Google Nest Doorbell

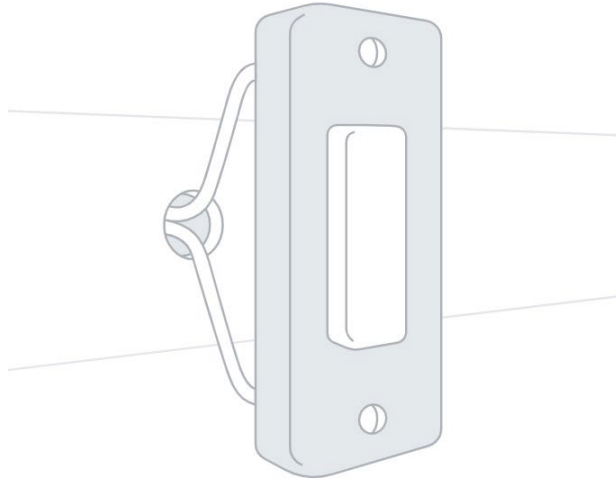




<https://youtu.be/TUEPaIBhBTI>

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

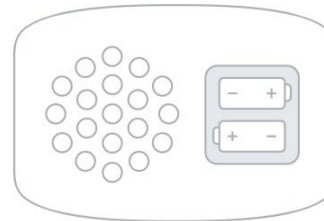
Can't find it

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

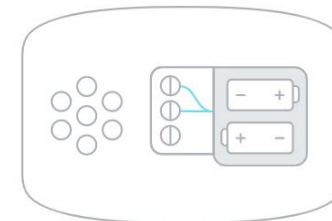
What do you see when you remove the cover? Select one.

2.

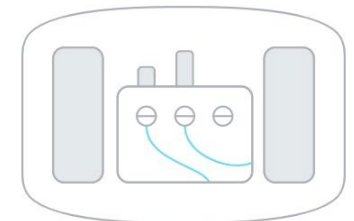
3.



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

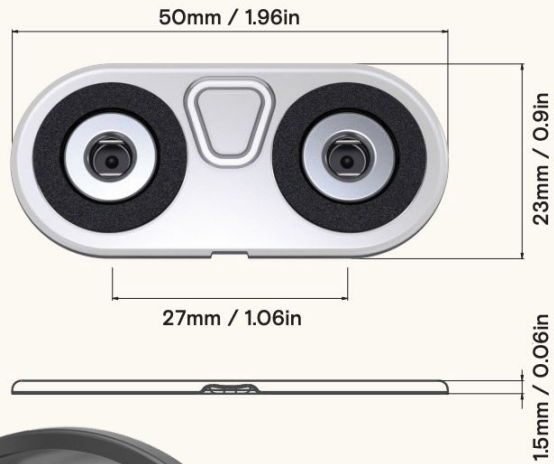


https://player.vimeo.com/video/193676824?h=771c2f06d5&app_id=122963

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°C to $+65^{\circ}\text{C}$ and $\pm 1.0^{\circ}\text{C}$ (max) from -40°C to $+125^{\circ}\text{C}$
- For heart rate and heart waveform: check [Movesense HR!](#)

