Rapidise provides end-to-end ODM capabilities for dashcam development, transforming the landscape by seamlessly connecting design and manufacturing via a cutting-edge on-demand platform. This process spans from the initial concept and prototyping through Design for Manufacturing (DFM), mass production, inventory management, warehousing, and shipping. The overall development cycle leverages Rapidise's 12+ years of design services and 25+ years of manufacturing services delivery.

Here is a breakdown of Rapidise's dashcam development capabilities across key phases:

Phase 1: Hardware Design, Components, and Integration

This phase covers the physical and embedded aspects of the dashcam, drawing on Rapidise's expertise in embedded hardware, mechanical design, and camera modules.

1. Technical Stack (Processors, Sensors, and Cameras)

Rapidise utilizes Qualcomm processors and their proprietary RISE platforms for automotive solutions.

- Processors/Platforms:
  - Qualcomm QCS5430 utilizing the RISE X1 Platform (8 Core CPU, 3.5 TOPS NPU) for Dual Camera Dashcams.
  - Qualcomm SM6225 utilizing the RISE Y1 Platform (8 Core CPU, 2 TOPS NPU) for Dual DashCams.
  - Qualcomm QCM6125 or SC668S-WF (associated with RISE C1 Platform) for DashCam + LTE Edge AI Box solutions.
- Cameras and Sensors:
  - Dashcam solutions frequently incorporate a compact 2-camera unit for front and in-cabin views.
  - Target cameras often feature 4MP resolution for both in-cabin and road-facing applications.
  - Dashcams integrate IMU Sensors (Inertial Measurement Unit).
  - RAM typically includes 4GB LPDDR5.
- Connectivity:
  - All featured dashcam solutions include Wi-Fi and Bluetooth connectivity.
  - Many variants include LTE (4G) communication.
  - GPS is a standard system component.
  - CAN Connectivity is implemented to interact with vehicle data.
  - The Dual DashCam (SM6225) specifically offers a variant with Ethernet connectivity.

2. Embedded Hardware and Mechanical Design

Rapidise covers comprehensive embedded hardware and mechanical development:

- Hardware Development: Includes Hardware Architecture, Electrical Schematic Design, Multilayer PCB Layout Design, High-Speed Board Design, and Analog & RF Design.
- Optimization and Tuning: Services cover Bill of Materials (BoM) Optimization, Antenna Tuning, and Image/Audio tuning.
- Mechanical Design: Includes New ID concept generation, 3D Engineering, Product Design & Development, Simulation and Analysis, and IP Standards Validation. This extends to Mold Development and manufacturing of plastic/metal parts.

Phase 2: Embedded Software, Firmware, and AI

This phase integrates intelligence and functionality into the hardware, utilizing specific operating systems and advanced AI algorithms.

1. Operating Systems and Firmware

Dashcam solutions typically run on Android or Android 13. Software development capabilities include:

• Embedded Software: Supports development on Bare Metal, RTOS, Linux, and AOSP (Android Open Source Project).

• Low-Level Development: Includes Board Support Package (BSP), Device Driver, and Firmware development.

• Updates and Control: Provides FOTA (Firmware Over the Air) capabilities and development for communication protocols like HAL, I2C, SPI, PCIe, WiFi, Cellular, and Sensors.

2. AI and Computer Vision Integration

Rapidise integrates AI/ML algorithms directly into the dashcam (Edge Computing) to enable advanced vehicle safety features (ADAS/DMS).

• AI Applications: Expertise includes Computer Vision, Edge Computing & AI, and Algorithm Development.

• Automotive AI Portfolio (ADAS & DMS): Specific applications developed include:

  ◦ Drowsiness Detection.
  ◦ Mobile Distraction.
  ◦ Front Collision Alert.
  ◦ Lane Departure Warning.
  ◦ Accident Detection.
  ◦ Blind Spot Detection.
  ◦ Road and traffic monitoring applications like Vehicle Classification, Overspeed Detection, and Red Light Violation Detection.

3. Cloud and Application Development

For data access and management, dashcam solutions are integrated with cloud servers and mobile applications.

• Cloud Engineering: Utilizes platforms like AWS, Azure, and GCP.

• Telematics Solutions: Provides a Vehicle Telematics Platform Solution which includes a Rapidise ADAS & DMS Analytics Dashboard and a Device Management & Analytics system.

• Mobile/Web Apps: Develops Web & Mobile Applications (iOS and Android), API integration, and IoT Dataflow Architecture.

Phase 3: Manufacturing, Testing, and Validation

Rapidise uses owned infrastructure to ensure quality and compliance from prototyping to mass production.

1. New Product Introduction and Assembly

The NPI phase includes critical quality checks before manufacturing:

• DFM Analysis: Design for Manufacturing is performed, ensuring readiness for production.

• PCB Assembly (PCBA): Uses High Speed SMT Lines (like the Fuji SMT Line, 200k CPH) and techniques like SMD, DIP, and TH assembly. Quality Control includes AOI, SPI, and X-Ray inspections.

• Camera Module Assembly: Performed in a specialized facility, including an ISO Class 6 Clean Room. Assembly steps include image sensor cleaning, lens setting/screwing, lens tuning, gluing, UV curing, and final image inspection.

• Full Product Assembly: Includes Box Build & Full Product Assembly, supporting High Mix Low Volume Manufacturing. Manufacturing utilizes 100% Traceability with MES integrated with SAP.

2. Testing, Reliability, and Certification

Rapidise employs extensive testing labs and chambers for product reliability and mandatory certification.

• Environmental & Reliability Testing: Includes exposure to various conditions:
  ◦ Temperature & Humidity Tests, Salt Spray Chamber, Dust Chamber, Water Spray, and Thermal Shock testing.
  ◦ Vibration Test and Highly Accelerated Stress Test (HAST).
• Electromagnetic Compliance (EMI/EMC) & RF Testing: Utilizes Semi Anechoic Chambers and specialized equipment (e.g., ESD checker, RF Power Amplifiers) for EMI/EMC testing and RF Tuning.
• Vehicle-Specific Testing: Access to a Vehicle Cold Chamber and Chassis Dynamometer. An ACG Rig Test Bench is also used for vehicle simulation.
• Validation & Certification: Services include Electronic Design Validation (EDVT Test Lab) and support for final Certifications.