

Information and Communication Technology in Automobile

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Abstract: *Information and Communication Technology (ICT) such as the world-wide application of mobile phones and internet have contributed substantially to the fast-growing world economy in unprecedented ways, our results indicate that in spite of our previous prediction that those two technologies contribute positively to the development of Chinese agriculture, we see negative influence of mobile phones and positive influence of internet. Possible explanations and further discussions are provided. ICT is often studied in the context of how modern communication technologies affect society. The implementation of ICT in automotive manufacturing is increasingly important in a highly competitive world. Not only does it enable technologies for lowered costs of manufacturing, adding value to core business processes; it also supports the development of systems for future automotive requirements. Automotive ICT products have become crucial for advancing the automotive industry over the last decade and will become even more important in the next decade and beyond. Today, for example, a luxury car has up to 100 microcomputer-based systems that control nearly all aspects of the car's operation. Subapplications include Car GPS, Self parking cars, Augmented reality windscreens and heads up displays, Self driving cars.*

Keywords: ICTs, automation, self-driving cars, self-parking cars

1. INTRODUCTION

Information Communication Technology (ICT) plays an important role in enhancing the quality of education. In this paper, review of the literatures regarding applications of ICT, types of applications and their effectiveness for administrative activities in automobile is presented.^[1] With ICT, the company can make the business easier to happen with the client, supplier and the distributor. It is also very important in our daily lives. Nowadays ICT cannot be separated with our daily needs.

ICT plays a catalytic role increasing opportunities for people in every walk of life. The integration of Information technology in to automobile industry has added a lot of new developments in to automobile industry. Today's vehicles have become more efficient, safer, and more connected to our lives than ever before. This seminar explores the intersection of information and communication technology and automobile industry in order to identify the safety measures. GPS systems within a car have become a necessity with the growing complexity of the road network and the increasing unpredictability of the traffic conditions. The implementation of ICT in automotive manufacturing is increasingly important in a highly competitive world. Not only does it enable technologies for lowered costs of manufacturing, adding value to core business processes; it also supports the development of systems for future automotive requirements^[2].

2. ROLE OF ICT IN AUTOMOBILE

Automotive ICT products have become crucial for advancing the automotive industry over the last decade and will become even more important in the next decade and beyond. Today, for example, a luxury car has up to 100 microcomputer-based systems that control nearly all aspects of the car's operation. Technology can enable automotive manufacturers to accurately calculate production times, synchronise production, and improve planning and control. This ultimately leads to not only reduced costs but also improved quality. Today's vehicles have become more efficient, safer, and more connected to our lives than ever before. This article explores the intersection of information and communication technology and automobile industry in order to identify the value additions created. The article looks in to the latest technological developments, safety improvements in automotive industry using ICT and the possible risks that have emerged due to the ICT involvement in the automotive industry^[3].

3. Applications

ICT has mainly contributed in adding a huge variety of sophisticated functionalities to making a car intelligent in order to make the driver's life easy. All these functionalities bring us one step closer to the concept of a smart car.

3.1. In car GPS

GPS systems within a car have become a necessity with the growing complexity of the road network and the increasing unpredictability of the traffic conditions. GPS systems traditionally helped us to get to a desired destination particularly when we do not know how to get there, but today's GPS technology can also provide below features:

- Identify the best travel routes to a given destination usually with the aid of digital map.
- Provide the details of the nearest location like gas stations, supermarkets, hotels etc..
- Suggesting the most efficient routes to take assessing the real-time traffic conditions.
- Helps to track the distance travelled on a particular trip, vehicle mileage and speed.
- It can keep a record of driving activity, including the address of each destination, names of streets travelled and how long the vehicle remained at each location which helps owners to track the use of their cars by other drivers.
- In some GPS systems even issues warnings when the car is speeding and when the car is approaching a speed trap.
- It can also help in the recovery of the stolen car.
- Today's sophisticated GPS can even monitor the car condition, and issues warnings when the battery is low or when it is time for an oil change.

3.2. Self Parking Cars

Self-parking cars are already there. They can not only detect available parking spots but also they can park themselves sensing the environment around it through its sensors. Latest systems can find a spot and park the car as the driver commands it to park itself using a smart phone. When the user is ready to leave, the vehicle can also drive itself to the user when it is commanded through the smart phone. Several automotive manufacturers like Volvo, Audi and Lexus has already built these functionalities in to its vehicles. They have perfected the technology through its learning curves as we speak.

3.3. Augmented Reality Windcreens and Heads up Displays

Some high-end vehicles even have displays on the windshield, but in the near future cars will be able to identify

external objects in front of the driver and display information about them on the windshield.



Figure 1: AR turns up entire car windscreen into heads up display

The AR display will overlay information on top of what a driver is seeing in real life. These systems can highlight the actual lane you need to be in and show you where you need to turn down the road without you ever having to take your eyes off the road. Prominent automobile manufacturers such as Audi, Benz, General Motors, have also come up with their own head up display technologies and augmented reality windcreens.