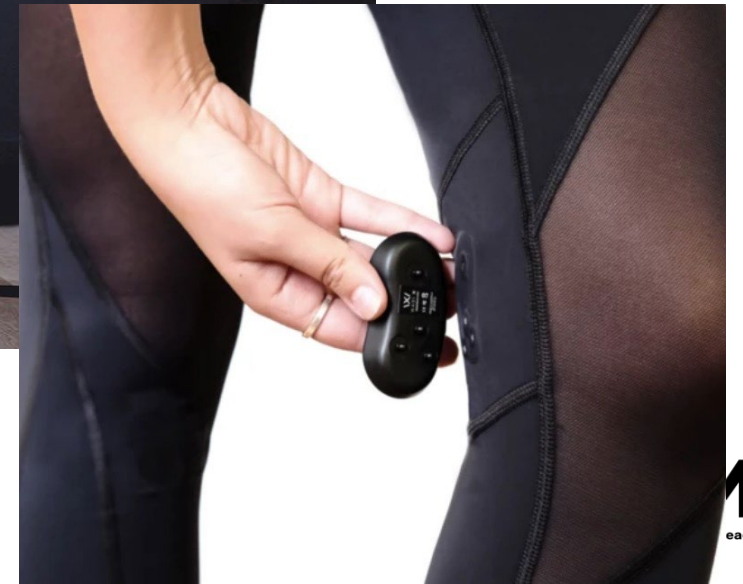
I/O

- 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

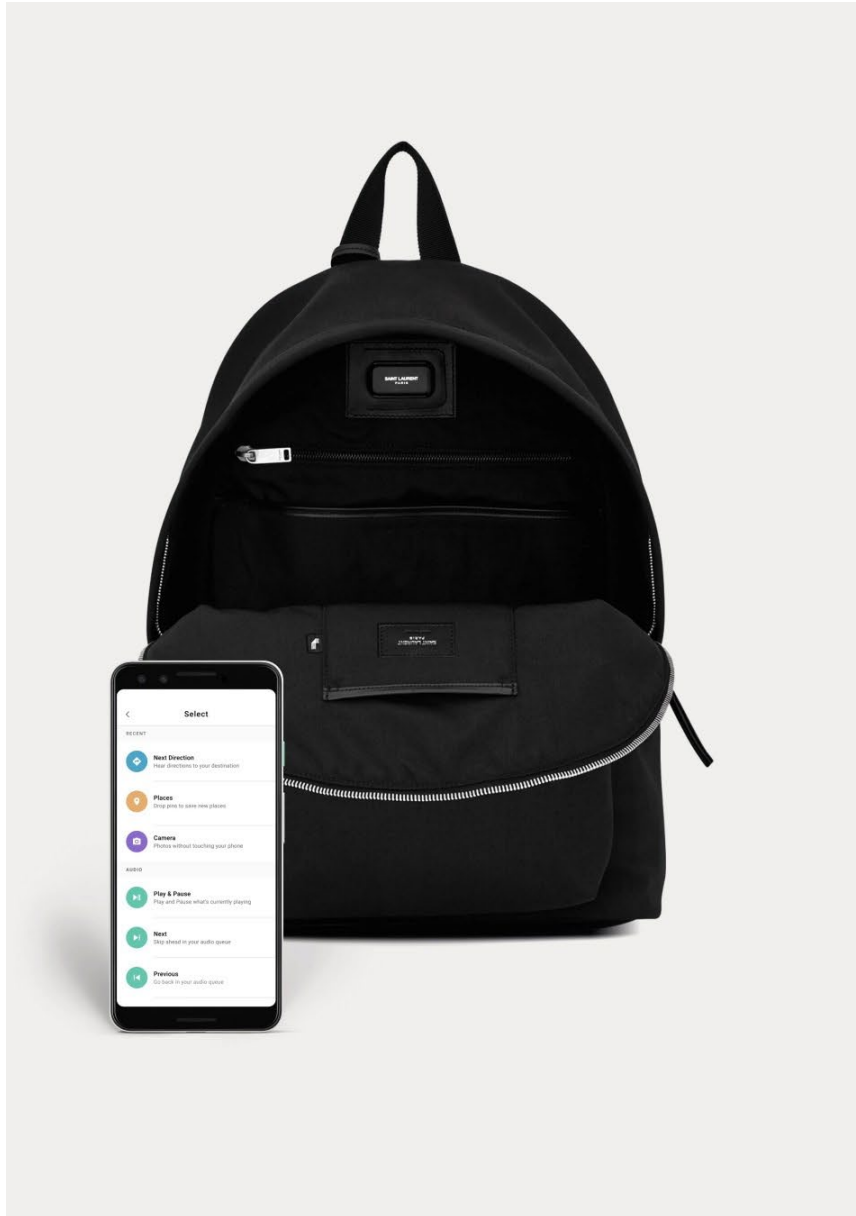
