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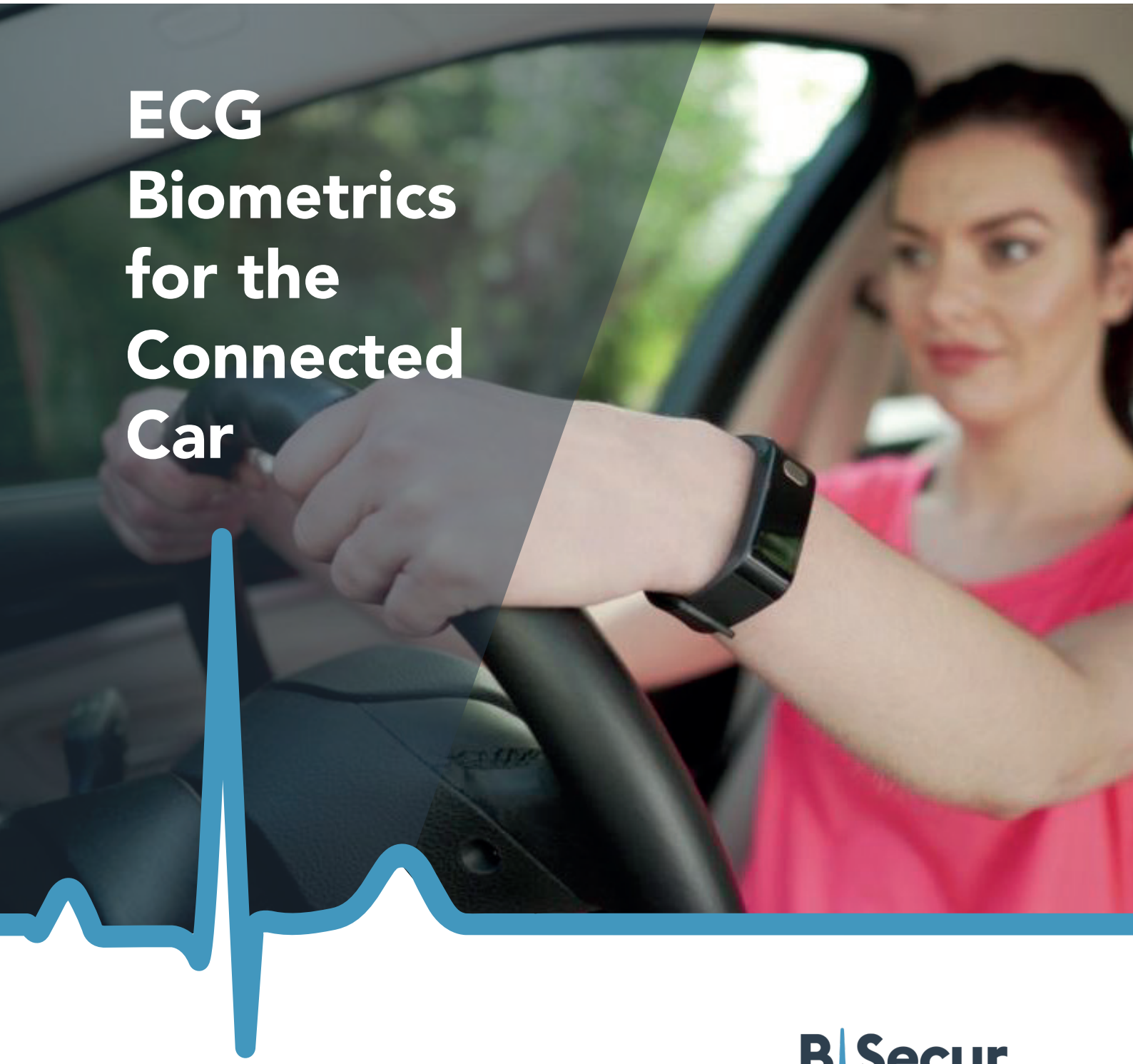
White Paper

ECG Biometrics for the Connected Car



BSecur

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This white paper from research and consulting company Goode Intelligence (GI) explores how ECG biometric technology can be leveraged by the automobile industry for a range of use cases that include identification, authentication and health, wellness and wellbeing.

Biometrics for the Connected Car

The First Wave of Consumer Biometrics – Smart Mobile Devices

The first wave of consumer biometric technology adoption has seen billions of smart mobile devices (SMDs) shipped with embedded biometric sensors – predominantly fingerprint sensors but an increasing number with other biometric modalities including Iris and hardware components that support 3D Face.