3.4. Self-driving cars

Self-driving cars that can drive themselves without human involvement is no longer a concept. Several innovators have made this concept a reality. They use lasers beam scanners, GPS sensors, Gyro sensors, HD, cameras, Radars, Proximity Sensors, Infra-red sensors and speed sensors in order to automate the driving process. Concept behind auto driven car is the robotic science and the super-fast computational power. Once the sensors capture the details of objects which is in front and besides the vehicle, it formulates a 360 degree digital image. The car determines the location of objects around the vehicle by referring to this digital image. Then it sends commands accordingly to the controllers of the vehicle (Electronic steering wheel accelerator, the breaks and etc.) Not only are these cars able to detect radio and light waves that humans can't, they also never get drowsy and they can see in all directions at the same time^[4].



Figure 2: Technology driving car

4. Safety

Safety is becoming an increasingly important concern as the technologies advances automotive industry has also offered

many safety improvements that elevate the quality of human life by reducing the risks a driver is exposed to.

4.1. Intelligent Speed Adaptation

These are systems that constantly monitor vehicle speed and the local speed limit on a road and implement an action when the vehicle is detected to be exceeding the speed limit. This can be done through an advisory system or through a supportive/warning system or through an intervention system. Passive systems simply warn the driver that they are speeding. An active system controls the speed of the vehicle, limiting how fast it can travel.

4.2. Sleep Prevention Technologies

Many accidents have happened due to the driver falling asleep while driving. There are systems that prevent a driver falling asleep. There are image based, sensor based and dialog based systems that identifies when a driver is falling asleep and alarms him appropriately. Even mobile apps have come to help you cope with this problem nowadays for an example iPhone anti sleep application can be taken. These systems can become particularly useful when driving through long boring highways during night.

4.3. Weather and Pedestrian Detection Systems

These systems can detect the weather condition using various sensors and inform the driver or take actions accordingly, rain detectors to activate wipers and control their speed appropriately, fog detectors to engage lights and fog lamps and inform the driver. Pedestrian detection systems can identify the pedestrians on the road and the distance to them. System can take action when the distance to a particular pedestrian is decreasing drastically in a dangerous fashion. Latest systems with night vision cameras are a very useful development when driving in nights. These not only visualize the pedestrians and animals that we can't see in the night and bad weather conditions, it can also take actions accordingly. System sends an auditory warning to the driver first. Then the system can even apply full breaks depending on the movements of the pedestrians if driver fails to take action.

4.4. Parents can Monitor Dangerous Teenage Drivers Remotely

This type of systems can be useful to avoid dangerous driving behaviours of teenage drivers. These systems can monitor whether the teen is wearing a seat belt, whether they are speeding, the engine RPM of the vehicle, whether they're hard cornering, hard braking. An alarm goes off when the driving behaviour of the teenager is risky. Parents can monitor the performance of the teenager by downloading the information from a memory card inside the black box^[5].

5. Risk Introduced

Even though these novel technological advances have immensely improved quality of human life, there are also some vulnerability these technological advances bring along with them. While any new technology will be appreciated for its positive it is inevitable that there will also be inherent negatives that compromises certain aspects and limits the boundaries of our comfort zones.

5.1. When our Car Got Hacked

Computers as we all know are very vulnerable to different types of security attacks. The integration of computers in to the automobiles can make the vehicles vulnerable too. For an example what if the hackers hack in to the break system and deactivated it for an instance. The driver may no longer have control over the vehicle. Currently, a user with malicious intent and some computer-programming skills can take command of your vehicle. After gaining access, a hacker could control everything from which song plays on the radio to whether the brakes work. The extent of control that can be gained by these attacks improves as the cars get more and more automatic functions in it. The automobile manufacturers are looking in to the potential security measures that can be taken^[6].

5.2. Possibility of Malfunctioning

Introducing smartness meaning the people in the vehicle increasingly depend on the decisions made by vehicle for them. It is true that the technologies are perfected to nearly eliminate the possibilities of malfunctioning. But still there can be a possibility. Since the vehicle is on the move the consequences for the passengers in the vehicle can be disastrous in such a situation.

6. Advantages of ICT in Automobile

- Reduction in production time.
- Increase in accuracy and repeatability.
- Less human error.
- Less employee.
- Increased safety.
- Higher volume production

7. Disadvantages of ICT in Automobile

- Less versatility
- More pollution
- Large initial investment
- Increase in unemployment
- Unpredictable costs

8. Conclusion

ICT refers to technologies that provide access to information through telecommunications. There is a lot that ICT can offer to improve automotive industry. Particularly the sophisticated developments mentioned in the first section, the article can elevate the standards of automotive industry to unimaginable heights. The safety aspects are also major value additions because the world is increasingly worried about health and safety and when it comes to safety they are ready to pay premium. But it is important to understand that there are risks that are introduced with the novel developments. The Industry has to face these challenges in a constructive manner and convince its consumers on acceptable level of mitigation in these risks for them to embrace the new developments. ICT for tracking vehicles and proposes the model for tracking vehicles and proposes the model for tracking in real time vehicles. This paper is focusing in proposing a model for tracking vehicles over-speeding in Tanzania, upcountry buses in particular. The proposed system will constantly track buses in real time and update the central database. The system will promptly pop up warning messages in case of over-speeding for appropriate action. Analyzed data from the central database could be used as the evidence in case of traffic case prosecution. The system will allow for easy tracking of drivers with a habit of over-speeding and therefore appropriate disciplinary action could be taken against them, such as ceasing of their driving license. The proposed system will make use of the potential of Global Positioning System (GPS), Global Positioning Satellites and Global System for Mobile communications (GSM) Technology in delivering its services.

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