

# 10 - RouteTrack Pi — Shift Mode (SQLite + Flask API + Dashboard Controls)

**Date:** December 25, 2025

**Category:** Raspberry Pi / GPS / SQLite / Flask / Leaflet

**Backlink:** [09 - RouteTrack Pi — Dashboard Autostart \(Gunicorn + systemd\)](#)

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## Project Goal

This phase introduces **Shift Mode** to RouteTrack.

Shift Mode allows RouteTrack to track work sessions independently of calendar days, which is essential for a portable, vehicle-mounted system that:

- Is powered down frequently
- Moves between locations
- Does not follow strict midnight-to-midnight boundaries
- Needs accurate per-shift metrics (hours, stops, time-on-site)

The dashboard now supports a simple workflow: **Start Shift → Drive → End Shift**

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## Why Shift Mode Matters

Daily summaries work well for reporting, but they don't match real-world truck usage:

- Overnight work can cross calendar boundaries
- Reboots/power loss interrupt sessions
- Short test runs clutter daily totals

Shift Mode solves this by creating a clean “session boundary” that the user controls.

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# Database Changes

## New `shifts` Table

A new SQLite table stores shift metadata independently of GPS data.

**Table:** `shifts`

```
CREATE TABLE IF NOT EXISTS shifts (  
  id INTEGER PRIMARY KEY AUTOINCREMENT,  
  start_ts TEXT NOT NULL,  
  end_ts TEXT,  
  note TEXT  
);  
  
CREATE INDEX IF NOT EXISTS idx_shifts_start_ts  
  ON shifts(start_ts);
```

### Design Notes:

- `start_ts` and `end_ts` stored as UTC ISO-8601 strings
- `end_ts` stays `NULL` while a shift is active
- Only one active shift allowed at a time
- Lightweight, isolated table to minimize lock contention

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# Applying the Schema Safely

Because GPS logging writes constantly to SQLite, stop the logger before applying schema changes.

```
sudo systemctl stop routetrack-logger.service
sqlite3 /opt/routetrack/data/routetrack.sqlite < /opt/routetrack/config/schema.sql
sqlite3 /opt/routetrack/data/routetrack.sqlite ".tables"
sudo systemctl start routetrack-logger.service
```

Expected tables:

```
daily_summary gps_points shifts stop_events
```

# Flask API Enhancements (Full `app.py`)

Shift Mode is implemented via additional Flask API endpoints.

## New Endpoints

Method	Endpoint	Purpose
GET	<code>/api/shift/active</code>	Returns the active shift (if any)
POST	<code>/api/shift/start</code>	Starts a new shift
POST	<code>/api/shift/end</code>	Ends the active shift
GET	<code>/api/shift/summary</code>	Returns live stats for the active shift

## Replace `/opt/routetrack/web/app.py`

Edit:

```
sudo nano /opt/routetrack/web/app.py
```

Paste the full file:

```
#!/usr/bin/env python3
"""
RouteTrack Local Dashboard (Flask)
-----
```

Provides:

- Web UI page (Leaflet map)
- JSON API endpoints:
  - /api/summary/<date>
  - /api/points/<date>
  - /api/stops/<date>

Shift Mode endpoints:

- GET /api/shift/active
- POST /api/shift/start
- POST /api/shift/end
- GET /api/shift/summary

Notes:

- This dashboard is READ-ONLY for GPS-derived tables:
  - gps\_points, stop\_events, daily\_summary
- Shift Mode DOES write to SQLite, but only into the "shifts" table.
  - This avoids lock contention with the logger and keeps writes minimal.