This biometric technology enables consumers to be quickly and securely identified and is enabling faster authentication for access to banking services and to support friction-less payments.

The Second Wave of Consumer Biometrics – Wearables and 'Things'

The second wave of adoption has begun with biometric technology being integrated into a wide range of devices. Wearable devices including rings, bands, clothes, smart watches and glasses are starting to appear with embedded biometric technology. Additionally we are witnessing biometrics integrated into the Internet of Things (IoT). Support from IoT for biometrics is either embedded into the 'thing' or supported through apps or APIs. One of the fastest growing consumer device types at the moment is smart home devices (SHDs). This includes Amazon's Echo where the Alexa voice recognition platform allows consumers to access digital services using voice commands.

Another important 'thing' that is evolving from a being dumb, unconnected transport mechanism, to a smart connected device on wheels is the automobile or car.

Goode Intelligence White Paper

GI's white papers offer analyst insight from research extracted from primary sources including surveys, analyst reports, interviews and conferences.

GI Definitions

SMD: Smart Mobile Device includes smartphones and tablets running popular mobile operating platforms such as Apple iOS and Google Android.

IoT: The Internet of Things is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these things to connect and exchange data.

SHD: Smart Home Device includes smart speakers, smart TVs, alarms, utility meters, smart locks and other home management systems that are connected to the internet.

Arm is a multinational semiconductor and software design company whose technology dominates the smart mobile device market. Increasingly we are seeing Arm-powered IoT devices.

ECG: An electrocardiogram (ECG) is a simple test that can be used to check a heart's rhythm and electrical activity. Sensors attached to the skin are used to detect the electrical signals produced by your heart each time it beats.

As biometric technology has proved itself for smart mobile devices and an increasing range of IoT devices, biometrics is beginning to be supported by cars. The ability for a connected car to accurately identify who you are has become a crucial function in the development of next-generation personal transportation systems. Biometrics not only provides a convenient way to identity a person but also enables automotive OEMs to accurately detect the health and wellbeing of both drivers and passengers alike. This is important with the development of autonomous vehicles supported by ride-sharing applications that need to know who is in the vehicle and how they are feeling.

For the connected car market, biometrics not only provides a convenient way to identity who you but enables automotive OEMs to accurately detect the health and wellbeing of both drivers and passengers alike.

The ability to support a range of connected car applications means that some biometric modalities are better suited for in-car integration and Goode Intelligence's research[1] has identified heartbeat (ECG) as a strong contender for being integrated by auto OEMs inside the car. As biometric technology moves beyond authentication, biometric modalities that can support multiple use cases and applications, such as heartbeat, will become more attractive than a single use modality such as fingerprint.

1 - Biometrics for the Connected Car – Automotive Biometrics Market Analysis and Forecasts 2018-2023. Published by Goode Intelligence November 2017. https://www.goodeintelligence.com/report/biometrics-for-the-connected-car-automotive-biometrics-market-analysis-forecasts-2018-2023/

