



actronika

SENSE IT

INTERFACE HOMME MACHINE DU FUTUR : COMMENT
L'HAPTIQUE INNOVE POUR L'INDUSTRIE AUTOMOBILE ?

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Business Developer



- Présentation de l'haptique
- Applications by Actronika
- Open discussion

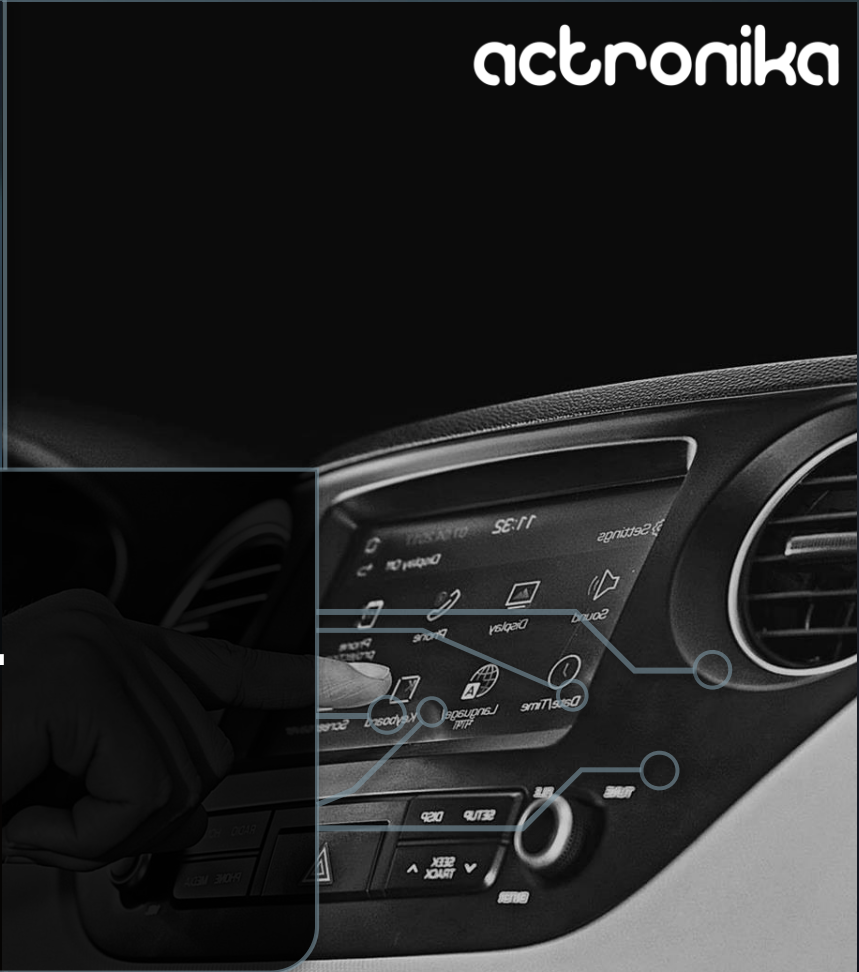


- Présentation de l'haptique

The main image shows two hands, one larger and one smaller, being held together in a supportive grip. The hands are positioned in the center-left of the frame, with the larger hand's fingers resting on the back of the smaller hand. The background is a bright, out-of-focus window. On the left side of the image, there is a vertical overlay of white circuit board traces and nodes. On the right side, there is a dark grey vertical panel containing the text.

L'HAPTIQUE C'EST LE SENS DU TOUCHER

TOUCH = TRUST





NEW TRENDS

- The recent boom in the digitalization of society and the constant increase of “smart devices” is redefining the current state of Human-Machine Interfaces.
- HMIs are now more than ever in need of new modalities to convey information.







NEW PROBLEM



We live in a world of tactile experiences...

"Touch comes before sight, before speech. It is the first language and the last, and it always tells the truth."

—Margaret Atwood



Yet, the sense of touch is not stimulated

“ I don't want people to sit there and objectively watch the film. I want them to experience it as something that's under their skin, so you try to make the films really tactile.”

