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Excessive Data Collection in the Automotive Industry: A Volkswagen Group Case Study

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Modern cars no longer simply move people from place to place. They are no longer just a toy to tinker with and appreciate as a hobby. Modern cars observe, record, transmit, reason, and remember. As a software integration engineer working in the automotive industry, I have watched vehicles evolve into fully networked computing platforms. This transformation brings innovation and convenience, but it also raises a difficult question: when a car knows this much about its driver, who truly controls that knowledge?

Despite its immense, quantum computing faces significant challenges.

Background: How did we get here? And what exactly is data collection?

Before large-scale data collection became standard practice, the concept was introduced as a safety and quality improvement effort. Manufacturers promised better products in exchange for customers' voluntary positive and negative feedback. In the early 2000s, the driving experience varied dramatically depending on the class of car purchased

I drove a 2001 Ford Mustang GT with a manual transmission and just enough computing power to measure its current speed—and little else. It was thrilling to drive, but far from safe or refined. The car could spin out unexpectedly, burn fuel inefficiently, and relied on airbags that were little more than explosive pillows, only marginally less dangerous than the wall you had just hit.

To the customer, the vehicle was simple: an engine, wheels, a steering wheel, and a few calculators. When something went wrong, it was relatively easy to understand the issue and provide feedback or seek repairs.

By contrast, a Mercedes S-Class of the same era featured radar-guided cruise control, long-distance phone capability, and advanced braking systems that calculated precise pressure at each caliper to prevent sliding on icy roads. It felt like witchcraft. It was so capable and refined that it actively helped the driver be safer and more competent. The tradeoff was complexity. When something failed, only the people who built the system truly understood how to fix it.

Market demand eventually pushed advanced safety technologies from luxury sedans down into more accessible vehicles like the Mustang. Over time, millions of cars were built, driven, repaired, and refined. By the late 2010s, most OEMs had largely optimized safety, emissions, efficiency, and quality. Innovation through customer feedback and incremental improvement had worked remarkably well.

social implications. Its power to crack encryption algorithms raises concerns about data security and privacy. Additionally, the potential.

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This is where the modern problem begins

Today, nearly every car on the road resembles an overclocked S-Class. Electronic control units manage virtually every function, sometimes down to the glove compartment. Diagnosing or repairing many issues now requires either a degree in computer engineering or access to dealer-only tools that can cost tens of thousands of dollars

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As manual customer feedback became less useful, OEMs shifted their focus from helping the driver operate better to making the car operate itself. To enable this shift, manufacturers embedded algorithms, AI systems, and telematics devices designed to autonomously collect vast amounts of data.

Depending on the manufacturer and feature set, modern vehicles may collect names, addresses, driving habits, routines, paired devices, voice interactions, biometric identifiers, network information,

and high-resolution video. The scope of this collection often far exceeds what most consumers realize. The data is frequently shared with companies and partners they have never heard of.

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How Much Data Does a Car Really Need

The short answer is: a lot, but not nearly as much as drivers are often led to believe.

Modern vehicles rely almost entirely on data packets transmitted over internal networks. Mechanical systems have largely been replaced by electronic ones. Even reclining a seat involves streams of digital signals. The drivetrain alone depends on constant communication between dozens of ECUs and hundreds of sensors.

However, there is a critical distinction to make. Nearly all of this operational data exists entirely within the vehicle. It does not require transmission to external cloud services in order for the car to function safely or effectively. In many cases, external data transmission can be limited or disabled while preserving full driving functionality. The tradeoff is usually convenience in the form of remote control apps, live updates, or cloud-based features.

From an engineering standpoint, there is a clear line between essential diagnostic data and expansive behavioral tracking.

Consumers are rarely shown where that line is drawn. Instead, data collection is framed as a technical necessity, even when much of it serves analytics, optimization, or commercial interests rather than vehicle operation.

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Can Consent Exist When Opting Out Is Not an Option?

Privacy policies often emphasize user consent, but consent loses meaning when declining becomes impractical. On many Volkswagen Group vehicles, users must accept connected services agreements to retain navigation, remote access, or core infotainment features. When essential functionality depends on agreement, the relationship shifts from choice to compliance. Drivers may technically consent, but few would argue that such consent is fully informed or freely given. OEMs rely on the fact that they are not explicitly forcing agreement. Instead, they operate on the assumption that most consumers will accept the terms because the alternative is to forgo modern vehicle features or avoid purchasing a new car altogether.

What Happens to the Data Once It Leaves the Vehicle?

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e future of computing and drive scientific progress. Quantum computing, once the realm of theoretical speculation, is now a reality. This technology has the potential to tackle previously unsolvable problems, poised to

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