Nadi X



Jacquard

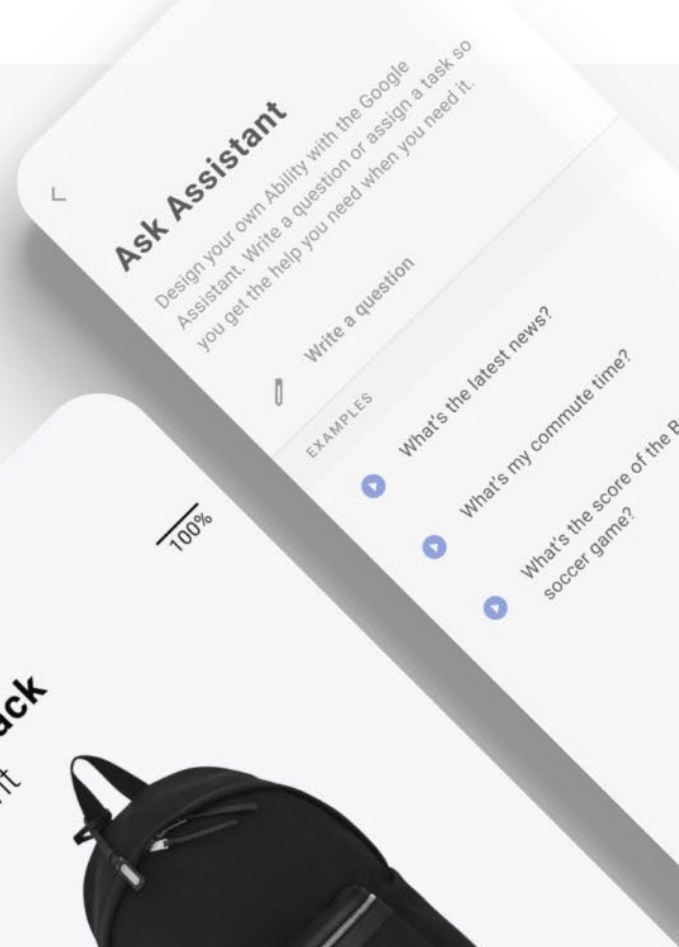
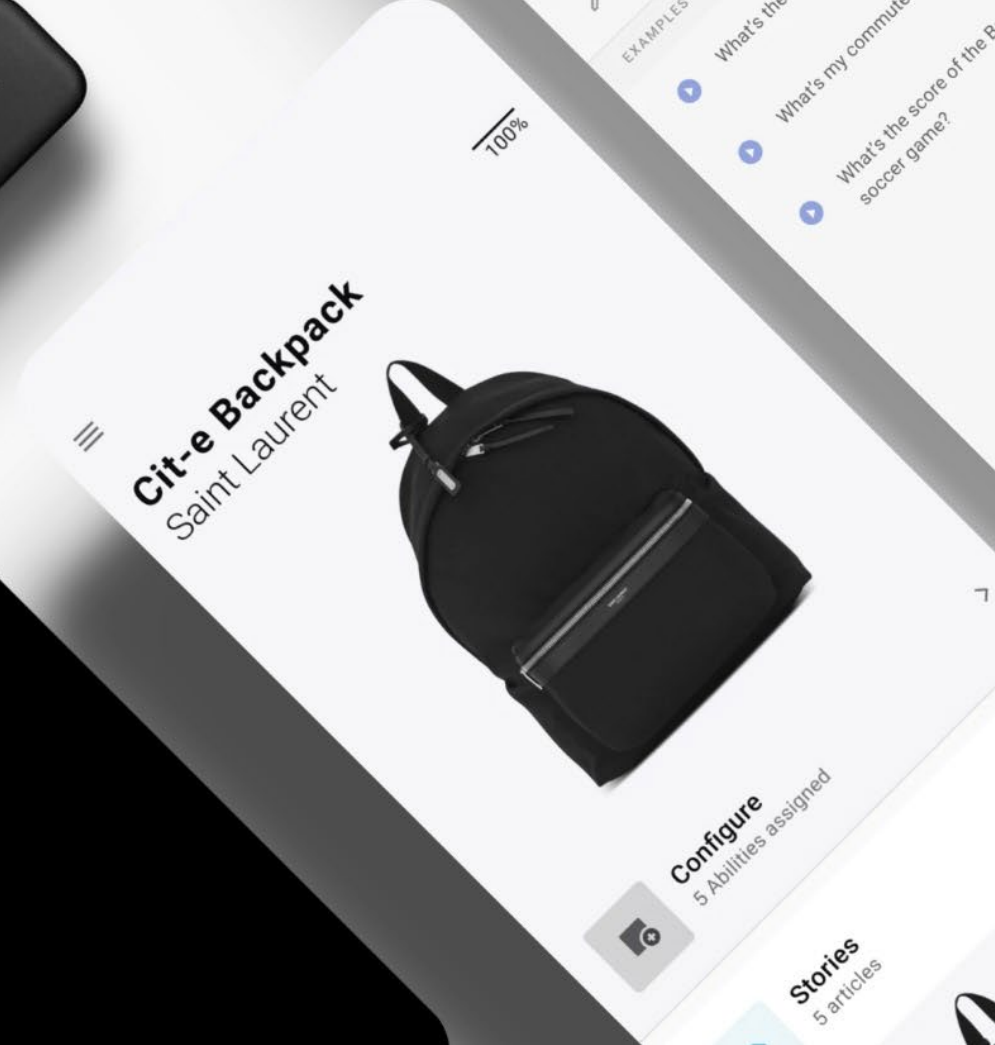
It's a new
Every Thing.