— Danny Boyle



New HMI's will need new interactions

HD Haptics can bring essential sensations to users on any interfaces. Haptics will help drivers and passengers have a safer, more convivial environment.



Haptics is not new, but HD Haptics is.

20-year Haptic Market Overview

2000's

Simple ERM motor-based devices



Old Generation Haptics

1st generation of haptic actuators for phones and gamepads*. Force feedback for medical devices.

*Still used in most of phones and gamepads, huge replacement market opportunity

2016

Tactile screens shift the market



Haptics Stays the same

For 15 years Haptics technologies stayed at the same level, until tactile screens arrived.

2017

New industry use cases



HD Haptics appears...

Gaming, Smartphones, wearable, and automotive leaders start introducing next generation haptics feedbacks.

2019

Towards replacing old Haptics



Tactronik Platform

We develop an OEM platform to allow our clients and prospects to integrate the next generation HD Haptics into their devices.

The 1st Platform ready for any integration on the market.

“

HD Haptics emulates real life like sensations, through the association of hand-crafted effects and hand detection algorithms. HD Haptics brings a whole new sense to the digital interfaces.

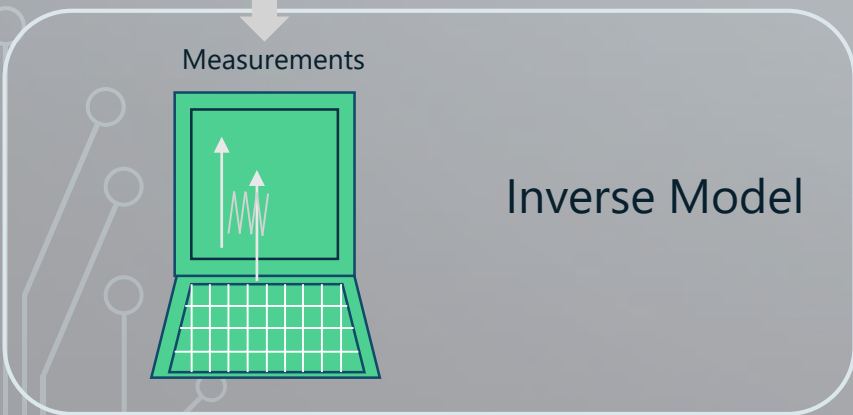
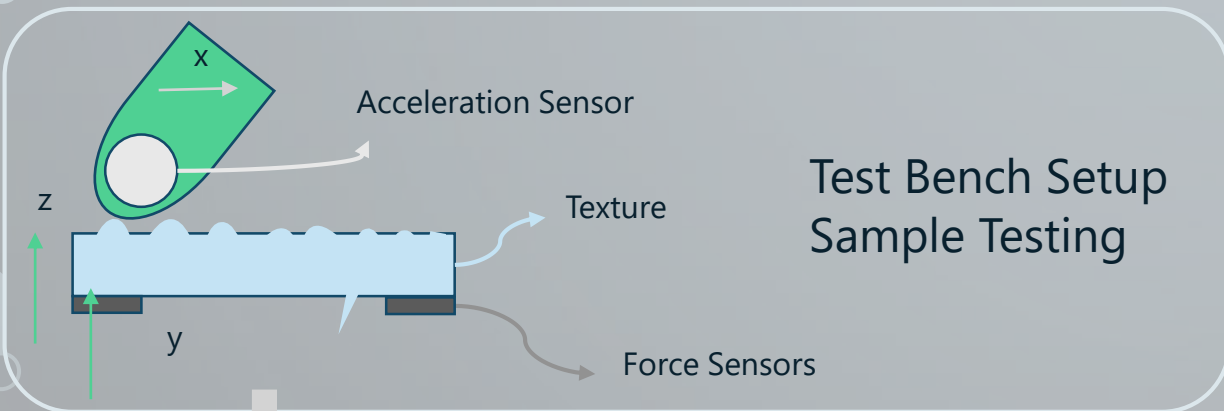
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1

Experiment

Using a specific method, we simulate real touch sensations.