"""

```
import sqlite3
from datetime import datetime, timezone

from flask import Flask, jsonify, render_template, request

DB_PATH = "/opt/routetrack/data/routetrack.sqlite"

app = Flask(__name__)
```

```
def db():
```

```
    """
```

```
    Open SQLite connection with Row output so we can jsonify results
    via dict(row).
```

```
    """
```

```
    conn = sqlite3.connect(DB_PATH)
    conn.row_factory = sqlite3.Row
    return conn
```

```
def utc_now_iso():
    """
    Return current UTC timestamp in ISO-8601 format (no microseconds).
    Example: 2025-12-25T16:05:00+00:00
    """
    return datetime.now(timezone.utc).replace(microsecond=0).isoformat()
```

```
@app.route("/")
```

```
def index():
    """Serve the dashboard HTML page (Leaflet UI)."""
    return render_template("index.html")
```

```
# =====
# Existing Daily Views (READ-ONLY)
# =====
```

```
@app.route("/api/summary/<day>")
```

```
def api_summary(day):
    """Return the daily_summary row for YYYY-MM-DD."""
    conn = db()
    cur = conn.cursor()
    cur.execute("SELECT * FROM daily_summary WHERE date = ?", (day,))
    row = cur.fetchone()
    conn.close()

    if not row:
        return jsonify({"error": "No summary for this date"}), 404

    return jsonify(dict(row))
```

```
@app.route("/api/points/<day>")
```

```
def api_points(day):
    """
    Return route points for a given day as a list of [lat, lon]
    suitable for drawing a Leaflet polyline.
    """
```

```

conn = db()
cur = conn.cursor()

start = f"{day}T00:00:00Z"
end = f"{day}T23:59:59Z"

cur.execute("""
    SELECT ts, lat, lon
    FROM gps_points
    WHERE ts >= ? AND ts <= ?
        AND mode = 3
        AND lat IS NOT NULL
        AND lon IS NOT NULL
    ORDER BY ts
""", (start, end))

rows = cur.fetchall()
conn.close()

return jsonify([[r["lat"], r["lon"]] for r in rows])

```

```
@app.route("/api/stops/<day>")
```

```
def api_stops(day):
```

```
    """
```

```
    Return stop events that START on a given day.
```

```
    """
```

```
    conn = db()
```

```
    cur = conn.cursor()
```

```
    start = f"{day}T00:00:00Z"
```

```
    end = f"{day}T23:59:59Z"
```

```
    cur.execute("""
```

```
        SELECT start_ts, end_ts, duration_seconds, lat, lon
```

```
        FROM stop_events
```

```
        WHERE start_ts >= ? AND start_ts <= ?
```

```
        ORDER BY start_ts
```

```
    """, (start, end))
```

```

rows = cur.fetchall()
conn.close()

return jsonify([dict(r) for r in rows])

# =====
# Shift Mode (writes only to shifts table)
# =====

@app.route("/api/shift/active")
def api_shift_active():
    """
    Returns the currently active shift (where end_ts is NULL),
    or {"active": false} if none exists.
    """
    conn = db()
    cur = conn.cursor()
    cur.execute("""
        SELECT *
        FROM shifts
        WHERE end_ts IS NULL
        ORDER BY id DESC
        LIMIT 1
    """)
    row = cur.fetchone()
    conn.close()

    if not row:
        return jsonify({"active": False})

    return jsonify(dict(row))

@app.route("/api/shift/start", methods=["POST"])
def api_shift_start():
    """
    Start a new shift.
    Prevents multiple active shifts at once.

