

I. Detailed Description of Software Capabilities

The overall software capabilities span both embedded systems development and enterprise Information Technology (IT) services.

Embedded Software Capabilities

The embedded software expertise covers operating systems, hardware interaction, and multimedia frameworks:

- **Operating Systems & Kernel:** Expertise includes **Bare Metal, RTOS (Real-Time Operating System), Linux, and AOSP (Android Open Source Project)**. This also involves **Linux Kernel Customization**.
- **Drivers and Firmware:** Services include developing **BSP (Board Support Package), Device Drivers, and Firmware**.
- **Hardware Abstraction and Interfaces:** Capabilities cover **HAL (Hardware Abstraction Layer)** and managing interfaces like I2C, SPI, PCIe, WiFi, Cellular, and Sensors.
- **Updates and Multimedia:** Development includes **Multimedia Codec & Framework** and implementing **FOTA (Firmware Over the Air)** updates.

Information Technology (IT) Capabilities

IT services focus on cloud platforms, data management, and user-facing applications:

- **Application Development:** Development of **Web & Mobile Apps, API Development and integration, and User Interface Software**.
- **Cloud Engineering & DevOps:** Expertise in **Cloud Engineering** across major platforms: **AWS, Azure, and GCP**. This includes **Managed DevOps Services**.
- **IoT & Data:** Capabilities cover **IoT Dataflow Architecture and Data Visualization**.
- **Specialized IT:** Services also include **Video Based Surveillance Dashboard Development, Robotic Process Automation, and Metaverse, AR/VR App development**.

Cloud Video Management System (VMS) Expertise Specific VMS cloud capabilities utilize technology stacks such as React or Angular for the Frontend, and NodeJS for the Backend. They utilize relational databases and NoSQL databases like MongoDB or DynamoDB.

- **Server Infrastructure:** Uses AWS services including ECS, EC2, S3, Kinesis/LiveKit, Lambda, Cloudfront, and ECR.
- **Multi-Tenant Architecture:** The recommended approach uses Docker to manage multi-tenant platforms, ensuring completely isolated tenants while reducing server infrastructure costs and accelerating time-to-market.
- **Live Streaming:** Utilizes **WebRTC (Web Real-Time Communication)** for peer-to-peer data sharing and teleconferencing to minimize cloud costs, leveraging open-source tools like LiveKit, Jitsi, MediaSoup, or AWS Kinesis WebRTC.
- **Event Detection:** Uses **Amazon Rekognition Video** to automatically identify objects, scenes, and activities, providing rich metadata for content searchability.

II. Case Studies Illustrating Software Capabilities

Case Study 1: Multi-Tenant Cloud Video Management Portal (Cloud/IT Focus)

This project involved developing a **Multi-Tenant Custom Cloud Video Management Software** to replace an existing third-party portal.

- **Description:** The portal functions as a comprehensive video streaming platform enabling users to seamlessly manage, distribute, upload, organize, and securely share video content. It features robust capabilities for video playback, customization, and analytics.
- **Software Role:** The development team was responsible for **PRD Creation, System Architecture, UI Design, Frontend Development, Backend Development, Admin/Partner/Customer Portal creation, Database management, DevOps Activity, Testing, and Deployment.**
- **Technologies Used:**
 - **Frontend:** ReactJS
 - **Backend:** NodeJS
 - **Database:** PostgreSQL and MongoDB
 - **Cloud Infrastructure:** Amazon Web Services (AWS)
 - **Other:** Nginx (Web Server) and FFmpeg (Video Encoding)

Case Study 2: Unified Fall Detection And Vital Capture System (Embedded/AI Focus)

This groundbreaking system was designed to enhance the safety and well-being of veterans and elderly individuals.

- **Description:** Key features include **Fall Detection and Emergency Alert Response, Privacy-Preserving Video Clips, Real-time Vital Capture, Natural Language Understanding (NLU) Based Secondary Check**, and Smart Lock Integration.
- **Software/AI Role:** Responsibilities included **PRD & System Architecture, Firmware Development (AOSP), Device Side Application Development**, and crucial **AI Algorithm Development**.
- **Technologies Used:**
 - **Platform:** Tejas 625 SOM running **Android 9.0**.
 - **Core Hardware:** Fall Detection Radar Module, Far Field Mic Array, USB to Ethernet Bridge IC.
 - **Communication:** MQTT Protocol.

III. Overview of AI and Telep Libraries

AI Development Capabilities Overview

AI development focuses heavily on Computer Vision and Edge deployment. Core competencies include:

- **Computer Vision**
- **Edge Computing & AI**
- **Algorithm Development**
- **Natural Language Processing (NLP)**
- **Specific Detection:** Object Detection and Face Detection.
- **Advanced Applications:** Predictive Maintenance, ADAS & DMS, Healthcare AI, and Recommendation Engine.

The development often utilizes powerful hardware platforms like the **Rapidise Edge AI Box**, featuring the Qualcomm QCS6490 SOC with a dedicated NPU offering **12 TOPS** (Tera Operations Per Second) performance.

Telep AI Model Library Overview

Telep is designated as an **AI Model Library** specifically focused on applications in **Security & Surveillance**. The library models are categorized into two primary areas: Safety Applications and Road & Traffic Monitoring.

