GreenGo

- ✅ Kickoff Talking Points
- ✅ Final project brief (problem, solution, dataset description, success criteria)
- ✅ Dataset file(s) & description of each column
- ✅ List of desired deliverables & deadlines (the milestones above)
- ✅ Access instructions for any shared drives or tools
- ✅ Mock Up

✅ Kickoff Talking Points

1. **Introduce yourself & GreenGo vision**
    - “Hi everyone, thank you for joining. My name is Alina, and I am the founder of GreenGo, a smart traffic light prediction app.”
    - “The idea came from noticing how much time and fuel is wasted at red lights in Toronto, and how dangerous it can be when drivers rush yellows.”
2. **Explain the project scope**
    - “Our MVP will focus on predicting how many seconds remain until the next traffic light change, and suggesting safe optimal driving speeds to catch more greens.”
3. **Highlight dataset**
    - “We’ve built a simulated dataset with timestamp, light states, vehicles, pedestrians, weather, and contextual data for both summer and winter conditions.”
4. **Discuss milestones & deliverables**
    - “Over the next 10 weeks, we’ll move from dataset validation to model development, then to building a functional prototype dashboard by late November.”

5. **Wrap up**
    - “The ultimate goal is to prove that traffic light prediction can be done in real time, paving the way for GreenGo to expand into city-wide smart mobility solutions.”

✅ GreenGo Project Brief

Project Name: GreenGo – Smart Traffic Light Prediction App

Problem:

- Drivers in Toronto and other major cities lose significant time waiting at red lights.
- This stop-and-go driving contributes to **traffic congestion, fuel waste, CO_2 emissions, and driver frustration**.
- Pedestrian and cyclist safety can be compromised when drivers attempt to “beat the light” instead of anticipating changes safely.
- Current navigation apps (Google Maps, Waze) do not predict **real-time traffic light changes**, leaving drivers without guidance.

Solution (GreenGo):

- GreenGo uses **traffic light data + prediction models** to estimate how many seconds remain until the next light change.
- Provides drivers with **optimal driving speeds** to catch more green lights, reduce idling, and drive more smoothly.
- Increases **safety** by reducing sudden stops/accelerations at intersections.
- Benefits include:
    - **Reduced accidents** caused by rushing yellow lights.
    - **Fuel and time savings** for drivers.
    - **Improved flow** for cars, bikes, and pedestrians.

Users:

- Everyday drivers in Toronto & GTA.
- Delivery/logistics drivers (Amazon, Uber, food delivery).
- City planners and municipalities (for smarter transportation systems).

Success Criteria (MVP):

- Accurate predictions of **time until light changes** for a simulated dataset.
- A working prototype that suggests **optimal driving speeds** to pass more green lights.
- User-friendly interface showing **traffic lights and prediction timers**.

✅ **Dataset Description**
Name: `greengo_dataset_weather_realistic.csv`

Columns:

- **timestamp** → Date & time of observation (e.g., `2025-07-18 08:01:00`).
- **intersection_id** → Unique ID for each traffic intersection.
- **current_light** → Current traffic light state (`Green`, `Yellow`, `Red`).
- **seconds_to_next_change** → Time remaining (in seconds) until the next traffic light change.
- **vehicle_count** → Number of vehicles detected in the intersection zone.
- **pedestrian_count** → Number of pedestrians detected near the intersection.
- **weather_condition** → Realistic weather conditions with seasonal alignment (`Sunny`, `Cloudy`, `Rainy`, `Snowy`). Weather only shifts a few times per day (3–6 blocks) and reflects Toronto's climate patterns (snow in winter, no snow in summer).
- **day_of_week** → Day of the week (e.g., `Friday`).
- **time_of_day** → Broad time-of-day category (`Morning`, `Afternoon`, `Evening`, `Night`).

- **latitude** → Latitude of the observation location (Toronto area).
- **longitude** → Longitude of the observation location (Toronto area).
- **acceleration** → Vehicle acceleration at the intersection (numeric).
- **visibility_category** → Categorical visibility level derived from weather: `Clear`, `Moderate`, or `Low`.
- **visibility_meters** → Approximate numeric visibility range in meters (higher in clear conditions, lower in rain/snow).
- **road_slipperiness** → Numeric scale (0.0–1.0) indicating road slipperiness risk. Default `0.0` in clear conditions, higher under rain/snow.
- **slipperiness_category** → Categorical interpretation of slipperiness (`Dry`, `Slight`, `Moderate`, `High`).
- **speed_limit_kmh** → Legal speed limit on the road segment approaching the intersection (numeric, km/h).
- **distance_to_next_light_m** → Distance from the vehicle to the upcoming traffic light (numeric, meters).
- **eta_to_light_s** → Estimated time of arrival at the next light based on current speed and distance (numeric, seconds).
- **predicted_state_at_arrival** → Expected traffic light state when the vehicle reaches the intersection (categorical: Green, Yellow, Red).
- **recommended_speed_kmh** → Suggested vehicle speed to optimize passing the light safely and efficiently (numeric, km/h).
- **lead_vehicle_speed_kmh** → Current speed of the vehicle directly ahead in the same lane (numeric, km/h).
- **headway_seconds** → Time gap between the subject vehicle and the lead vehicle, indicating following distance (numeric, seconds).
- **congestion_level** → Overall traffic density around the intersection (categorical: Low, Medium, High).

- **can_make_green (boolean)** → Indicates whether the vehicle can safely pass through the intersection before the light turns red (true/false).
- **safe_braking_required (boolean)** → Indicates whether the vehicle must begin braking to avoid entering the intersection unsafely (true/false).

Dataset Coverage:

- 2 full summer weeks (July 18 – August 01, 2025).
- 2 full winter weeks (Jan 10 – Jan 16, 2026).
- Represents **different traffic volumes, weather conditions, and times of day**.

✅ Deliverables & Deadlines (Milestones)

1. **Week 1 (Sep 9 – Sep 16):** Dataset review, cleaning, and validation.
2. **Week 2–3 (Sep 17 – Sep 30):** Develop baseline model to predict `seconds_to_next_change`.
3. **Week 4 (Oct 1 – Oct 7):** Integrate contextual features (weather, pedestrian, vehicles).
4. **Week 5–6 (Oct 8 – Oct 21):** Build prototype dashboard (visualizing lights + prediction timer).
5. **Week 7 (Oct 22 – Oct 28):** Test predictions on validation dataset.
6. **Week 8–9 (Oct 29 – Nov 11):** Improve accuracy, refine UI.
7. **Week 10 (Nov 12 – Nov 18):** User testing with sample drivers (simulated).
8. **Week 11 (Nov 19 – Nov 25):** Finalize MVP, prepare presentation/demo.

✅ Access Instructions

- **Dataset location**: The project dataset (`greengo_dataset_with_driving_logic.csv`) will be shared **through Riipen** with read/write access granted to the Cavendish University project team.

- **Communication channel**: Project communication will be conducted via **email** and **weekly Zoom sync meetings** for alignment, updates, and support. Any changes to the meeting schedule (e.g., due to illness) will be communicated as soon as possible.

✅ Mock Up