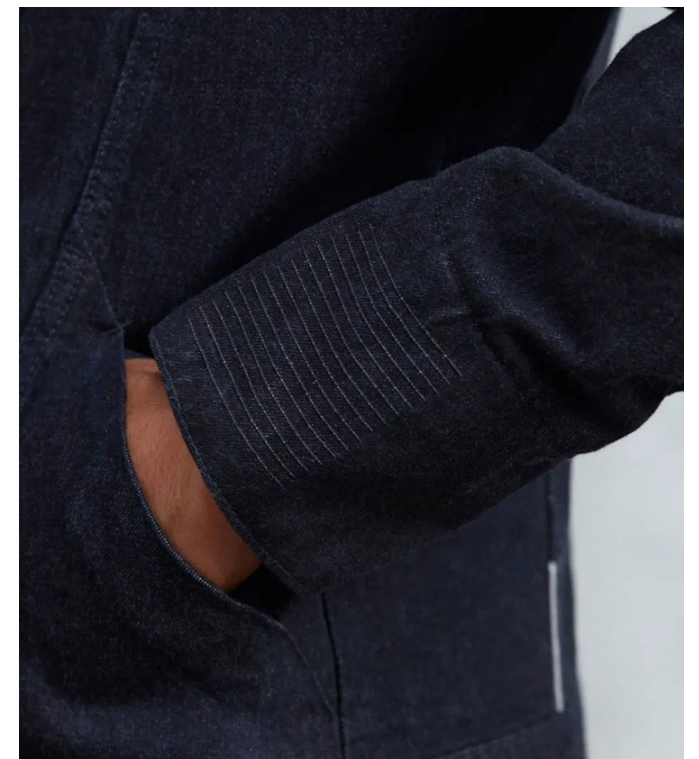
Big tech, small Tag.

