LINKMOTION “CARBRAIN” INTEGRATING AI & BLOCKCHAIN IN THE CARPUTER

Next generation carputer

With the growing mobility dynamics and regulation requirements, there is a need for a carputer that manages, secures and ensures the future transactions that each of the car makers desire to deliver to their consumers.. Linkmotion’s carputer aims to be the enabling platform for car makers trying to adopt and revolutionize their forward-thinking goals and stay connected, secured, cloud managed and mobility protected. The development of the carputer to the “CarBrain” will support the integration of AI and Blockchain applications and technology architecture.

Next Gen Smart Car Platform

link motion

Introduction to this document

The focus of this paper is to discuss how the software-designed cars integrate and utilize AI and blockchain and why it's very significant for us at Link Motion. The most robost way to incorporate these attributes and intelligence into cars is within the Carputer and this document serves a crucial role to elaborating this message to our customers throughout the automotive landscape.

AI plays a significant role in bringing cross platforms in Automotive ecosystem together. It allows the OEM and end customers with skills and services to be managed and executed. AI performs several key steps and helps to manage the entire business cycle both in manned and autonomous vehicles.

Blockchain plays a crucial role in fulfilling the various needs of marketplace transactions with a supremely secured ledger and management across the car life, manufacturing, sales and mobility dynamics.

There is a demand for cars to become safer, more comfortable and easier to use, even though complexity is rapidly rising. Technology helps to achieve this goal. Linkmotion's carputer brings these aspects together in a way that enables the car makers and manufacturers to deliver great products to their customers. The CarBrain will further this goal by supporting the integration of AI and Blockchain applications and technology architecture.

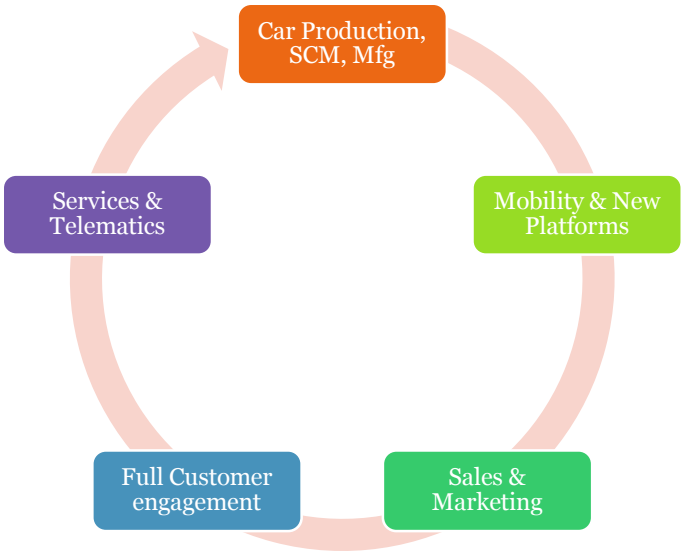
Transportation is becoming increasingly intelligent to become more efficient. Better efficiency makes transportation a more critical part of the overall city and economic infrastructure. This makes the technology solutions very important for an efficient and secure operation of overall transportation within cities and economies. Introduction of new technologies will make it easier to manage new-age transportation infrastructure and improve systems over time.

Background on AI

Usage of AI has exploded in various IT industries creating both solutions to historic problems as well as creating solutions and problems in the present and future. This dynamic will become more significant in the future.

In the past, present and future, the gaming world has experienced tremendous advancements and many players like Nvidia, Intel and next-gen startups are making use of these experiences to develop the next-gen in Automotive needs. These solutions range from simple personal assistant skills all the way to the most sophisticated and fully autonomous capabilities.

AI has been successfully used to implement completely new kinds of applications and re-implement existing problems to achieve better / simpler alternatives.



AI in Mobility Services

TAAS- Transportation as a Service

Fleet Optimizations and Car management, Telematics

AI in Voice assistants and customer engagements.

Car Cognition

V2V, V2I and B2V communications

Figure 1 Usage of AI throughout the cycle in automotive

AI technology has been under tremendous development and there is constant innovation happening in the area. The automobile industry has also caught up with various AI-based development culiminating in the major application of a fully autonomous and self-driving car. AI development is also creating a myriad of other applications such as driver guidance, vehicle control automatization and increasing driver / passenger comfort with a personal assistant.

Challenge: How to develop a successful vehicle software ecosystem?

In-vehicle telematics & telemetry services OBD-II based dongles / smartphones have been winning over integrated systems, even though the latter is technically more sound and the former one often less secure. Why has that happened?

- Time-to-market and market access
- OEM is vehicle expert, but there might be others who know more about target application

The tide is turning however and more and more services are being integrated into the vehicle. Integrated solutions are more robust, secure and easier to use. However, the cost is often higher and the time to enter markets has been significantly longer. For example, the vehicle industry has managed to win over the use case, but how long it can continue before more agile approaches out run it?

Vehicle manufacturers have many advantages compared to aftermarket options that make integrated applications technically more attractive:

- Access to all data in car, compared to smaller set of data available through OBD-II port
- Integration into vehicle embedded system enabling always on operation and power management
- Integration into vehicle control systems instead of separate device

So far, vehicle manufacturers haven't been willing to open access to embedded systems. This is due to competition factors, safety aspects and security concerns. However, opening access would enable benefits for the ecosystem for vehicle-based applications:

- Embrace software intensive approach, make it possible to write SW for vehicle. Replace applications used in external devices and provide better alternatives for integrated ones. It can be done internally, within limited partner ecosystem or in public.
- Move focus from intelligent centralized service to intelligent agents in vehicles allowing more feature-rich scenarios
- Open up vehicles for competition in software space

What is preventing this?

- Security issues leading to possible liabilities -> create protected "container" for execution of SW components, that allows hybrid ecosystems
- Not possible to ensure deterministic behavior of vehicle -> Ensure deterministic characteristics of vehicle in case of AI, "API" management, examples exist such as W3C / Genivi
- Fear of platformization in vehicles leading to duopoly seen in mobile devices

Figure 2 Airconnect with IBM Watson cognitive services (source: IBM Watson blog)

Part of the strength of AI lies in acknowledging that it may provide unexpected results sometimes and this is accepted by the creators and users of the applications. This is orthogonal to traditional safety critical systems development which starts fully deterministic control of the system to be able to verify the system behavior in every possible situation.