```

Optional JSON body:

```
 {"note": "optional note here"}
```

```
 """
```

```
 note = ""
```

```
 try:
```

```
     payload = request.get_json(silent=True) or {}
```

```
     note = payload.get("note", "") or ""
```

```
 except Exception:
```

```
     note = ""
```

```
 conn = db()
```

```
 cur = conn.cursor()
```

```
 # Block starting a shift if one is already active
```

```
 cur.execute("SELECT id FROM shifts WHERE end_ts IS NULL LIMIT 1")
```

```
 if cur.fetchone():
```

```
     conn.close()
```

```
     return jsonify({"error": "A shift is already active."}), 409
```

```
 start_ts = utc_now_iso()
```

```
 cur.execute(
```

```
     "INSERT INTO shifts (start_ts, note) VALUES (?, ?)",
```

```
     (start_ts, note)
```

```
 )
```

```
 conn.commit()
```

```
 cur.execute("SELECT * FROM shifts WHERE id = last_insert_rowid()")
```

```
 row = cur.fetchone()
```

```
 conn.close()
```

```
 return jsonify(dict(row))
```

```
@app.route("/api/shift/end", methods=["POST"])
```

```
def api_shift_end():
```

```
 """
```

```
 End the currently active shift by setting end_ts.
```

```
 """
```

```
 conn = db()
```

```
 cur = conn.cursor()
```

```

cur.execute("""
    SELECT *
    FROM shifts
    WHERE end_ts IS NULL
    ORDER BY id DESC
    LIMIT 1
""")
row = cur.fetchone()

if not row:
    conn.close()
    return jsonify({"error": "No active shift."}), 404

end_ts = utc_now_iso()
cur.execute("UPDATE shifts SET end_ts = ? WHERE id = ?", (end_ts, row["id"]))
conn.commit()

cur.execute("SELECT * FROM shifts WHERE id = ?", (row["id"],))
updated = cur.fetchone()
conn.close()

return jsonify(dict(updated))

```

```
@app.route("/api/shift/summary")
```

```
def api_shift_summary():
```

```
    """
```

Returns a lightweight summary for the ACTIVE shift window.

Current output:

- shift window (start -> now)
- number of gps points in that window (mode=3)
- stop count + stopped seconds for stop\_events inside window

NOTE:

This does not compute miles yet. That comes next.

```
    """
```

```
conn = db()
```

```
cur = conn.cursor()
```

```

# Find active shift
cur.execute("""
    SELECT *
    FROM shifts
    WHERE end_ts IS NULL
    ORDER BY id DESC
    LIMIT 1
""")
shift = cur.fetchone()

if not shift:
    conn.close()
    return jsonify({"error": "No active shift."}), 404

start_ts = shift["start_ts"]
end_ts = utc_now_iso() # "now" for active shift

# gps_points stores timestamps with trailing "Z"
# shifts stores timestamps with "+00:00"
# Convert bounds for gps_points query
start_bound = start_ts.replace("+00:00", "Z")
end_bound = end_ts.replace("+00:00", "Z")

cur.execute("""
    SELECT COUNT(*) as point_count
    FROM gps_points
    WHERE ts >= ? AND ts <= ?
    AND mode = 3
    AND lat IS NOT NULL
    AND lon IS NOT NULL
""", (start_bound, end_bound))
point_row = cur.fetchone()

cur.execute("""
    SELECT COUNT(*) as stop_count,
           COALESCE(SUM(duration_seconds), 0) as stopped_s
    FROM stop_events
    WHERE start_ts >= ? AND end_ts <= ?
""", (start_ts, end_ts))

```

```
stop_row = cur.fetchone()

conn.close()

return jsonify({
    "shift_id": shift["id"],
    "start_ts": start_ts,
    "end_ts": end_ts,
    "points": int(point_row["point_count"] or 0),
    "stop_count": int(stop_row["stop_count"] or 0),
    "stopped_time_seconds": int(stop_row["stopped_s"] or 0),
    "note": shift["note"] or ""
})

if __name__ == "__main__":
    # Local dev run (manual)
    app.run(host="0.0.0.0", port=5000, debug=False)
```

Make executable:

```
sudo chmod +x /opt/routetrack/web/app.py
```

Restart dashboard service:

```
sudo systemctl restart routetrack-dashboard.service
```

---

# Dashboard UI Enhancements (Full index.html)

The dashboard top bar now includes Shift controls:

- Start Shift
- End Shift
- Refresh Shift
- Shift status pill

A new **Active Shift** section shows live stats and refreshes every 30 seconds.