Telep AI Model Library – Safety Application

This category encompasses models designed to monitor environments and personnel for immediate security and health concerns:

- **Detection & Alerting:** Intrusion detection, Fire and Smoke Detection, Gun Detection, Violence Detection, Leakage Detection, and Tailgating Warning.
- **Activity Monitoring:** Human Activity Detection, Loitering Detection, and Motion Detection.
- **Identity & Interaction:** **Facial Recognition System**, Sign Language Detection, Word Spotting, and Gesture Control.
- **Compliance:** Safety Gear detection.

Telep AI Model Library – Road & Traffic Monitoring

This category includes models tailored for analyzing vehicle, road, and compliance issues in traffic environments:

- **Vehicle Identification & Tracking:** License Plate Recognition, Vehicle in out counting, and Vehicle Classification.
- **Violation Detection:** Overspeed Detection, No helmet Detection, Red Light Violation Detection, Wrong turn Detection, No Parking Detection, and Zebra crossing Violation.
- **Incident & Infrastructure:** Congestion Detection, Accident detection, Pothole Detection, Garbage Detection, and Deer / Animal Alert.

To understand how software capabilities integrate with hardware and AI, consider a piece of software as a sophisticated orchestra conductor. The **Embedded Software** is like the conductor managing the low-level instruments (drivers, sensors) on the stage (the hardware/chipset), ensuring every piece starts and ends on time (FOTA, RTOS). The **Information Technology** stack, particularly the Cloud VMS, is like the remote recording studio and distribution platform, collecting the music (video streams/data), analyzing it (Amazon Rekognition), and delivering customized playlists (dashboards, mobile apps) to listeners worldwide. The **Telep AI Library** provides the specific musical scores—pre-written, highly optimized routines—for detecting intrusion, identifying vehicles, or noticing if a performer is wearing the wrong safety gear.

Here are three examples of Telep AI safety applications:

1. **Intrusion detection**
2. **Gun Detection**
3. **Facial Recognition System**

Other safety applications listed in the Telep library include:

- Safety Gear
- Fire and Smoke Detection
- Violence Detection
- Leakage Detection
- Tailgating Warning
- Loitering Detection
- Human Activity Detection
- Motion Detection

The RISE Series is presented as a **SMART IOT MODULE ROADMAP** and is a core part of the Rapidise multimedia platform. These modules are advanced, highly capable hardware platforms designed for integration into various products across sectors like Automotive, Retail, Health Care, Robotics, and crucially, Security and Surveillance.

I. Detailed Description of the RISE Module Series

The RISE modules are specialized computing units designed for high-performance edge processing, utilizing Qualcomm technology (implied by the use of Qualcomm platforms in related products).

Core Components and Performance Metrics

Each RISE module integrates sophisticated processing units necessary for running complex AI and multimedia applications, particularly Computer Vision tasks. The key components specified in the roadmap include:

1. **CPU (Central Processing Unit):** Many modules feature an **8 Core CPU**.
2. **NPU (Neural Processing Unit):** The NPU is critical for running AI algorithms at the edge. The performance of the NPU varies widely across the roadmap, indicating scalability for different application needs:
 - a. **Entry/Mid-Range:** RISE C1 offers **1 TOPS** or **1.1 TOPS**.
 - b. **Mid-Range:** RISE X1 offers **3.5 TOPS**. RISE X2 offers **5 TOPS**.
 - c. **High-End:** RISE X4 offers **12 TOPS**. RISE Z1 offers the highest performance listed at **48 TOPS**.
3. **ISP (Image Signal Processor):** These modules are designed to handle high-resolution camera input, featuring dual (up to 44MP) or triple (up to 58MP or 108MP) ISP capabilities.

4. **DSP (Digital Signal Processor) and GPU (Graphics Processing Unit):** All modules listed include specified DSP cores (e.g., 2 Core or Hexagon DSP) and dedicated GPUs with varying clock speeds (e.g., 315 MHz up to 950 MHz).

Specific Module Examples

- **RISE C1 Series:** This series includes specific form factors relevant to security, such as the **LTE CAMERA** and **BODY CAMERA**.
- **RISE X4:** This module, with its 12 TOPS NPU, is also targeted toward specialized roles like **Drones** for real-time object tracking and Military/Defense for environment monitoring.

II. Connection to Security and Surveillance

The RISE modules are fundamentally connected to security and surveillance by serving as the **Edge Computing** platform for running advanced **AI Algorithms**. The hardware specifications, particularly the powerful NPUs and ISPs, are optimized to enable sophisticated, real-time security functions directly on the device.

The RISE module roadmap explicitly lists the following security and surveillance applications:

RISE Module Series	Target Sector	Specific Application(s)	Source
RISE X1	Surveillance	Face Recognition, Gun Detection, Tailgating	
RISE C1 Series	Surveillance	Face Recognition, Gun Detection, Tailgating	
RISE C1 Series	Security	Home Surveillance, Alarms, Theft Alert	
RISE C1 Series	Smart City	Signal-Light Violation Alerts, Light Traffic Analytics, ANPR (Automatic Number Plate Recognition)	

This integration means that complex, AI-driven security analyses that traditionally required cloud processing can be performed locally on the **RISE module**, supporting core security expertise such as **AI on Edge** and **Camera Design & Manufacturing**.

The RISE modules, therefore, act as specialized, high-density processors for implementing specific AI-driven security functions, similar to how a **physical security guard** (the camera/module) is equipped with pre-programmed knowledge (the AI model) to immediately recognize and respond to specific threats—like recognizing a

familiar face (Face Recognition), spotting a restricted item (Gun Detection), or noticing unauthorized entry (Intrusion/Tailgating)—without needing constant, slow communication with a remote headquarters (the Cloud).