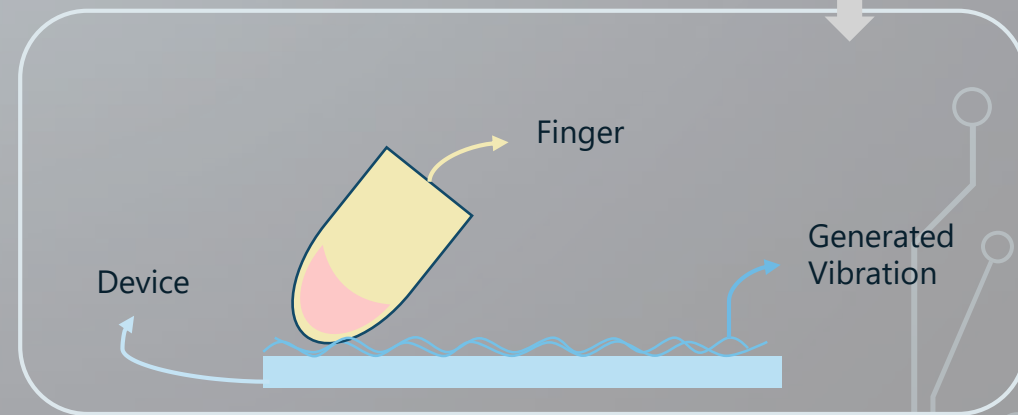
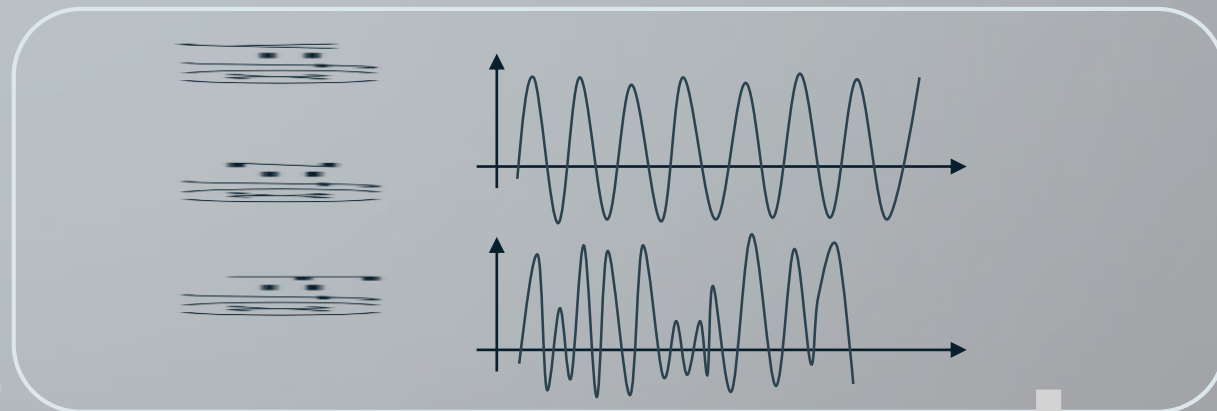
Analysis

Decomposition

Synthetic

We develop effects by algorithms.