# Replace

```
/opt/routetrack/web/templates/index.html
```

Edit:

```
sudo nano /opt/routetrack/web/templates/index.html
```

Paste the full file:

```
<!doctype html>
<html>
<head>
  <meta charset="utf-8" />
  <title>RouteTrack Dashboard</title>
  <meta name="viewport" content="width=device-width, initial-scale=1" />

  <!-- Leaflet (CDN) -->
  <link
    rel="stylesheet"
    href="https://unpkg.com/leaflet@1.9.4/dist/leaflet.css"
  />
  <script src="https://unpkg.com/leaflet@1.9.4/dist/leaflet.js"></script>

  <style>
    body { margin: 0; font-family: Arial, sans-serif; }
    #topbar { padding: 10px; background: #111; color: #fff; display: flex; gap: 10px; align-items: center; flex-
wrap: wrap; }
    #topbar button { cursor: pointer; }
    #map { height: 70vh; }
    #stats { padding: 10px; }
    .row { margin: 6px 0; }
    code { background: #eee; padding: 2px 4px; border-radius: 4px; }
    .pill { display: inline-block; padding: 2px 8px; border-radius: 999px; font-size: 12px; background: #333; color:
#fff; }
  </style>
</head>
```

```
<body>
  <div id="topbar">
    <strong>RouteTrack</strong> — Local Dashboard

    <span>|</span>

    <span>Date:</span>
    <input id="day" type="date" />
    <button onclick="loadAll()">Load Day</button>

    <span>|</span>

    <button onclick="startShift()">Start Shift</button>
    <button onclick="endShift()">End Shift</button>
    <button onclick="loadShift()">Refresh Shift</button>

    <span id="shiftStatus" class="pill">Shift: Unknown</span>
  </div>

  <div id="map"></div>

  <div id="stats">
    <h3>Active Shift</h3>
    <div id="shift"></div>

    <h3>Daily Summary</h3>
    <div id="summary"></div>

    <h3>Stops</h3>
    <div id="stops"></div>
  </div>

  <script>
    // Default date = today (browser local time)
    const dayInput = document.getElementById("day");
    dayInput.valueAsDate = new Date();

    const shiftDiv = document.getElementById("shift");
    const shiftStatus = document.getElementById("shiftStatus");
```

```
const map = L.map("map").setView([38.7153, -89.94], 13);

L.tileLayer("https://{s}.tile.openstreetmap.org/{z}/{x}/{y}.png", {
  maxZoom: 19,
  attribution: "&copy; OpenStreetMap contributors"
}).addTo(map);

let routeLine = null;
let stopMarkers = [];

// -----
// Day-Based Views
// -----
async function loadAll() {
  const day = dayInput.value;
  await loadRoute(day);
  await loadStops(day);
  await loadSummary(day);
}

async function loadRoute(day) {
  const res = await fetch(`/api/points/${day}`);
  const pts = await res.json();

  if (routeLine) map.removeLayer(routeLine);
  if (!pts.length) return;

  routeLine = L.polyline(pts, { weight: 4 }).addTo(map);
  map.fitBounds(routeLine.getBounds());
}

async function loadStops(day) {
  stopMarkers.forEach(m => map.removeLayer(m));
  stopMarkers = [];

  const res = await fetch(`/api/stops/${day}`);
  const stops = await res.json();

  const stopsDiv = document.getElementById("stops");
  stopsDiv.innerHTML = "";
```

```
if (!Array.isArray(stops) || !stops.length) {
  stopsDiv.innerHTML = "<div class='row'>No stops found.</div>";
  return;
}
```

```
stops.forEach(s => {
  const durMin = Math.round(s.duration_seconds / 60);
  stopsDiv.innerHTML += `<div class="row">
  Stop: <code>${s.start_ts}</code> → <code>${s.end_ts}</code>
  (${durMin} min)
</div>`;
```

```
if (s.lat && s.lon) {
  const m = L.marker([s.lat, s.lon]).addTo(map)
  .bindPopup(`Stop (${durMin} min)<br>${s.start_ts}`);
  stopMarkers.push(m);
}
});
}
```

```
async function loadSummary(day) {
  const summaryDiv = document.getElementById("summary");
  summaryDiv.innerHTML = "";
```

```
const res = await fetch(`/api/summary/${day}`);
const data = await res.json();
```

```
if (data.error) {
  summaryDiv.innerHTML = `<div class="row">No summary for ${day}. Run processor first.</div>`;
  return;
}
```

```
summaryDiv.innerHTML = `
<div class="row">Start: <code>${data.start_ts}</code></div>
<div class="row">End: <code>${data.end_ts}</code></div>
<div class="row">Distance: <strong>${data.total_distance_miles}</strong> miles</div>
<div class="row">Moving: <strong>${Math.round(data.moving_time_seconds/60)}</strong> minutes</div>
>
<div class="row">Stopped: <strong>${Math.round(data.stopped_time_seconds/60)}</strong> minutes</div>
```

```

div>
  <div class="row">Stops: <strong>${data.stop_count}</strong></div>
  `;
}

// -----
// Shift Mode
// -----
async function startShift() {
  const res = await fetch("/api/shift/start", {
    method: "POST",
    headers: {"Content-Type": "application/json"},
    body: JSON.stringify({ note: "" })
  });

  const data = await res.json();
  if (!res.ok) {
    alert(data.error || "Failed to start shift");
    return;
  }
  await loadShift();
}

async function endShift() {
  const res = await fetch("/api/shift/end", { method: "POST" });
  const data = await res.json();
  if (!res.ok) {
    alert(data.error || "Failed to end shift");
    return;
  }
  await loadShift();
}

async function loadShift() {
  shiftDiv.innerHTML = "";

  const activeRes = await fetch("/api/shift/active");
  const active = await activeRes.json();

  if (!active || active.active === false || !active.id) {