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

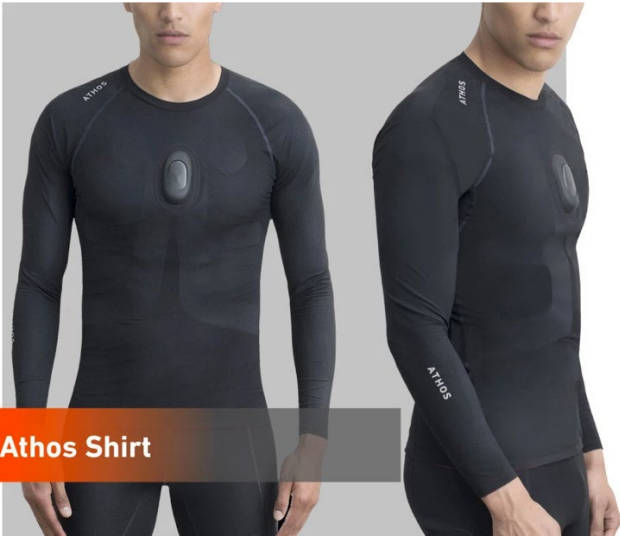




JACQUARD™
by Google



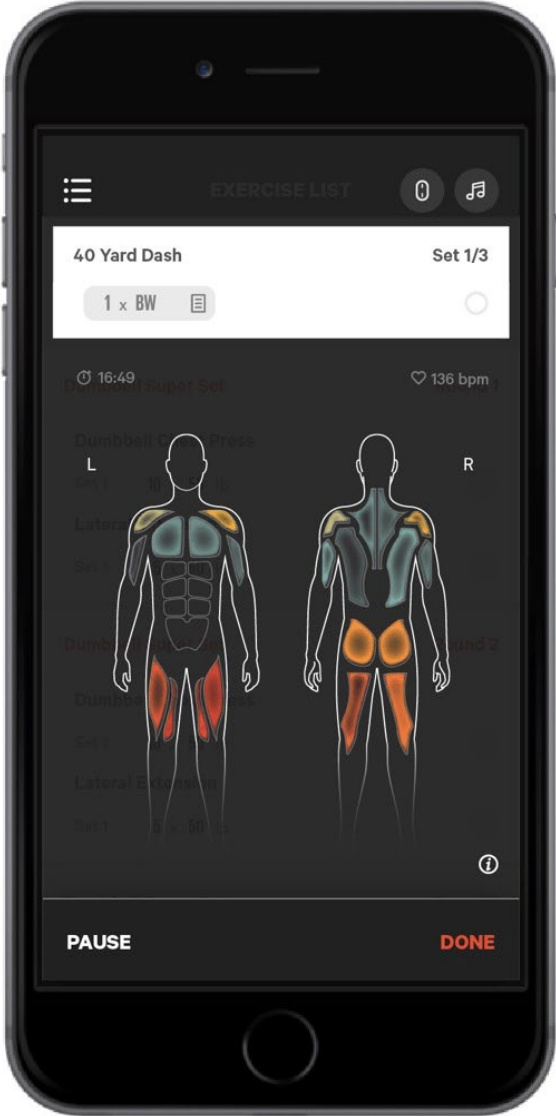
Athos



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.



