Milestone 1

REMOTELY CONTROLLED CAR VIA LTE OR WI-FI

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Overview

- Project: Remotely Controlled Car via LTE or Wi-Fi
- Milestone 1 focuses on tool investigation, initial demos, requirements, and design
- Built Electron + JavaScript UI demo with latency/time-to-display metrics
- Made UDP client and server connection

Progress Matrix

Task	Completion %	Christian	Joseph	Nicholas	Donoven	To do
1. Investigate tools	100%	25%	25%	25%	25%	none
2. Hello World demos	100%	Video	UI harness	UDP ESP32	UDP Laptop	none
3. Requirement Document	100%	20%	20%	30%	30%	none
4. Design Document	90%	25%	22%	22%	21%	Finalize Designs and add missing diagrams
5. Test Plan	100%	25%	25%	25%	25%	none
6. Implement, test & demo feature/module (UI + telemetry)	50%	0%	50%	0%	0%	wire image-path input; refine metrics
7. Implement, test & demo feature/module (network/video)	30%	15%	0%	15%	0%	implement bitrate adapt; debug UDP jitter

Task 1: Tool Investigation

- Compared networking stacks & crypto libraries
- Evaluated UI frameworks → selected Electron + JavaScript
- Confirmed Wi-Fi and LTE feasibility

Task 2: Hello World Demos

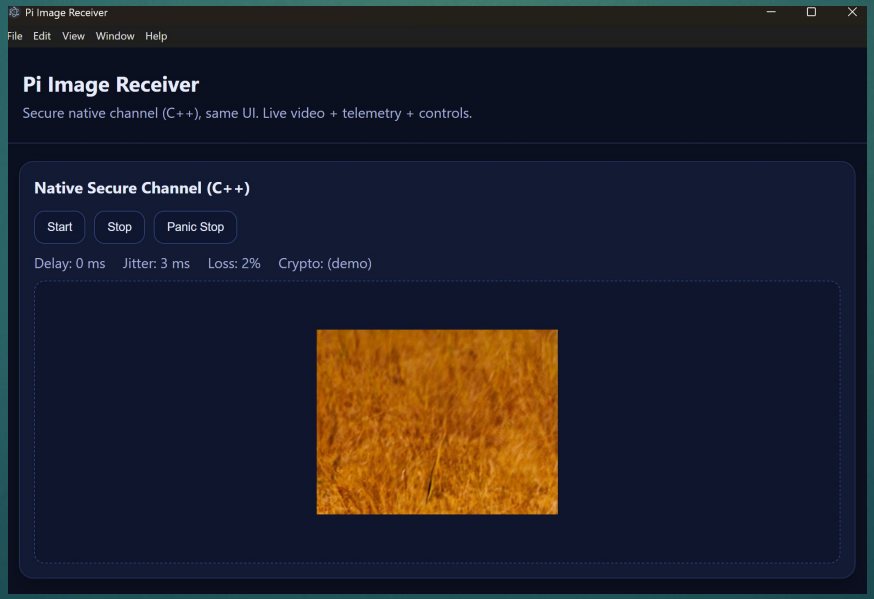
- UDP sender/receiver validated between Windows ↔ ESP32
- Electron shell displayed image feed
- Confirmed baseline operator interface & packet flow

Task 3-5: Docs

- Defined system goals & user stories
- Key latency constraint: <300ms end-to-end
- Captured functional + non-functional requirements
- Drafted 4-layer architecture: Video Capture, Transport, Secure Channel, UI + Telemetry
- Documented module interactions & design rationale
- Defined test cases for latency measurement, reconnection handling, safety mechanisms

Task 6: UI + Telemetry Demo

- Built Electron demo showing live video placeholder
- Displayed metrics: latency, jitter, packet loss, delay-to-display



Task 7: Networking + Video Integration

- Captured image from camera
- Set up UDP connection

```
nicks@raspberrypi:~/Server $ ./Server
Client : 1819043144
hello

Sent: Hello, UDP server!
Received: hello
```

Milestone 2 Task Matrix

Task	Nicholas Shenk	Christian Prieto	Joseph Digafe	Donoven Nicolas
Secure Channel Implementation	Integrate DTLS/AEAD, replay window tests	Integrate DTLS/AEAD, replay window tests	Protocol integration tests	Key/config loader
UI + Raspberry Pi Camera Integration	Video integration & layout wiring	Video integration & layout wiring	Telemetry expansion, controller loop (dead-man stop)	Failover status, LTE/Wi-Fi toggle
Telemetry Expansion	Latency & jitter metrics validation	Bitrate and video stats integration	Encryption status, delay meter in UI	Logging hooks, failover telemetry
Documentation Updates	Update networking/control path sections in Design Doc	Update video subsystem in Design Doc	Update UI + telemetry sections in SRD/Test Plan	Update failover + resilience sections in SRD/Test Plan

Task 1: Secure Channel

- Advisor-guided crypto choice (Custom AEAD, DTLS, TLS/WireGuard)
- Implement handshake, key schedule, replay protection
- Document nonce rules & rekey policy

Task 2: UI + Raspberry Pi Camera Integration

- Connect UI directly to live video stream from Pi camera
- Render encrypted video feed in operator console
- Validate latency and video quality in real conditions

Task 3: Telemetry Expansion

- Extend telemetry panel with latency, bitrate, encryption status
- Prepare data hooks for future failover metrics

Task 4: Documentation Updates

Update Requirements, Design, and Test Plan with:

- Final crypto decision
- Secure channel implementation details
- UI–camera integration flow

Meetings & Feedback

- Advisor meeting: Sep 02, oct 1, 2025 + follow-ups
- Feedback: Improvement to JPEG is too hard for this project. Better some parallelization, requirements and design draft adequate.