emotion3D's in-cabin monitoring software is setting new standards in driving safety

Case Study

Company snapshot

Name: **emotion3D**

Description: **Based in Vienna, Austria, the company enables a new level of driving safety. Emotion3D creates AI-powered software for 3D environment perception for in-cabin monitoring. Emotion3D's software is used by several leading OEMs and Tier-1 suppliers in the automotive industry.**

Website:
https://emotion3d.ai/

Goal

According to the World Health Organisation, more than 1.35 million people die each year in road accidents, almost all of which (94%*) are caused by human error (according to NHTSA). While human error can be attributed to various things, it is estimated that a significant number of these cases can be traced back to the driver being distracted, drowsy or fatigued.

Over the past few years, car manufacturers have been adopting advanced technology to increase safety standards. Most new cars now have some form of Advanced Driver Assistance Systems (ADAS) on board which greatly enhance both safety and driving experience. While these systems are aware of their surroundings, many of these technologies are blind to a crucial variable in the equation: the occupants in the car.

Solution

This is where emotion3D comes in. Based in Vienna, Austria, the company aims to create a new level of driving safety. emotion3D creates AI-powered software for 3D environment perception for in-cabin monitoring. Emotion3D's software is used by several leading OEMs and Tier-1 suppliers in the automotive industry. And almost all their projects are powered by Arm-based CPUs — for example, the Arm Cortex-A53 and Cortex-A57, some of the world's most widely used processors for high-performance processing.

AI powered software for real time analysis

Using comprehensive computer vision and machine learning (ML), emotion3D's software analyzes the feed from cameras inside the vehicle to determine the state of the driver and all passengers as well as safety-critical objects such as mobile phones that are in the cabin. There are two parts to emotion3D's software – the In-Cabin Monitoring software Stack: Driver Monitoring (DMS) and Occupant Monitoring (OMS).

The DMS focuses on the driver. For example, if the driver is drowsy, distracted or having a medical emergency, this valuable information is vital to implementing intelligent safety functions for cars. Depending on the level of autonomous vehicles, the response could be an alert to warn the driver or for the car to react if the driver is incapacitated.

Since an immediate response is critical in such instances, emotion3D's ML algorithms are highly optimized and run in real-time on low-power embedded devices with a high level of accuracy. This data and analysis are the basic building blocks for intelligent safety and user experience functions in cars.

The Arm advantage

An increasing number of governments and automotive institutions recognize in-cabin monitoring as a primary safety system. This awareness means many of the use-cases and projects emotion3D is working on now will become mandatory in the near future. The software is required to support safety standards as well be appealing to manufacturers. Arm's technology enables emotion3D to cater to both these requirements by delivering the following benefits:

1. Extremely high accuracy: emotion3D's software is highly accurate and robust, which is essential for a safety-critical applications.
2. Low-cost, high-performance: The complete software stack is optimized to run natively on Arm CPUs which provide a strong cost advantage while not compromising on performance.
3. Flexibility: emotion3D ensures a very comprehensive solution to in-cabin monitoring and supports a wide range of cameras and sensors. This enables a broad selection of use cases and allows to quickly tailor their software to partners' and customers' preferred hardware.

> "Arm's processors are mature, well-tested and the most widely used in the industry. This makes it extremely attractive to software suppliers like us because we only need to optimize the software once to deploy in a wide range of platforms. From the pilot test to the product, it makes the process faster and simpler for our customers."
>
> Florian Seitner, CEO of emotion3D

The future of safety for autonomous vehicles

"We are aiming to provide a completely new level of driving safety and user experience. Even in a future with fully autonomous cars, our solution remains important and relevant. In fully autonomous cars, it would become important to know where the occupants are in case of an emergency, especially since they will have the freedom to move around more," says Florian.

Emotion3D's software can detect and track every occupant and object within the car. This creates not just enhanced driving safety but also comfort within the car for all occupants.

A few examples of how this can be used are:

✦ Classifying occupants into relevant height/weight classes for airbag deployment

✦ Positions of all body parts can be estimated for optimal airbag deployment in case of an inevitable crash

✦ Recognizing hand and body gestures for enhanced human-vehicle interaction

✦ Monitoring the occupants so the vehicle can adjust temperature, lighting, and music accordingly

Florian believes the company's scope extends beyond the automotive industry: "We see a future in areas beyond automotive, such as robotics or industrial environments where safety and real-time analysis of humans is critical. Our vision is to advance the understanding of human interaction with technology in safety-critical environments."

For more information on emotion3D:

https://emotion3d.ai/

https://vimeo.com/408750944

For more information on Arm AI:

Arm AI Solutions