POC Document: Google Maps Navigation Integration

1. Objective

To implement a simplified, rider-friendly navigation interface on the **OKT507-C** (QT Environment) by processing Google Maps data and displaying glanceable turn-by-turn instructions.

2. Methodology: The Link-to-Cluster Workflow

Because the OKT507-C cannot run the full Google Maps app due to resource constraints and UI complexity, we use a **Gateway Approach**:

1. **Input:** A Google Maps URL (e.g., `https://maps.google.com/?q=17.3850,78.4867`) is shared or generated.
2. **Parsing:** The destination coordinates are extracted from the link.
3. **Cloud Sync:** The Firebase Realtime Database acts as the bridge. It stores the "Current Instruction" (e.g., "Left Turn in 200m").
4. **Output:** The OKT507-C reads this JSON and renders high-contrast navigation symbols.

3. Navigation Display Components

The OKT507-C interface is optimized for high visibility during daylight riding:

UI Element	Source Data	Description
Maneuver Icon	`nav/instruction`	Dynamic SVG/PNG (Left, Right, U-Turn, Straight).
Distance Bar	`nav/distance`	Countdown until the next maneuver (e.g., 500m → 100m).
Destination	`nav/target_name`	The name of the location derived from the Google Maps link.

| **ETA** | `nav/eta` | Estimated time of arrival calculated via the Maps API. |

4. Implementation Details (OKT507-C / QT)

On the OKT507-C side, the QT application performs the following:

- **Firebase Listener:** A background thread monitors the `/navigation` node for changes.
- **Symbol Mapping:** If the `action` is `turn-left`, the QT UI displays a large green arrow pointing left.
- **Glanceability:** The text size is kept at a minimum of **24pt** to ensure the rider can read it in 0.5 seconds.

5. Key Advantages of this Approach

- **Safety:** By using simplified arrows instead of a complex map, rider distraction is minimized.
- **Efficiency:** Passing a Google Maps link or coordinates through Firebase uses minimal data compared to streaming a full video/map feed.
- **Connectivity:** If the bike enters a tunnel and loses GPS, the OKT507-C displays the "Last Known Maneuver" until connectivity is restored