There are a couple of options in how to manage the integration going forward:

- It is possible to build such deterministic behavior into the AI processor, like Nvidia has done.
- An other approach would be to add a deterministic layer in-between that would ensure the safety of the vehicle.
- AI could be also be completely separated from such safety critical systems

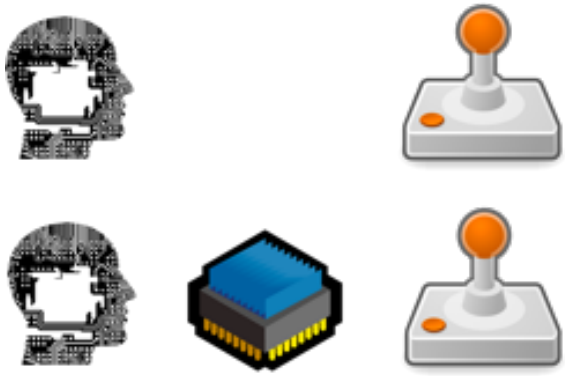


Figure 4 Integration of AI with controller vs with deterministic layer[redraw picture]

Building such critical software components is in any case a significantly challenging task that requires deep understanding of software engineering. However, separating the AI with a controlled layer could bring benefits and it might be the only viable approach to realize complex AI-based applications in cyber-physical systems.

Applications for consumers appear to be mostly coming from an IT domain or vehicle domain, however, some examples of hybrids do exist. Applications from each direction have specific advantages. Applications are of a completely new kind, which combine real-world objects with cyber domain information management.

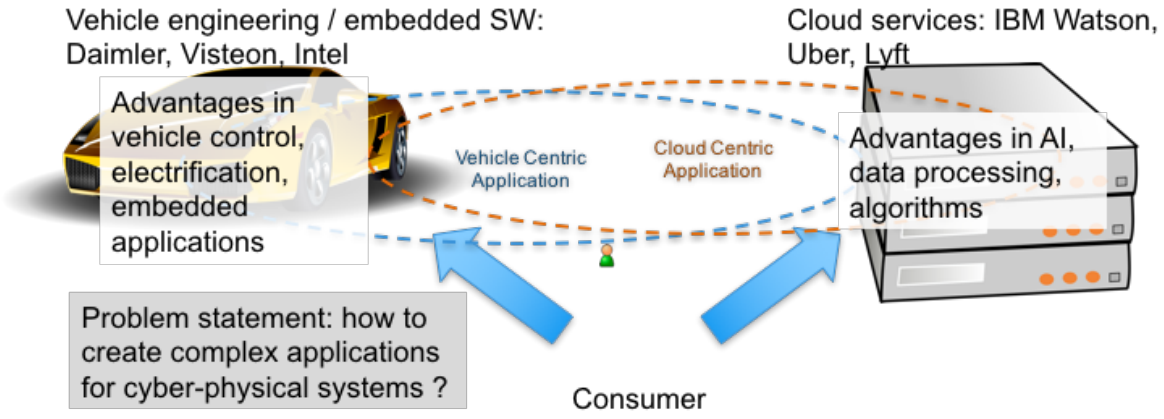


Figure 5 How to create complex applications for cyber-physical systems ?

IT domain-based services are big in information processing and agility of companies. Introduction of AI & blockchain have widened this gap as it allows more rapid development of applications while being deployed. IT domain companies are pushing towards expanding their domain into the vehicle engineering by pushing software platforms to be incorporated into vehicles. Examples: Android Auto, Apple Carplay, MS Azure Edge. Disadvantages of IT domain based services are centralized characteristics and exposure to complex real-life objects, such as cars. Integration of complex IoT devices is something that is only starting to take off in the industry.

Vehicle domain-based services' strengths lie in the precise control of vehicles with an ability to access all information related to the vehicle. Development of embedded computing platforms has made it possible to implement more and more sophisticated applications within an embedded domain, that can control vehicles with better precision. Vehicle originating services are pushing towards cloud-based approaches by implementing their own services, which is often slow and lacking behind 'IT native' companies. Technologies used in cloud oriented applications, such as AI and Block chain are being adopted to vehicle-based systems as well. Disadvantages of vehicle domain-based services are long development timeframes and transaction-type business / development models.

Obviously the winner of the ultimate race will be the party which makes the best applications in the shortest time frame with the most security. There are notable similarities between cars and other IoT devices. There are already platforms for IoT development, that are backed by carmakers and applicable to both. One example of such is Eclipse foundation based ecosystem, which allows engineering of IoT applications both in embedded device and cloud, creating a 'full stack' environment for such connected services.

Current issues include:

- Security issues leading to possible liabilities -> create protected “container” for execution of SW components
- Not possible to ensure deterministic behavior of vehicle -> Ensure deterministic characteristics of vehicle in case of AI, “API” management, examples exist such as W3C / Genivi
- Fear of platformization of vehicles leading to duopoly seen in mobile devices