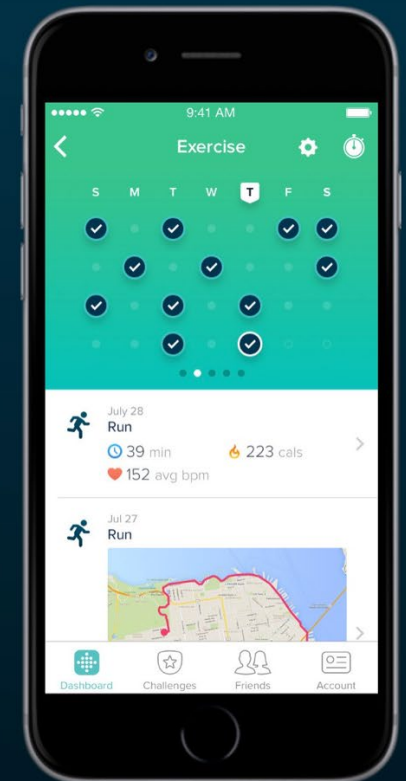
Track Exercise

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

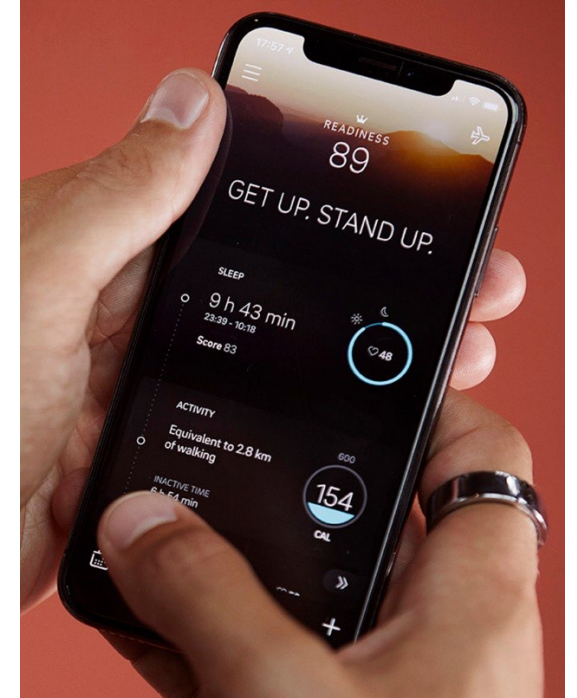
Use the Fitbit app to share a view or a selfie once you've reached the peak of your workout. Your pic and stats can be sent to friends and followers on any social channel, or through email and text.



Sensoria AI Sports Wear

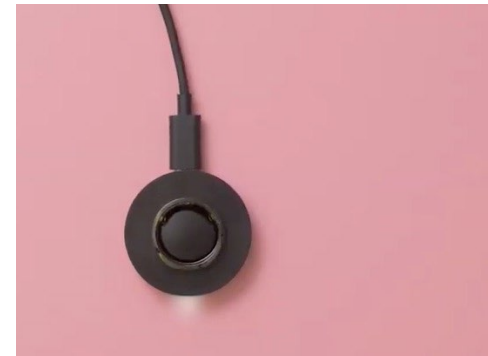


OURA



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

Rank	Robot Model	Smartest Response
1	iRobot Roomba 800	1 2 3 4 5 6 7 8 9 10
2	Robot Roomba 750	1 2 3 4 5 6 7 8 9 10
3	Robot Roomba 600	1 2 3 4 5 6 7 8 9 10
4	Robot iV-200	1 2 3 4 5 6 7 8 9 10
5	Neato Botvac D5	1 2 3 4 5 6 7 8 9 10
6	Samsung Powerbot UP 800	1 2 3 4 5 6 7 8 9 10
7	Neato iV-15	1 2 3 4 5 6 7 8 9 10
8	Meaco Floor 900	1 2 3 4 5 6 7 8 9 10
9	Samsung Powerbot Ultimate 8000S	1 2 3 4 5 6 7 8 9 10
10	LG Homobot Square	1 2 3 4 5 6 7 8 9 10