Analyst Viewpoint

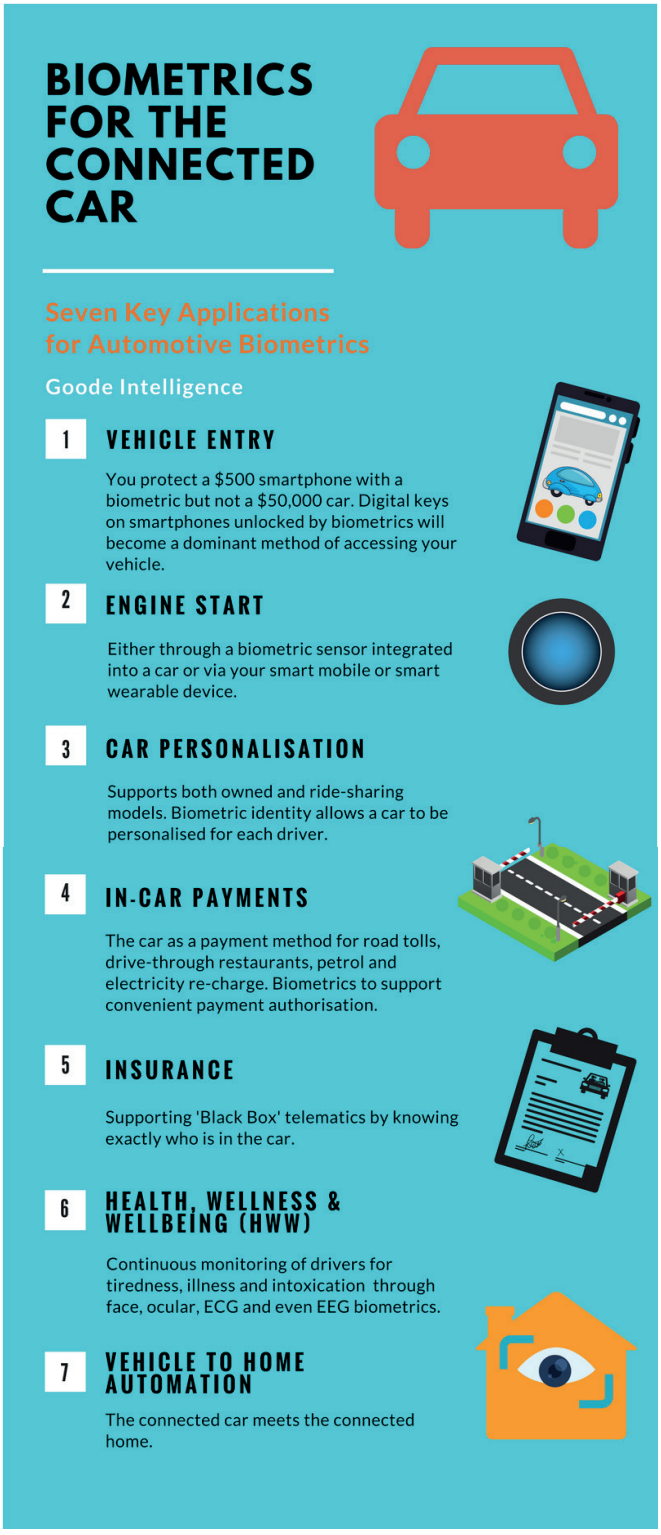
This is still an industry at the beginning of its lifecycle and there are many different options and scenarios that could play out. What is very clear is that biometrics for the connected car is not just about identity and authentication. Many of the applications and use cases that Goode Intelligence has identified are not identity related and as biometrics starts to be integrated in increasing numbers, other disruptive applications will consequently be revealed.

Goode Intelligence believes that the biometrics market for the connected car has significant value, particularly from 2021 onwards and we forecast that by 2023 the market will be valued at just under one billion dollars at $969 million.

The revenue will be aided by nearly 39 million biometrically-enabled cars rolling off production lines around the world during 2023 – over 37 percent of cars produced.

Goode Intelligence's research into biometrics for the automobile industry has identified seven key use cases and applications that biometrics can enable – many of them outside of the traditional identity and authentication ones.

These seven use cases are detailed in the infographic on the right hand side of this page.



Infographic information taken from the Goode Intelligence analyst report Biometrics for the Connected Car - Automotive Biometrics Market Analysis & Forecasts 2018-2023.

The Drowsy Driving Problem

Drowsy driving is the dangerous combination of driving and sleepiness and fatigue and can be related to alcohol consumption.

In the US, an estimated one in 25 adult drivers (aged 18 years or older) report having fallen asleep whilst driving[2] and The National Highway Traffic Safety Administration estimates that drowsy driving was responsible for 72,000 crashes, 44,000 injuries and 800 deaths in 2013.[3]