AI features and evolution

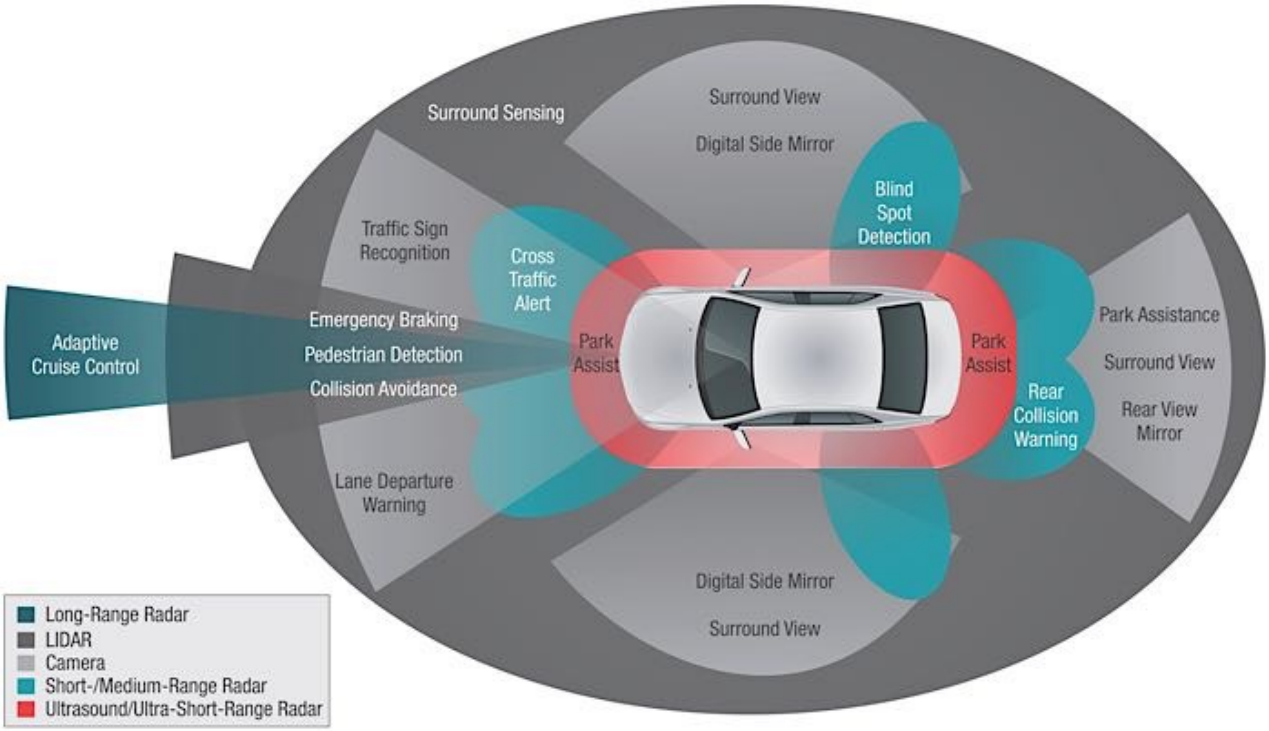


Figure 6 Management of sensors in scope of AI

AI is a powerful tool for many new features. There are few areas, in which AI-based implementations are starting to emerge as de facto standards, as well as some areas where AI-based designs have turned out to be more efficient. New areas are

emerging as well, thus an important feature of any automotive software platform in the future is its ability to adapt into a variety of AI technologies.

Few highlighted areas include:

- AI based assistants, which provide easy to use user interface and automatize tasks
- Driver assistance systems, which may focus on augmentation of various sensor information or getting a better understanding of traffic situations
- Automatization of previously manual tasks, with a self-driving car as the ultimate goal
- Added intelligence in traffic management allowing more efficient usage of resources such as road space, time and safety
- In addition AI has a growing role within applications, such as navigation, entertainment etc.

AI based assistants:

Apple Siri was instrumental in the introduction of personal assistants. Many companies have followed since. There are general purpose options being offered by IT companies, such as Amazon Alexa and Microsoft Cortana. OEMs have also announced entering the race with their own assistants. There are also new cross-vendor automotive focused assistants, such as Third Space Auto.

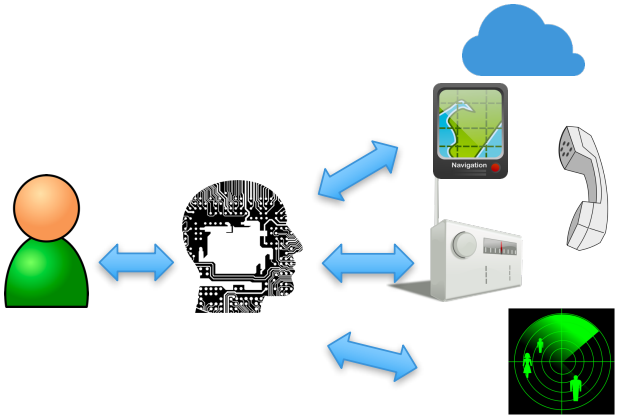


Figure 7 AI assistant interface for using car features

Automotive is an aspired target for AI based assistants because:

- When driving vehicle voice interface is more desirable due to limited ability to use other interfaces and safety requirements

- Automotive environment is challenging due to high traffic workload in certain situations and plenty of time to focus on infotainment compared to some other situations
- The car is often a personal companion for the owner, much like a smartphone

For companies focusing on the automotive sector, there are plenty of options for implementing AI based assistants.

- General purpose assistants have the benefit of easier integration with a variety of services
- Automotive focused assistants have the benefit of more tailoring into the automotive sector
- Embedding assistant technology into selected applications

Implementing an owned assistant is still a viable option, which allows full customization into the target environment by the automative makers.

This is in turn managed by the Carputer's intelligence and security layer performing all of the above ADAS functions through an AI command central or activated driver assistance.

Add voice enablement AI to any skill or set of skills

1. Virtual assistance – Music and Nav
2. Speech recognition
3. CMD- Customized commands
4. Customized trigger phrase
5. Speech to meaning
6. Conversational intelligence

This allows the following;

Create a custom domain model for each of your car brands

Create custom recognition models for music, acoustics conditions and noise management

Create custom trigger phrase based on the card brand or choose from selection of branding and marketing guidelines.

