CARAMEL PROJECT FINAL REVIEW

CARAMEL

Artificial Intelligence based Cybersecurity for Connected and Automated Vehicles

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 833611

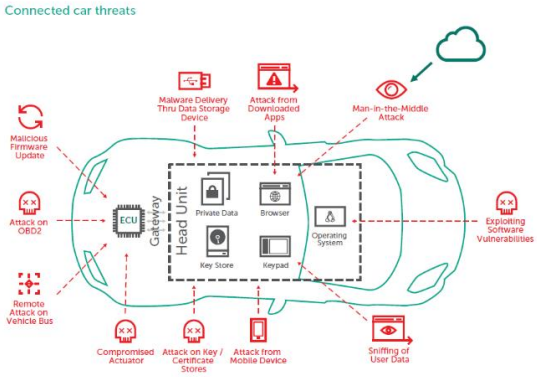
INTRODUCTION

After an incredible 33 months of work in the CARAMEL project, the consortium had the opportunity to hold its final review. The event was held virtually and organized by the CARAMEL's project officer.

The selected reviewers as well as representatives from each of the consortium members also participated in this event. During the activities of this meeting, the technical experts presented the results obtained by the project. Each of these results was explained in detail by the responsible partners.

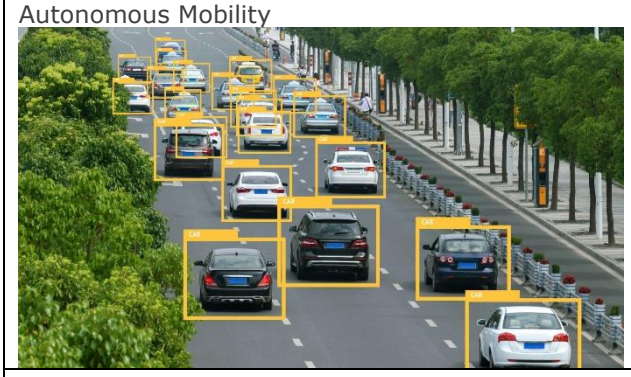
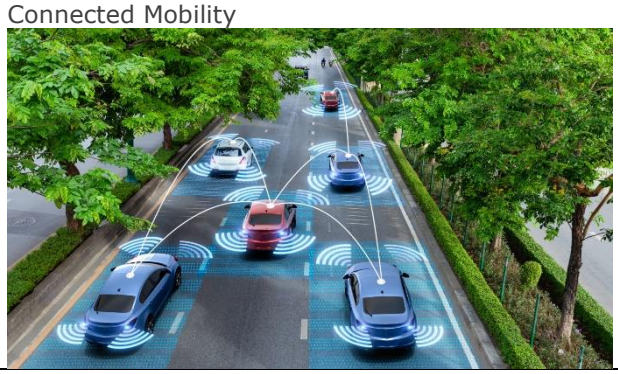
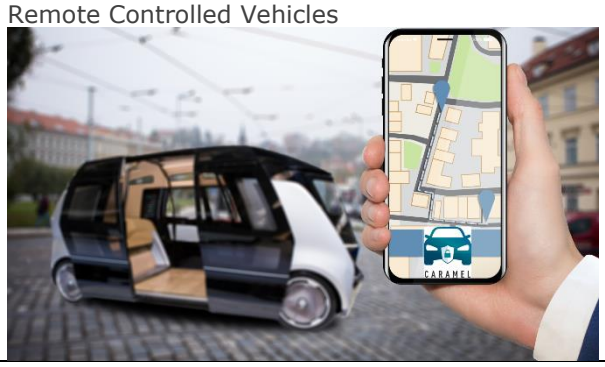
Although this meeting was conducted virtually, it was possible to give video demonstrations of the CARAMEL project in action for each pillar of the project.

The final meeting started at 13:00 CET and lasted until 17:30 CET. Despite the tight agenda it was possible not only to explain in detail the research carried out but also to view several demonstration videos to give a hands-on impression of the results obtained.



