Rapidise's automotive solutions are powered by a range of high-performance SoCs and specific sensor technologies optimized through rigorous testing protocols, ensuring robust reliability, compliance with safety standards, and real-time processing capability for critical functions like ADAS and DMS.

1. Key SoCs and Processing Platforms

Rapidise utilizes processors from major semiconductor partners, particularly focusing on Qualcomm and NXP for both current deployments and next-generation platforms.

Platform Category	Specific SoCs Identified	Automotive Use Case	Key Performance Note
High-Performance (In Development)	**Qualcomm QCS6490** (Tejas SOM/Edge AI Box)	Ideal for **EDGE AI Box**, security cameras, and rugged handhelds.	Offers astonishing performance up to **12 TOPS** (Trillions of Operations Per Second) with minimal power consumption.
Infotainment / Digital Cockpit	**NXP iMX8**	Used in a **Dual Display IVI System for a Truck OEM** to implement a custom control system, HMI, and service layers for the Head-Unit Cluster and Head-Up Display.	Supports Android OS, CAN data acquisition, 4G LTE, and Gigabit Ethernet.
High-Compute AI/Vision	**Qualcomm 8155**	Used as the platform for a high-accuracy, low-latency **2.5D Face Recognition** solution.	Achieved an inference time of **less than 1 second**.
Advanced Camera Systems	**Qualcomm 8550 SOC** (QCS8550)	Used in the development of a **Low Light Camera** with a new age Image Sensor, utilizing the Qualcomm advanced **Spectra 7 ISP**.	Supports 4G communication, Wi-Fi 7, and AI Algorithms.
Edge IoT/Telematics	**Qualcomm 625** (Quectel SC600T)	Powers the **Tejas Edge Camera, Tejas Android Infotainment System**, and **Tejas IoT Gateway**.	Supports dedicated GPU (Adreno 506) for Edge computing AI applications.

(Note: The sources provided do not mention the use of Ambarella SoCs in Rapidise's automotive solutions.)

2. Sensor and Integration Expertise

Rapidise focuses on integrating sophisticated sensors, managing the low-level drivers, and optimizing the camera pipeline for vision-based safety systems:

- **Vision Sensors:** Rapidise's capabilities cover the integration of **LiDAR, RADAR, cameras, and other sensors**.
  - The **Sony iMX335 (STARVIS Technology)** is used in the Tejas Camera solution. Rapidise specializes in developing the sensor driver and system integration for components like the **Sony's IMX335 sensor driver integration in the Qualcomm camera pipeline system**.
- **Depth Sensing:** Solutions incorporate advanced sensing, such as combining a **Camera and Time-of-Flight sensor** for 2.5D face recognition to capture depth information alongside 2D imagery. They also handle **Depth map generation** for Time-of-Flight camera sensors and Stereo cameras for 3D applications.
- **In-Cabin Sensors:** For the IVI/Instrument Cluster systems, integrated sensors include **Temperature, Accelerometer, Gyrometer, Magnetometer, and Light Sensor**.
- **Vital Sign Monitoring:** DMS solutions are designed to monitor drivers' vital signs, including **Blood Oxygen, Heart Rate, Stress Index**, and Facial Expression.

3. AI Frameworks and Real-Time Performance Optimization

Rapidise utilizes a proprietary stack for AI implementation, focusing on lightweight models for efficient edge deployment:

- **Telep AI Stack:** The core AI offering is the **Telep ADAS & DMS AI Portfolio**, which contains a full portfolio of **ready-to-use computer vision AI algorithms** designed to be **hardware agnostic**.
- **Frameworks:** The AI models are developed using the **TensorFlow** training framework. For deployment, optimization tools include **TensorFlow Lite** (TensflowLite), NVIDIA, and Android.
- **Edge AI Optimization:**
  - Rapidise employs the **Edge AI Framework for Automotive** which incorporates advanced AI algorithms to enable **edge computing for faster processing and optimized performance**.

- o For the Face Recognition feature, a **Custom CNN model inspired from the centernet architecture** was developed. This model is explicitly designed to be **Light Weight for edge devices** (less than 10 mb size), ensuring real-time responsiveness with an inference time of less than 1 second.
- **Camera and ISP Tuning:** For real-time vision performance, they specialize in:
  - o **ISP pipeline Optimization**.
  - o **High quality ISP Tuning** (Image Signal Processor Tuning) for various platforms.
  - o Optimization of complex algorithms like **HDR (High Dynamic Range) algorithms** and **low light enhancement algorithms**.

4. Optimization for Reliability and Safety (ISO 26262)

Rapidise integrates safety and reliability testing throughout its Hardware Development Life Cycle (HDLC).

A. Safety and Certification Compliance

- **ISO 26262:** Rapidise's automotive services include **Hardware Validation and Testing** that verifies compliance with safety standards and regulations, specifically citing **ISO 26262 safety certifications**.
- **Automotive Standards:** Rapidise holds the essential automotive quality management certification **IATF 16949**.
- **Operational Safety:** Design revisions (e.g., Design Version 2.0) are dedicated to reviewing **Corner Cases** and **Ensuring Operational Safety on Board Level**.

B. Reliability and Environmental Testing

The Product Reliability Test Lab utilizes comprehensive methods to ensure hardware endurance and reliability:

- **Accelerated Stress Testing:** Testing includes **HALT (Highly Accelerated Life Test) / HAST (Highly Accelerated Stress Test)**.
- **Electromagnetic Compatibility (EMI/EMC):** Design versions include **EMI/EMC** checks. The test lab is equipped for **Electromagnetic Testing (EMI & EMC)**, utilizing **Semi Anechoic Chambers** and ESD (Electrostatic) Control measures.
- **Environmental Endurance:** Testing covers extremes of climate and physical stress, including **Thermal, Humidity, Insulation Testing, Endurance & Ageing Testing**, as well as using a **Vehicle Cold Chamber** and **Chassis Dynamometer** for dedicated vehicle testing.

This layered approach—combining powerful, specifically optimized processing platforms (Qualcomm, NXP) with custom, lightweight AI algorithms (Telep AI Stack) and mandatory validation against stringent standards (HIL testing, ISO 26262, EMI/EMC)— ensures that the final automotive solutions meet the industry's demands for dependable, high-speed, safety-critical operation.