AI based driver guidance systems

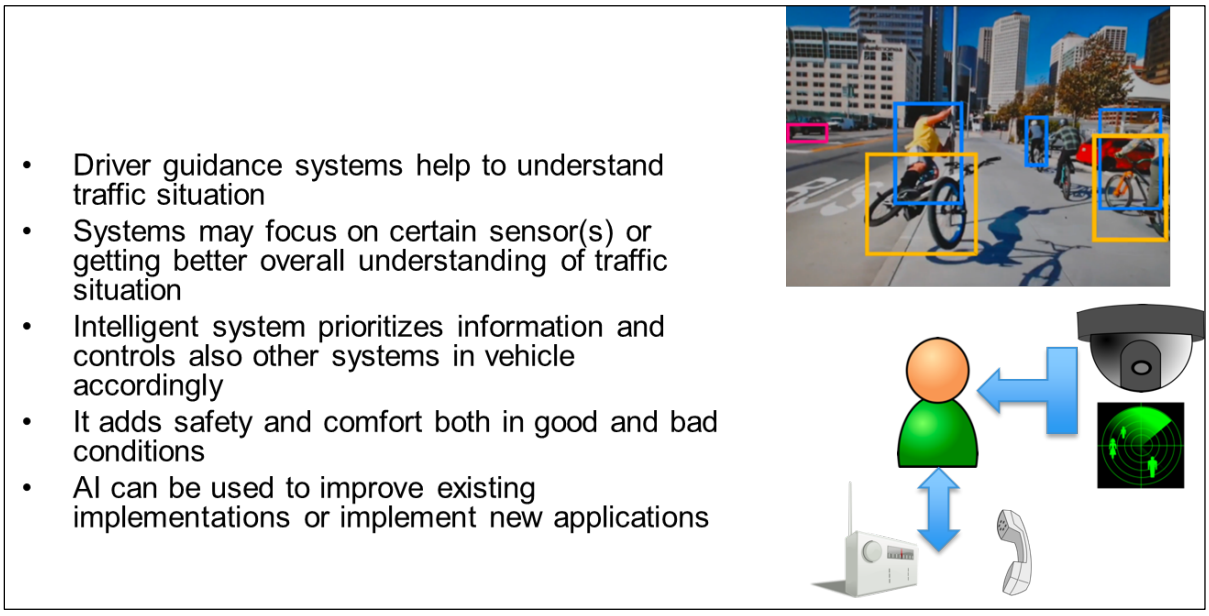


Figure 8 Driver guidance systems

Driver guidance systems help to understand traffic situations. The systems typically augment information it gathers from the environment and then presents this to the driver. More advanced systems combine information from multiple inputs. These other inputs may include other sensors, information from other networks, other connected vehicles or some combination.

Most advanced systems may also prioritize information presented to the driver. Prioritization has a potential pitfall that most important information is not presented, because a system may not have as good of judgement of the situation as a human driver. In such cases a deterministic layer on top of AI based system helps. Prioritization and a combination of information can also be seen as a user interface design of highly complex guidance systems.

In most complex guidance systems the information given to the driver is vast exceeds an amount that can be processed correctly and thus limiting, combining and prioritization is a must, or otherwise there is a risk that the system is too distracting. Prioritization may also tailor the information based on a driver's profile and alertness. Information and the quantity of simultaneously shown information can be tailored to look different for old or young drivers. If a driver is tired, notification workload can be more focused.

Driver guidance systems improve driving comfort and safety both in good and bad environments. In good environments driver workload is made easier and thus saving attention to complex scenarios. In bad environments, the augmentation can show information otherwise non-observable to the driver.

Guidance systems can be implemented with AI or with traditional methods. Often AI based approaches is more efficient and more adaptable. Traditional approaches may provide more deterministic and accurate information of the data. Driver guidance may work on raw sensor data, requiring lots of processing power, or pre-processed data, which can be processed in an environment with less processing power.

Increasing Automation in vehicles using AI

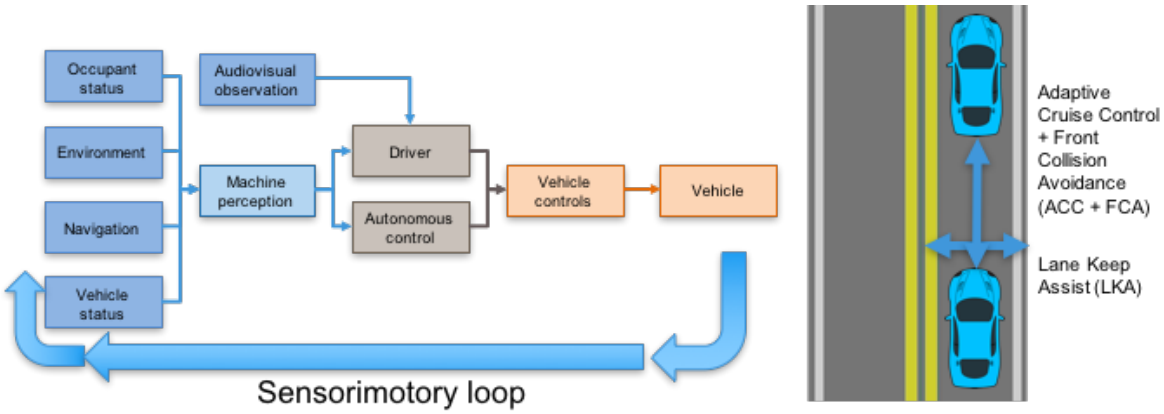


Figure 9 Automatization of driving tasks with AI

Automatization today is of longitudinal control in the form of cruise control is a norm, and latitudinal control is becoming more common. For example even

Vehicle accessories in the exterior that support any form of assistance can also be automated.

AI has a big role in making automatization happen. The use of AI is critical here since many of the control functions are safety critical therefore there needs to be enough determinism in the system to ensure proper control of the vehicle in all situations, with managed driver intervention from time to time. AI helps in building this already measured and used data or new data gathered through machine learning.

AI: Traffic management systems

AI has a big potential in making traffic more efficient. Different people in traffic have different goals, which includes optimization of cost, time and comfort. AI can be used both within vehicles to optimize individual vehicle behavior and to steer entire systems for more efficient usage. Navigation applications are already optimizing individual vehicle behavior. Uber is using cost of individual rides to balance demand over longer periods of time.

Figure 10 AI based management of traffic

Areas:

- More efficient usage of fleets
- Management of traffic flows to improve efficiency of scarce resources (energy, roads, space in cars)
- Use data to manage systems

AI has the potential to improve user experience in traffic notably.

Blockchain in the Automotive Sector

Blockchain - Transaction Management and Revolutionalizing the Auto Marketplace

Yes, the next horizon for Automotive is already shaping up in Autonomous vehicles and Blockchain-backed automotive infrastructure.

A perfect example here is Tesla, in the United States of America, if you would like to buy a Tesla, you simply send an email, web request or make a call for a test drive of a model that you wish to buy. The car arrives at your door step and you check all software features and cost plans.

You go back to the online order form, fill in all the details and after the transaction is complete, you get your custom-made Tesla car model and color in 3-4 weeks or in 2 months based on the booking slot or waiting time (or longer if waiting for a new model!).

This format has simplified the complete buyer experience in certain luxury segments, however, in the larger scale sales methods for the medium or full-size cars, you require several financial, taxes and payment clearances that can hold up or make a car buying and ordering process undesirable.

This is where blockchain comes to the rescue with legitimate transaction ledger or payments management with all the tax and financial resources.