2



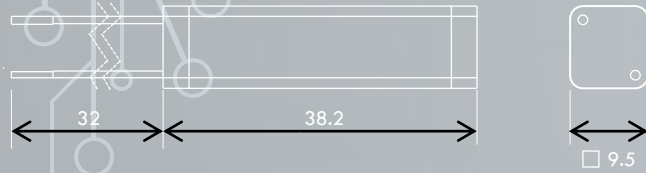
Technology Scan

	Electrodynamic Motors	Piezo-electric plates and bars	Dielectric electroactive Polymer	Ionic Electroactive Polymers	Variable reluctance Motors	Nonlinear Acoustics	Plate Electrodes
Physics	Coils interacting with magnetic fields.	Dimensional change in a ceramic material when exposed an electric field	Large deformation of soft gel layer under electrostatic attraction/repulsion.	Ion migration in a gel causing dimensional changes.	Magnetic circuit broken by an air gap.	A high power ultrasonic acoustic wave meets a boundary creating a net, weak force owing to the nonlinear behavior of air.	Electrostatic force between plates of surface.
Advantages	<ul style="list-style-type: none"> • Mature • Commonly industrialized • Wear-free • Linear • Steady improvement of permanent magnet technology • Numerous arrangement • Low Voltage • Little intrinsic bandwidth limit • Packageable 	<ul style="list-style-type: none"> • Can be very inexpensive in mass production • Can displace stiff or heavy loads 	<ul style="list-style-type: none"> • Astonishing at first sight • Fast 	<ul style="list-style-type: none"> • Astonishing at first sight 	<ul style="list-style-type: none"> • Mature • Commonly industrialized • Wear-free • No need for permanent magnets • High power density • Good at dc • Low voltage • Packageable • Miniaturize 	<ul style="list-style-type: none"> • Astonishing at first sight • Steerable in mid-air 	<ul style="list-style-type: none"> • Can be integrated in solid state structures • Highly miniaturized
In Haptics	<ul style="list-style-type: none"> • Miniature Eccentric Rotating Masses ERM • Single frequency linear resonant actuators LRA • Dc Motors • Vibrotactile transducers • All industrialized today 	Refreshable Braille Vibrating Screen, unsuccessful yet Ultrasonic standing waves in glass for friction modulation (on-going)	<ul style="list-style-type: none"> • Laboratory demonstrations • Realisation of soft interfaces such as straps • Industrially unsuccessful yet 	Early Laboratory demonstrations.	<ul style="list-style-type: none"> • Rendering of shocks • Industrialized 	<ul style="list-style-type: none"> • In development • Development kits marketed • Few industrial prototypes 	<ul style="list-style-type: none"> • Used to attract skin to stick to glass • Development kit marketed • Few industrial prototypes
Mass Application	Commonly found in industrial applications : <ul style="list-style-type: none"> • Loudspeaker • Storage drives • Dc motors • Etc... 	Monomorphic disks in buzzers Bimorphs for larger displacements Tweeters	<ul style="list-style-type: none"> • None 	None	Commonly found in industrial applications : <ul style="list-style-type: none"> • Solenoids • Relays • Stepper motors • Etc... 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Light steering mirrors in arrays in projectors

COMPETITION SCAN

														
HD Haptics Ready	✓	✗	✗	✗	✓	✗	✗	✓	✓	✓	✗	✓	✗	✓
Integrated Platform (HW/SW)	✓	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Scalable Technology	✓	✓	✓	✗	✗	✓	✓	✗	✓	✓	✓	✓	✗	✗
Form Factor	✓	✓	✓	✗	✗	✓	✓	✗	✓	✗	✓	✗	✗	✓
IP	✓	✗	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗

Our proprietary hardware



Patent:

HFBA 9532 Actuator
Mid Sized Voice-Coil

Large Bandwidth

10 Hz – 20 kHz / Resonant @ 65Hz

Acceleration peak-to-peak

6g @ Resonant freq. on 100gr mass

Form Factor

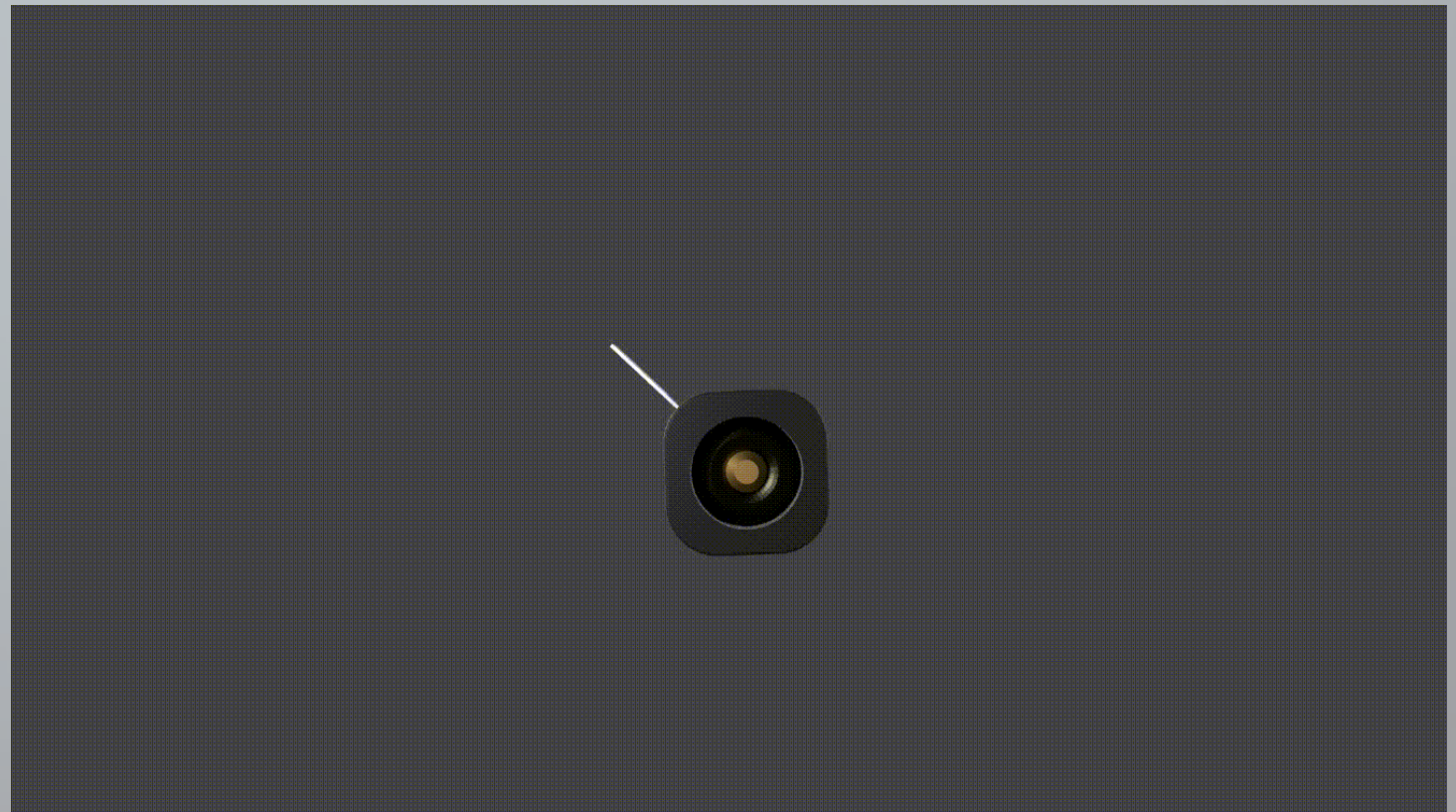
9,5mm x 9,5mm x 32 mm |

Scalability

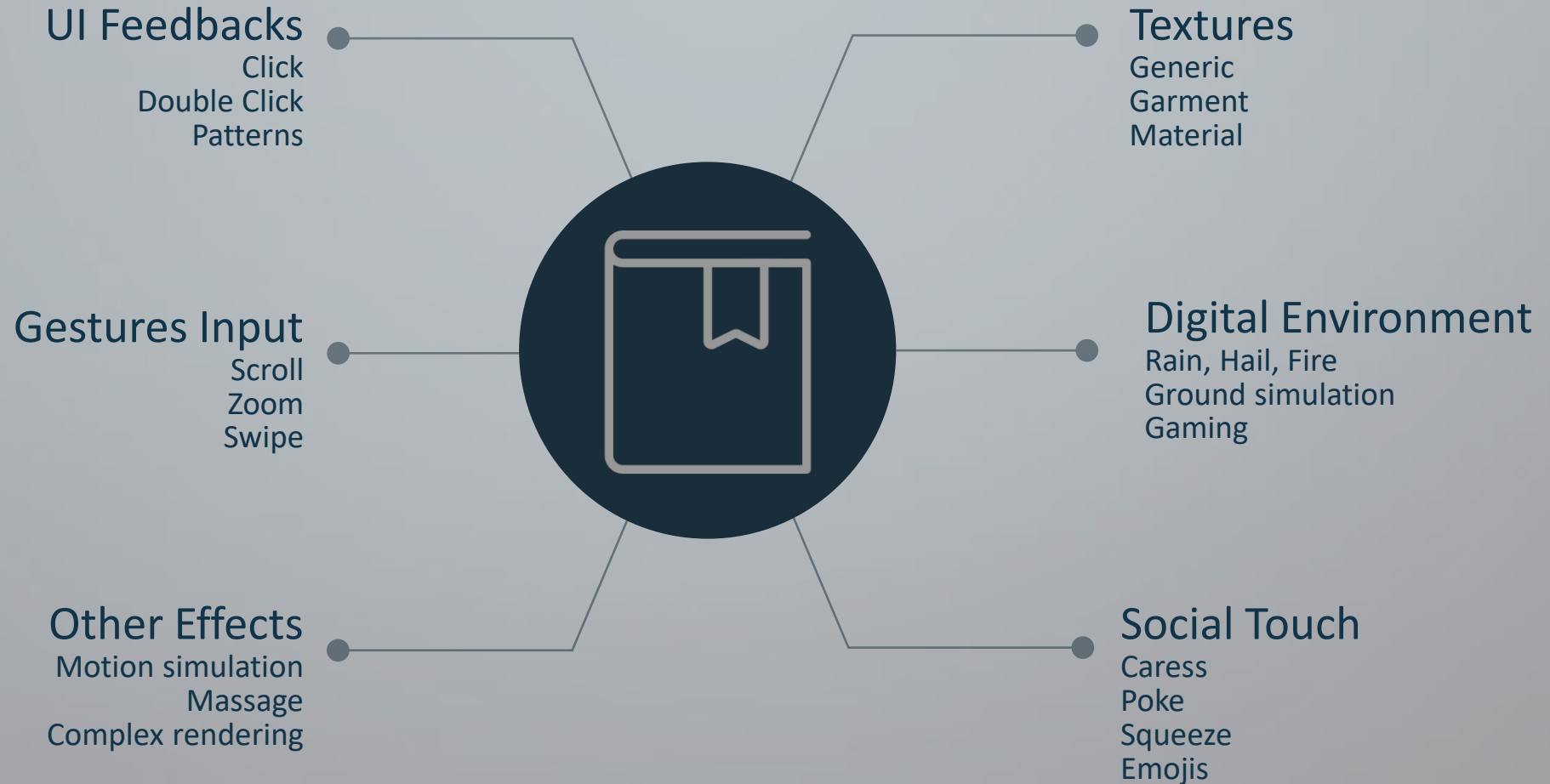
Voice-coil

Industrialization

100%



Creating effects is our main expertise



Innovation through Facilitated Integration



Hardware

Cutting-edge proprietary haptic Actuators, featuring an impressive bandwidth.



Firmware

Our embedded chips allow you to store effects and control the Actuators.



Software

Our Library of HD Haptic Effects is tailored, precise and true-to-life.



Research

Based on our CTO's 30 years of research, we are leading innovation in the field.

tactronik™

Integration

Our comprehensive Tactronik platform enable the incorporation of HD Haptics into any new device, no matter the level of technical complexity.





- Applications by Actronika

Company Purpose

Our mission