```

```

    shiftStatus.textContent = "Shift: Inactive";
    shiftDiv.innerHTML = "<div class='row'>No active shift. Click <strong>Start Shift</strong> to begin.</div>";
};
    return;
}

shiftStatus.textContent = `Shift: ACTIVE (#${active.id})`;

const sumRes = await fetch("/api/shift/summary");
const s = await sumRes.json();

if (s.error) {
    shiftDiv.innerHTML = `<div class='row'>${s.error}</div>`;
    return;
}

shiftDiv.innerHTML = `
<div class="row"><strong>Shift ID:</strong> ${s.shift_id}</div>
<div class="row"><strong>Start (UTC):</strong> <code>${s.start_ts}</code></div>
<div class="row"><strong>Now (UTC):</strong> <code>${s.end_ts}</code></div>
<div class="row"><strong>Stops (inside window):</strong> ${s.stop_count}</div>
<div class="row"><strong>Stopped Minutes:</strong> ${Math.round(s.stopped_time_seconds / 60)}</div>
>
<div class="row"><strong>GPS Points (mode=3):</strong> ${s.points}</div>
`;
}

// Auto-load on page open
loadAll();
loadShift();

// Auto-refresh active shift every 30s (handy for truck use)
setInterval(loadShift, 30000);
</script>
</body>
</html>

```

Restart dashboard:

```
sudo systemctl restart routetrack-dashboard.service
```

---

# Validation & Testing

Before starting a shift:

```
curl http://localhost:5000/api/shift/active
```

Expected:

```
{"active":false}
```

```
curl http://localhost:5000/api/shift/summary
```

Expected:

```
{"error":"No active shift."}
```

Dashboard validation:

- Start Shift creates an active session
- Refresh Shift updates live metrics
- End Shift closes session cleanly
- Status pill returns to “Shift: Inactive”

---

## Result

RouteTrack now supports:

- Continuous GPS logging
- Stop detection + daily summaries
- Local dashboard (Flask + Leaflet)
- **Shift Mode with user-controlled Start/End**
- Live shift summary panel in the UI

This moves RouteTrack closer to a true **truck-ready route tracking + session logging system**.

---

# Next Steps

Now that Shift Mode works end-to-end, next upgrades will add:

1. **Shift mileage + moving time**
  - Apply Haversine logic inside shift window
2. **Persist final shift totals**
  - Save a shift summary row when ending a shift
3. **Shift history**
  - List past shifts and export (CSV/GeoJSON)
4. Optional: offline map tiles

---

Revision #2

Created 25 December 2025 16:41:13 by Nate Nash

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