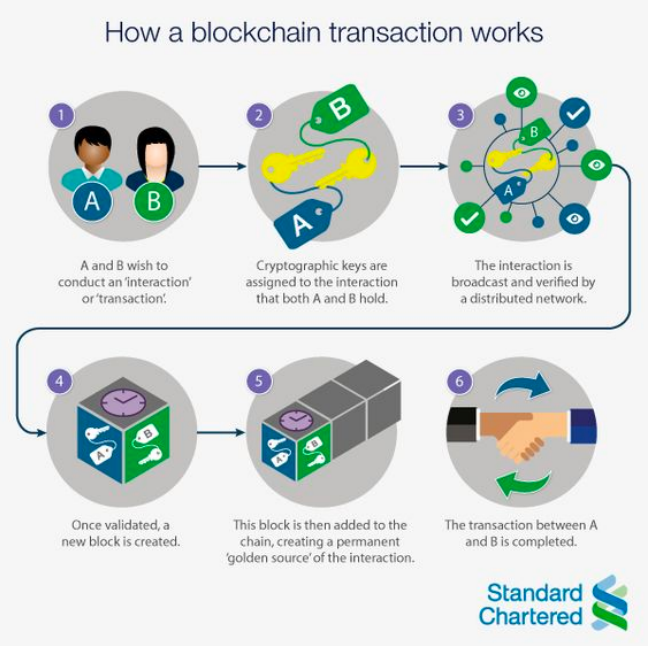


Figure 11 Blockchain transaction (too basic, remove ?)

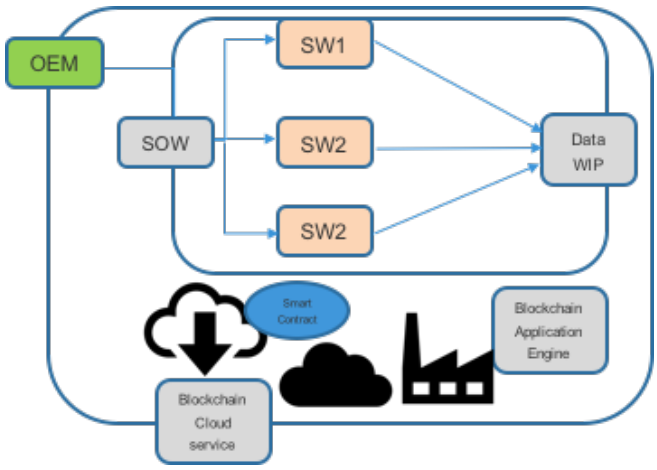


Figure 12 Block chain based contract

Blockchain in the Automoative Technology and Software Ecosystem

Blockchain in the Automotive manufacturing or software engineering ecosystem can further be explained.

A blockchain digital ledger allows the following;
Multiparty work of software engineering in process
Engineering change requests captured or managed
Flexibility by all engineers to commit to data decisions on blockchain

Blockchain allows:

Trust and management of all software engineering
Verification and quality standard in software engineering delivery

Since automotive software deals often with physical world objects with significant value, there is often valuable assets and/or money involved in many use cases. When dealing with such objects, it is important that two actors in the system can trust each other. Trust is being achieved by an ability to quickly verify identity in a reliable manner. Privacy is often an issue, it should not be possible to track users by following their transactions, yet it must be possible to prove those when needed. Blockchain solves both of these problems.

It is different from a traditional public-key infrastructure in the following ways:

- In blockchain, the verification is based on a distributed set of ledgers, which using the mathematical code, verify every transaction. Users in the system may use any of the ledgers to verify transactions. It is used instead of centralized CA.
- Distributed network of ledgers is redundant instead of a centralized system
- Ownership of the target object is identified by alternating a public key, which means that transactions can be anonymous, yet provable

Application	Conventional Methods	Advantages introduced by BC
WRSU	• Centralized – not scalable • Partial participation: not addressing the full chain starting from a SP all the way to a service center • Lack of privacy: a direct link between the vehicle and OEM can compromise the driver's privacy (e.g., driver behavior or location) • Only OEM can verify communications or history of update downloads.	• Distributed data exchange and security provides scalability • End-to-end: involving SP, OEMs, vehicles, service centers, assembly lines, etc. • Ensure privacy of the user (also for diagnostics) • Update history as well as authenticity of the SW can be publicly verified
Insurance	• Current systems are often insecure, which endangers the vehicle's integrity [10] • Users lack control over the exchanged data • Privacy-sensitive data must be continuously sent to the insurance company for receiving services	• Secure, distributed, and privacy-preserving data exchange • Users control the exchanged data • Privacy-sensitive data is shared on demand (e.g., accident happened) instead of a continuous data exchange. Authenticity of data stored in the vehicle can be publicly confirmed
Electric vehicles	• Central payment and accounting • The location and behavior (e.g., using a specific charger on a specific day) of the user can be tracked.	• Private and distributed security, payments and accounting • User data such as location information remain private
Car-sharing services	• Central payment and accounting • Users can be tracked by their identity • Central authorization	• Private and distributed security, payments and accounting • Users use changeable identities • Distributed authorization

Figure 14 Comparison of block chain based approach and conventional approach for selected use cases. Source: Dorri et al. / IEEE

Issues where real-time trust is needed in automotive, yet it should not be possible to track the vehicle:

- EV charging. In a charging scenario it must be possible to verify the payment
- Traffic advisory. In V2V communication it must be possible to verify the origin
- Car sharing. It must be possible to verify payment and fueling / charging of the vehicle
- Usage based insurance. It must be possible to record driving history and prove only when needed

OEM's are looking at managing a basket of the following (all optimized if blockchain is utilized);

1. High sense of security across all transactions is the OEMs primary goal.
2. Apps and services across marketplaces and making secured payments to these services offered by OEMs
3. People-centric services and payments managed in the same market place.
4. All OEM-side payments for life of the car use and services are managed securely through blockchain

5. Car transfer or sale or mobility sharing under blockchain.

- The AI in the automotive sector can bring revolutionary benefits in autonomous vehicle and this in turn becomes a huge business disruptor that will change not only the ownership patterns of vehicles but also redefine how the OEMs bring cars to customers. This is redefining the customer for automakers.
- What happens now will be a tectonic shift in the automotive industry, this shift raises business model questions of whether the future will be a shared economy with ownership switching from consumers to a fleet or will this commoditize the automakers and thus forever disrupt their place.
- This is where blockchain plays a crucial role. The ecosystem that blockchain brings to the Automotive table is significant and provides a new path to thrive in the futuristic value chain. This will have a deep impact and completely change the value chain forever.