To improve safety in the automotive sector through intuitive human-machine interaction tools

Our company

- French hi-tech Company founded in 2014, funded in 2016, based in Paris
- Strong team of 15 members and a reputable advisory board
- Revenues for €0.6M in 2018 and a total of €2.4M in private funding to date
- Three patents filed covering the Tactronik® vibrotactile technology



Team



Gilles Meyer
CEO

Manager with 19+ years of experience as CEO or Director of more than 10 companies



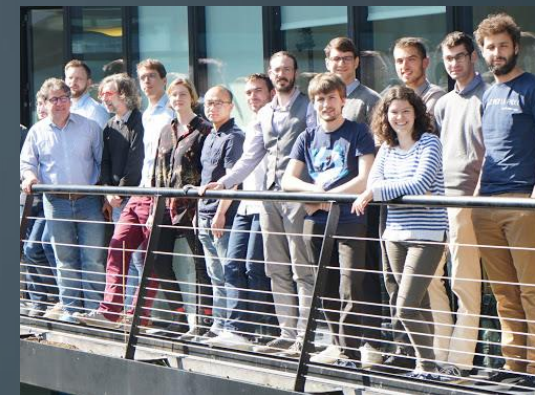
Rafal Pijewski
CTO

10+ years of experience in mechanical design, manufacturing processes and industrial standards



Vincent Hayward
Chief Scientific Officer

Professor of Intelligent Systems and Robotics. 30+ years of experience in haptics, tactile perception and technologies



Mechanical, Electronic and Marketing team

Team of 15 dedicated members, with expertise in embedded systems engineering, mechatronics, ergonomics and marketing strategy.