HIGHLIGHTS PER PILLAR

The topics presented during the presentations are highlighted as follows

Autonomous Mobility 	• Physical Layer-Attack on Traffic Signs • Cyber-Attacks on Camera Sensor • Mitigate attacks on camera sensors using LiDAR • Location Spoofing Attack • Robust scene analysis and understanding via multimodal fusion • Detection and Mitigation of Image Deterioration Attacks on Autonomous Vehicle Camera Sensors
• Radio Interoperability, Secure Communications, Privacy Issues, • HW OBU design and HW & SW OBU securitization • Public Key Infrastructure • Collaboration mitigation and detection mechanism against GPS spoofing • In-vehicle Location Spoofing Attack Detection	Connected Mobility 
Electromobility 	• Smart Charging Abuse • Smart Charging Anomaly detection
Korean partners, who still have one year of project based on Korean funding, continue working in: • Remote control vehicle based on mmWAVE (23GHz) • Data processing architecture • Malicious Traffic Detection Solution LSTM-based cyber-attack anomaly prediction /detection.	Remote Controlled Vehicles 

PROJECT DISSEMINATION

IoTS World Congress

The CARAMEL project had a successful dissemination action in the activities of the IoTS World Congress, thanks to the participation of more than 400 people who were interested in the project and who were offered a personalized explanation about the most outstanding results of the project.

It is relevant to mention that thanks to the participation in this event we were able to establish communication with several cybersecurity organizations through which we will look for future collaboration opportunities.

We appreciate the feedback of each visitor because without their visit the CARAMEL testbed demonstration would not have been the same.

Key Performance Indicators

The completion of all the key performance indicators set at the beginning of the project, some of which were even exceeded by a large margin, is outstanding.

PROJECT REVIEW CONSOLIDATED REPORT

Overall Assessment

Project has fully achieved its objectives and milestones for the period.

Significant results linked to dissemination, exploitation, and impact potential.

The project has delivered exceptional results with significant immediate or potential impact (even if not all objectives mentioned in the Annex 1 to the GA were achieved). The project has achieved all its objectives and milestones for the period and went much beyond the dissemination objectives. Overall, the project has addressed very well all its challenges, objectives and milestones within the executed project activities and reported on them in a very structured way into the different planned deliverables. The dissemination activities were excellent. All planned KPIs were achieved with a high success.

General Comments

The main goal of the project was the development of a more secure driving experience for the connected and automated vehicles and was built around four innovation pillars: the autonomous vehicle, the connected vehicle, the plug-in electrical vehicle and the remote control vehicle. The consortium overall adhered very well to the work plan presented in the DoA and globally achieved all of it's objectives and milestones. Significant realizations have been performed with respect to standardization activities, dissemination in academic, commercial and industrial fora and by creating synergies and liaisons with other running EU funded projects and initiatives. A final and successful demonstration found place on June 20th-21 in Langen (Germany), whose results have been clearly reported in the foreseen deliverable and presented during the panel review. A clear market-oriented exploitation plan has been developed and potential market sectors including a revenue prediction have been identified. Several commercial leads have been identified and initiated with major companies and organizations. A roadmap for future evolution of the project's achievements has been provided in order to clearly summarize the potential use and benefits of the project's outcomes and to ensure the long-term success of the project. The project's website has been very popular and many references by other websites maintained by different organizations have been made to the project website. The presence in social media also contributed to the successful dissemination of the project's results. There was a very fruitful interaction with the Advisory board, who consisted of major relevant people in the field. The overall topic of CARAMEL is very relevant and important for the European competitiveness. Thus, the general evaluation of the project activities is very good, based on the provided deliverables and the presentations and demonstrations of the project's results

CONCLUSIONS

The CARAMEL consortium funded by the H2020 program of the European Commission has successfully completed the research and development of an artificial intelligence system for autonomous vehicles. It is a great pride to have achieved the high quality of research and demonstration of each of the pillars of the project for safer roads.

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