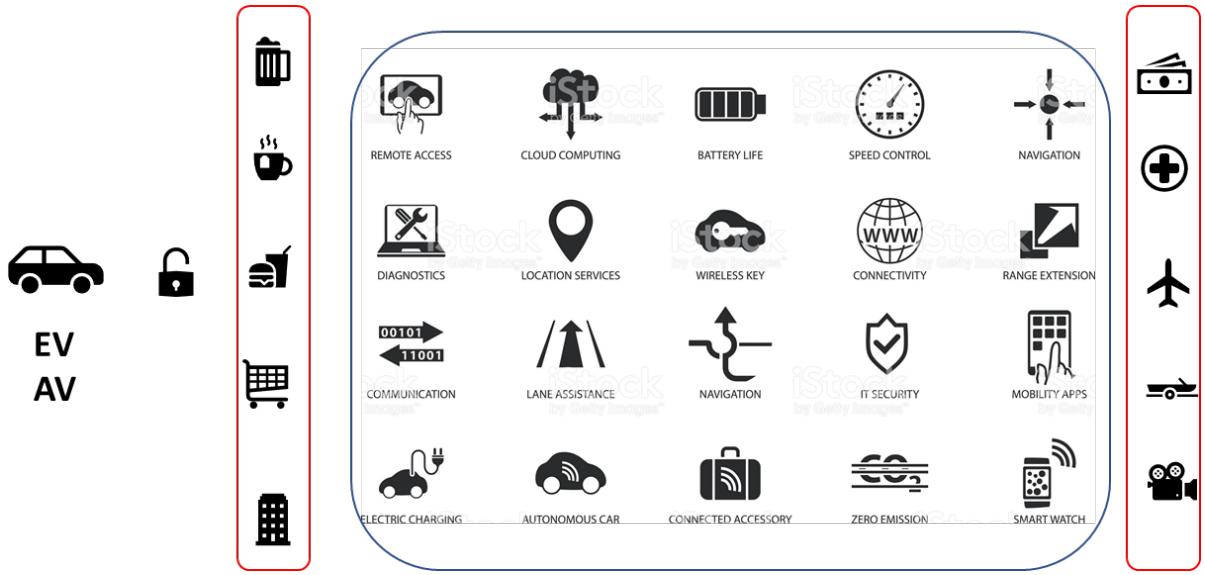


Figure 15 Areas of to apply block chain

For example, the software ecosystems have often struggled to attract enough developers. One reason for that is the dilemma of how to build enough trust in the system in a manner that can be managed, and it produces enough speed to

transparency, accuracy and assurance to owner, users and providers of the ecosystem.

Blockchain is a technology that can be used to track assets and transactions with mathematical proof. The same method can be applied to software components. Blockchain can be used to track software components instead of digital currency. In a blockchain-based software component delivery system, the author of the software signs the original software component with a secret key. The component can then be signed by other parts of the supply chain, the OEM and even by the fleet management operator.

When software reaches the vehicle, the vehicle can verify the origin of the software based on its own rules. Blockchain verification is distributed and thus it is possible to sign independently and verify signatures with any of the ledgers. Distributed and modular structure allows quicker deployment of software into the vehicle while maintaining the same level of security as a centralized system.

Example: Blockchain assisted OTA ecosystem- Trust and execution management for car makers

In a blockchain-based software component delivery system,

- The author of the software signs the original software component with secret key.
- The component can then be signed by other parts of the supply chain, the OEM and even by fleet management operator.
- When software reaches the vehicle, the vehicle can verify the origin of the software based on its own rules. Blockchain verification is distributed and thus it is possible to sign independently and verify signatures with any of the ledgers.

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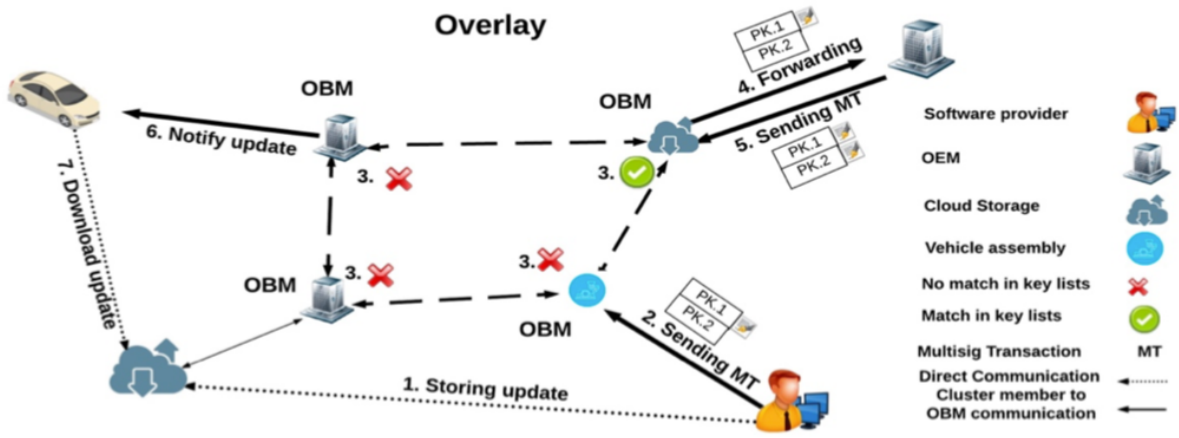

Figure 16 Block chain backed software delivery (Source: Dorri et Al / IEEE)

The automotive industry is used to managing complex supply chains for hardware components. Software intensive approach introduces similar problems into software components. Blockchain is a technology to manage supply chain in the same accuracy as is done for hardware or other parts and thereby giving the automaker, a full circle management using blockchain.