iRobot®
Roomba®

witt



https://youtu.be/Kg_iRvaw5f8



WORLD
LEADER
IN ROBOTIC
MOWING



THE FUTURE IS NOW

<https://youtu.be/zm2cCumYvQQ>

<https://youtu.be/47niFAv6f9g>

Autostore logistics



<https://youtu.be/rMcJmwYeJf4>

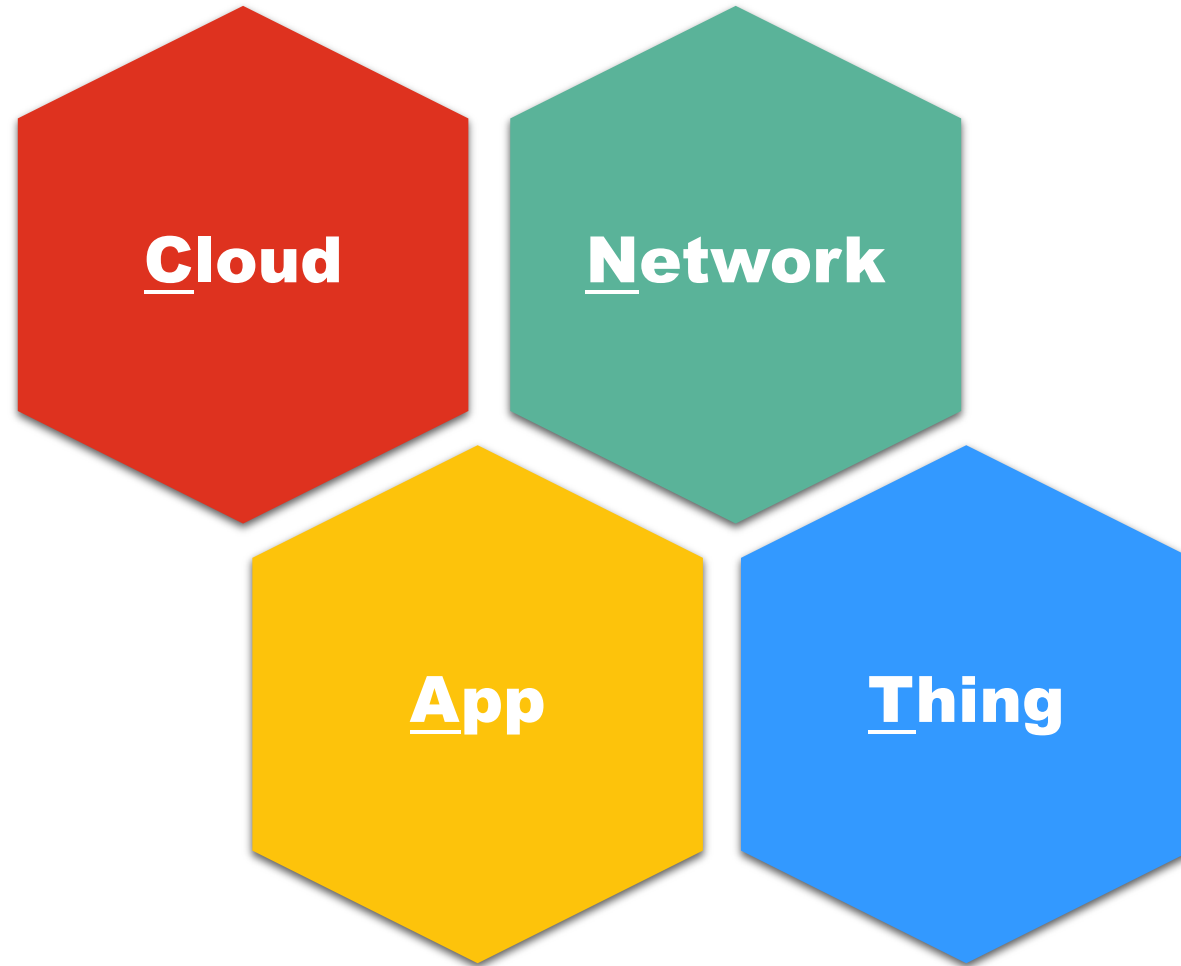
Tesla AI



<https://youtu.be/6hkiTejoyms>

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

Key parts of IoT



[C A N T]

IDBM