ECG Biometrics – The Definitive Biometric Technology for Auto

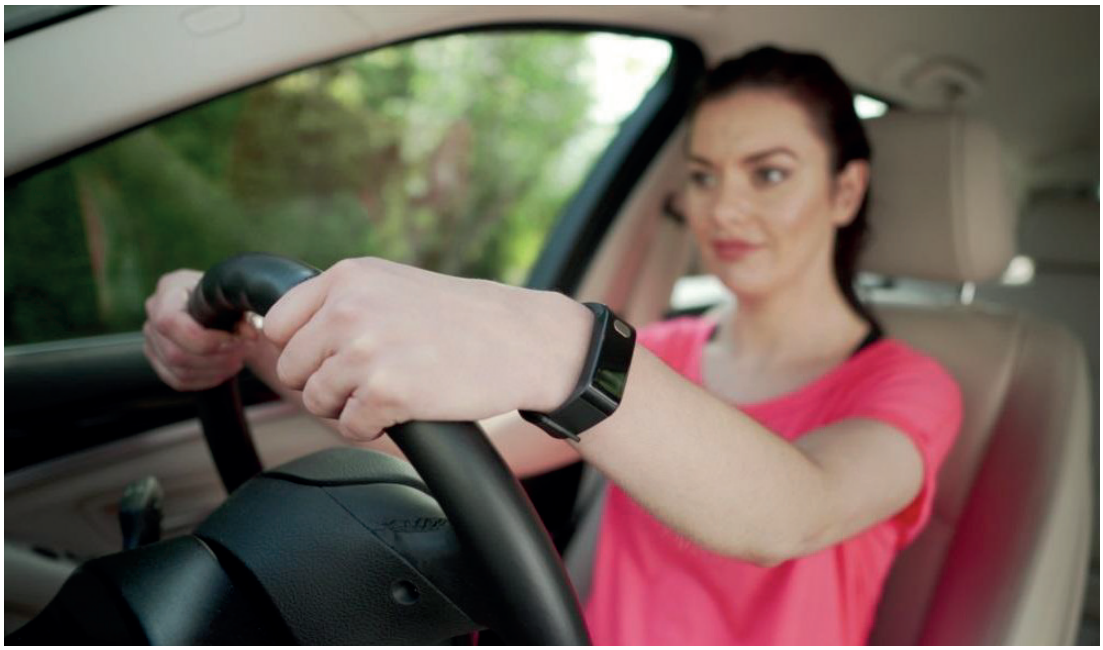
ECG biometric technology is an ideal modality for auto as it supports multiple use cases and applications. The heartrate biometric also offers flexibility for auto OEMs in terms of how it is deployed, ranging from being used on a wearable device for car access control to being embedded into a car's steering wheel to support identification and health, wellness and wellbeing (HWW) applications.

ECG biometric technology can be used with any conductive material which means that it can be wrapped around a car's steering wheel to gather ECG data from the car.

Its applicability for auto HWW is that ECG is currently a medical technology used in monitoring the heart. This medical application would make it ideal in monitoring the cardio-health of a driver – in addition to supporting all of the applications referenced in the infographic including detecting drowsy or inattentive drivers.

2 - Wheaton AG, Shults RA, Chapman DP, Ford ES, Croft JB. Drowsy driving and risk behaviors—10 states and Puerto Rico, 2011-2012

3 - Tefft BC, AAA Foundation for Traffic Safety. Prevalence of Motor Vehicle Crashes Involving Drowsy Drivers, United States, 2009 – 2013



Introducing B-Secur

Enhancing Driver Safety

Working with a number of semi-conductor and automotive companies, the company has integrated small but powerful ECG sensors into a steering wheel to unearth vital health and wellness data.

The ECG signal is collected from the driver via electrodes on the steering wheel itself. The signal is then captured via an ECG Analogue Front End (AFE).

A high performance AFE is recommended for ECG analysis due to the small signal amplitude at the hands. Typically, the voltages seen are around 0.5 to 2 mV.

The AFE amplifies the signal and filters out noise to isolate the relevant information, at which point the signal is digitised and passed to B-Secur's ECG biometric algorithms.

At this point, key health and wellness indicators can be determined, including:

- Drowsiness
- Heart rate
- Stress
- Cardiac insights

B-Secur is an ECG biometric vendor from the UK that is already making inroads into enhancing driver security and safety, using ECG data.

Personalising the In-Car Experience

B-Secur is also exploring the opportunity to personalise the driving experience, using the same technology.

The experience could begin with unlocking the vehicle with a smartphone or wearable device, negating the need for a key.

Once in, the engine is started using biometric sensors located on the steering wheel.

These sensors load the user's personal profile into the vehicle, adjusting the environment to their preference and connecting their devices.

By authenticating and identifying the user, this can enable the vehicle itself to become a payment device, facilitating faster payments through fuel courts, drive-throughs and toll gates.

SUMMARY AND CONCLUSIONS

The first wave of biometric adoption has seen billions of consumers benefit from convenient identification and authentication allowing them to protect expensive smart mobile devices and to access digital services.

We are witnessing the second wave of biometric adoption where new biometric modalities, such as heartbeat (ECG), are providing device OEMs and service providers with technology that supports multiple applications and use cases.

IoT and auto OEMs are turning to heartbeat biometric technology to support a range of applications including secure vehicle access control, in-car identification to start the vehicle and access personalised services, enabling in-car payments and providing medical feedback to prevent accidents. Supporting all of these use cases cannot be singularly achieved through non-heartbeat biometric modalities.

About Goode Intelligence

Since being founded by Alan Goode in 2007, Goode Intelligence has built up a strong reputation for providing quality research and consulting services for the Cyber Security industry including biometrics.

We publish analyst and market intelligence reports, custom technology-driven market research and act as trusted advisors to our clients.

For more information on this or any other research please visit goodeintelligence.com.

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