Car sharing and Mobility sharing/ fleet management using Blockchain

Blockchain can be used to validate car sharing transactions while maintaining the anonymity of the user. The user of the service buys access to use a vehicle, for which the user gets a token that grants access. The access credential may have some limitations. It could be:

- Prepaid access to certain group of vehicles for fixed amount of time
- Access to use any number of vehicles with charging afterwards
- Access to single vehicle with certain mileage allowed

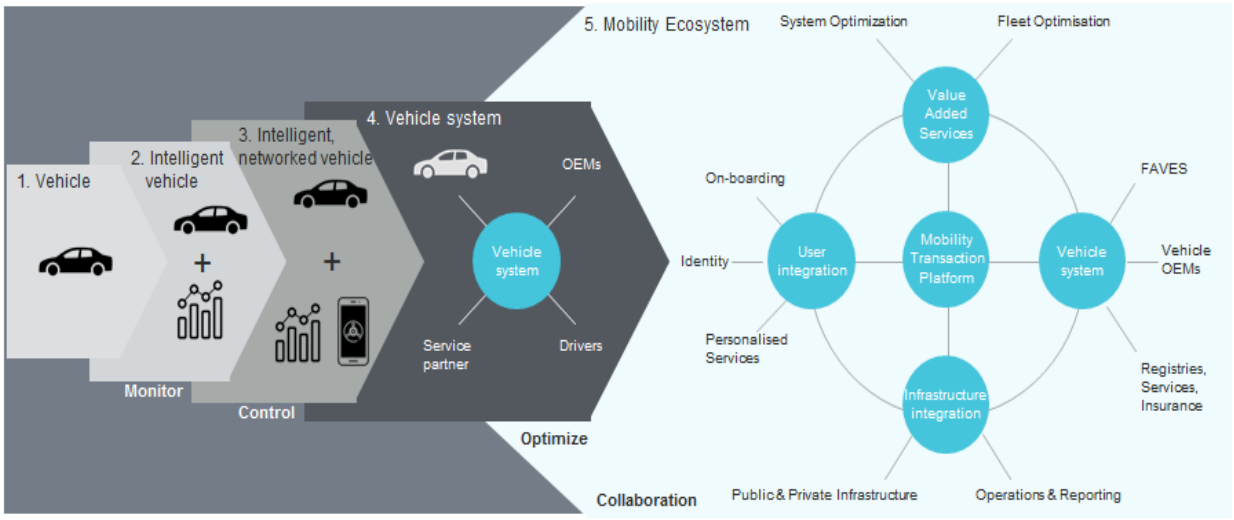

Figure 17 Vehicle management with block chain

In this way the car makers or the fleet operators both can collaborate and execute the right policy and transaction framework to manage the mobility business without security and system issues.

The Linkmotion CarBrain Platform

Enabled for AI and Blockchain Applications and Technology Architecture

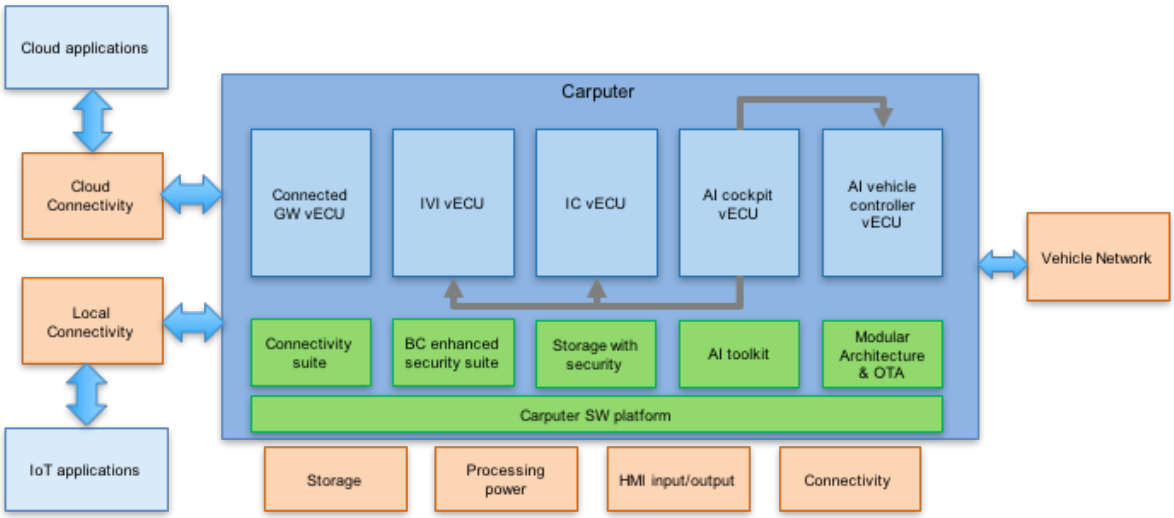

Figure 19 Link Motion platform with AI and blockchain

The Linkmotion CarBrain platform has been designed from day one with security taken into account for powering connected applications in connected cars.

The first generation Linkmotion Carputer added three components called virtual ECUs (vECU):

- Instrument Cluster
- IVI
- Connected GW

Powering AI and blockchain applications requires major upgrades to existing components as well as new ones. These new components include:

- AI cockpit vECU which is AI powered interface for interacting with vehicle
- AI controller vECU which controls vehicle using AI based approach

The AI toolkit is the key enabler for adding AI functionality. It is based on a rich computing platform offering a variety of frameworks with a rich component library.

Key advantages of these rich platforms is the ability to use AI software designed for the cloud/desktop applications also within cars. AI toolkit needs to be combined with modular architecture & OTA, which allows easy creation of new vECUs as well as keeping current ones up-to-date in a modular fashion. The AI toolkit is also integrated with security, which needs to support varying levels of security starting from extremely sensitive data like credentials to mass storage of stored data with security comparable to cloud systems.

A Carputer SW platform extension towards cloud & desktop standards is not however enough. A SW platform needs to also develop embedded features, because the carputer stands between the embedded & cloud. This is where the Carputer will become the CarBrain and key improvement areas for the embedded parts are the following:

- Easy coupling of embedded safety critical components and rich cloud integrated components, including inclusion in modular architecture & OTA
- Wider integration of communication protocols for interacting with wider variety of IoT, cloud, and vehicle networks
- Security suite supporting block chain, privacy control and traceability of data

A connected gateway is the key entity for enhancing integration with connected devices & services. The addition of blockchain allows deeper integration of trust-related decisions and new kind of applications for connectivity. Linkmotion's Carputer platform already includes secure storage for sensitive information, and its CarBrain platform can be used for the new kind of use cases such as storing credentials for accessing EV charging and other services. Connectivity & security related services are accessed either through IC/IVI based user interface or through AI cockpit.