Financials partners





Steering Wheel
A.D.A.S.
Notifications
Intuitive UI interface

Car Door Panel
Window Panel HMI
Haptic Handle

Seats
A.D.A.S.
Massages
Haptic Bass for Music
Notifications

Tactile Screens
UI Feedback
Textures and zones
Confirmations effects

Car Control Center
UI Feedback

**actronik
Auto**

**UI
Feedback**

Textures

A.D.A.S

Gestures

Wellness

**1 SOFTWARE FOR
ALL USE CASES**

- Buttons
- Multi-Level Clicks
- Validations
- Alerts

- Generic textures
- Material textures
- Zone textures

- Emergency Brake
- Lane departure
- Dead angle
- Speed limits

- Swipe
- Zooms
- Rotation
- Scrolls

- Social
- Massage
- Notifications
- Drowsiness

Example: The haptic seat

Problem

- **30%** car accidents occur due to driver distraction
- Alert time of standard Advanced Driver-Assistive Systems (ADAS) is **too long (1s)** to generate an effective reaction
- Current ADASs emit **annoying sounds** and produce rudimentary, **unpleasant effects**. Many drivers disable these systems.
- **Only 2%** of vehicles on the roads currently have standard ADAS due to **poor efficiency and high prices**

The diagram illustrates the haptic seat system components and integration. It features a central code block with the following content:

```
#include <HD_Haptics.h>
//HD_Haptics
_User Interface
_Textures
_Dynamics
_Safety
_Wellness
```

Surrounding the code block are several key features:

- HD Haptic Platform with cutting-edge technology**: Represented by two cylindrical actuators.
- Highly customizable form factor and feeling**: Represented by two car seats with glowing haptic zones.
- Platform ready for ADAS integration**: Represented by a car seat with a glowing haptic zone.
- Easily integrated system is compatible with all devices**: Represented by a car seat with a glowing haptic zone.

At the bottom of the diagram, there is a photograph of a driver in a car, with the **tactronik** logo and the tagline **Bringing the user realistic haptic effects**.

Solution

Tactronik® is a unique ADAS platform integrated in car seats that makes drivers intuitively aware of unexpected hazardous driving conditions, thus reducing user reaction time and improving drivers' safety.

Tactronik®

Next generation technology
in road safety

Conclusion

Key takeaways

Reduces the risk of car accidents by 50-55%

Multi-billion market opportunity

Affordable solution for haptic technology in ADAS

Existing traction with key market players:

Novares, FCA, Daimler and Faurecia

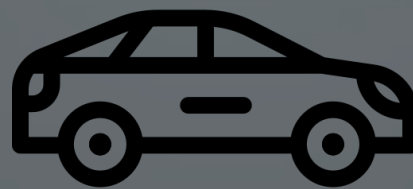


We keep in touch with trust at all development levels



LEVEL 0-1

Helps the driver **keep their eyes on the road**



LEVEL 2-3

Create a **strong feeling of trust** between the user and the car



LEVEL 4-5

Focus on user experience:
wellness, passenger entertainment

“To **avoid a feeling of fear** brought about by a lack of control, self-driving cars need to better communicate with passengers”

Gemma Wharton, Autonomous Vehicle Control engineer, Jaguar Land Rover

“By enhancing the HMI, automotive companies are able to create not only smarter and more streamlined interiors, but also a more **trustworthy** transition into autonomy”

Luke Edwards, About smart surfaces in the Automotive Interiors World, May 2019



- Open discussion

VISION/HEARING
AND NOW...

TOUCH





actronika

SENSE IT

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