Finally deeper coupling of carputer applications means integration of cloud, IoT and carputer development platforms into a 'full stack' environment allowing co-development of entities.

Infrastructure for next generation carputer development

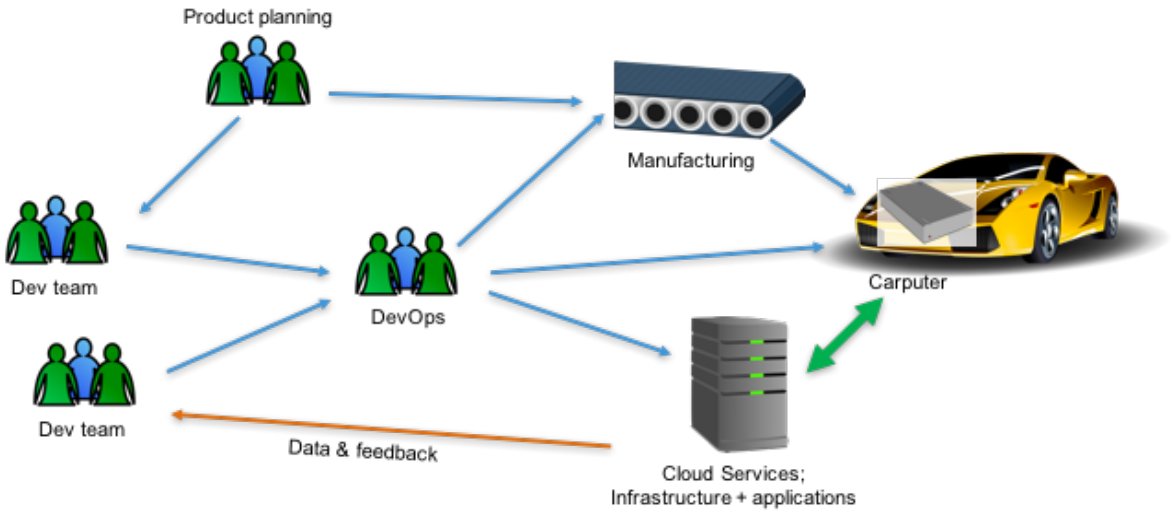

Figure 20 Infrastructure for next generation carputer development

Supply chain engineering is an area where the automotive industry excels already today. However, supply chains have been design for efficient creation of cars that are delivered in a transaction manner to customers. Infrastructure needs to grow to support continuous delivery of updates as part of the services offered to customers.

A full stack approach advocates giving mandate to development teams to deliver updates constantly to software components involved within feature. Software components may involve a number of cloud service components, upgrades to existing vECUs in carputers, new vECUs and updates to other smart devices, such as smart phones. Development teams need to be supported by DevOps team, which establishes channels for deliveries. DevOps teams exist already as manufacturing & software updates is already provided for cars.

The role of DevOps team also grows as infrastructure for new applications requires additional features:

- Blockchain related additions to security infrastructure
- Management of data collected from fleet of vehicles taking security into account
- More complex configurations in combinations of SW & devices/HW

Blockchain: extending OEM – customer relationship

Business models in the automotive industry are changing from a one-off transaction business towards pay-for-use charging which can take many forms from financing into complete service packages including service, energy/fuel, tolls, insurance, washing etc. Yet in such service packages, OEMs can take a bigger role of managing the customer framework and bypassing local dealers for vehicle and services related to it. In such models, the consumer would buy a package and get a vehicle for use for an agreed upon period. OEMs would grant access to the services.

Figure 21 OEM - Customer extended relationship

Blockchain is used to implement the framework. Because blockchain allows anonymity in transactions, the service providers are not able to track consumers by following transactions. The distributed manner of such a framework increases the reliability and enhances the scalability of such frameworks making it more efficient to operate. The consumer part of the application may be hosted in a smart phone, wearable device or even a car key.

Usage of the vehicle can also be part of a mobility package offered by a MaaS (Mobility-as-a-Service) company. In this MaaS scenario, the consumer may get a vehicle for use for shorter periods of time. Packages may include some amount of usage as part of a monthly fee, with an option to use premium services for additional cost.

Blockchain may also be used to extend packages offered in MaaS scenarios easily:

- Extend geofenced contract with additional payment. Extension may cover insurance, fuel / energy and tolls
- Simplify EV charging infrastructure by tracking energy consumed with block chain. This will simplify infrastructure of EV charging and enable more rapid expansion of network

Past Focus was only about speed and accident control, now the aim of the CarBrain must integrate AI and Blockchain within the overall Car PC environment to ensure a safe, comfortable, and seamless utility of the car in new and revolutionary ways.

With the influx of EV vehicles and the paradigm shift in consumers for automotive, it's quite evident the big need for full-vehicle management across all domains and technology.

The changing landscape is happening and unrolling quickly on a global scale. We are seeing several mobility options and mobility companies and start-ups being acquired by car makers just for the purpose of last mile or technology stack or users/memberships or just to get the initial traction on mobility services and how this business model can be sustained or made profitable from day 1 or the car makers don't want to leave any leaf unturned. Beyond this, it's the new age EV car makers who may take all of us ahead. See what Tesla has done, broken the mold and every Tesla buyer swears by it. So the new-age car maker or the technology-advanced car makers in EV are able to do it but what about the existing car makers and manufacturers. How will they do it?

The answer is in the enabling technology to help them make a fully software-designed car. Linkmotion's CarBrain platform is that enabling link for car makers to truly leap into the convergence and digital makeover during this transformation period. The Linkmotion CarBrain allows the new-age and the current-age car makers to fully develop a software managed car. Add the best of technology skills, ADAS, Remote control and management. Making everyone have a safe and secured vehical for both the car maker and their customer.

Link Motion is proud to announce that Link Motion by itself makes the computers and software the automotive industry needs to power connectivity, self-driving, shared mobility and electric vehicles.

From Carputer to Car Brain

Link Motion will be the first company to integrate block chain into an automotive platform enabling novel use cases made possible. Link Motion's strong commitment to security will make block chain based applications unique. Block

chain and AI are complementary technologies filling gaps in many applications described in this paper. Car Brain will make car more intelligent part of the traffic ecosystem, extending carputer, which made the car more intelligent towards the user. Car Brain allows car to do more with less effort from the driver.