TOYOTA FORESIGHT

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DID YOU KNOW YOUR EV CAR IS SUFFERING?

Developed a predictive model for Toyota EVs to anticipate component failures, ensuring timely maintenance and prioritizing safety.

► Examples of Parts:

01 Battery

02 Electric Motor

03 Heated and Ventilating System (HVAC)

04 Braking

05 Safety (such as Airbags)

06 Fluids (such as Coolant)

Why Simulations?

-→ More Input Data -→ Accurate Predictions.
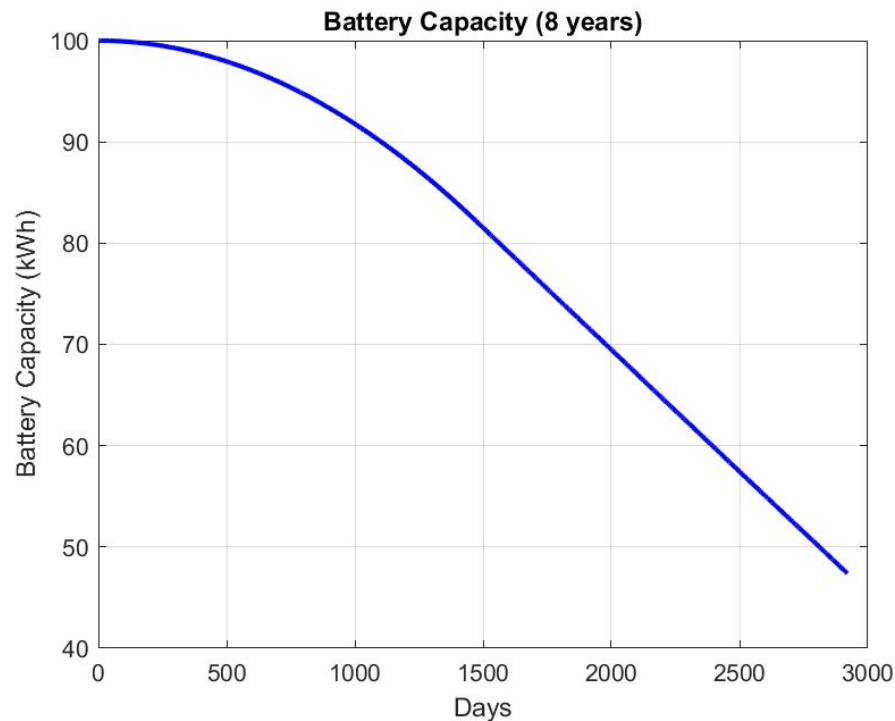
-→ Simulate real world data without tedious trails

Battery Max Capacity

Period: *8 years*
Initial Capacity: *100 kWh*
Final Capacity: *47.38 kWh*

* Tested against real world data provided by daily driven EV.

Battery Capacity (8 years)

Brake Pad Thickness

Period: **90,000 Miles**
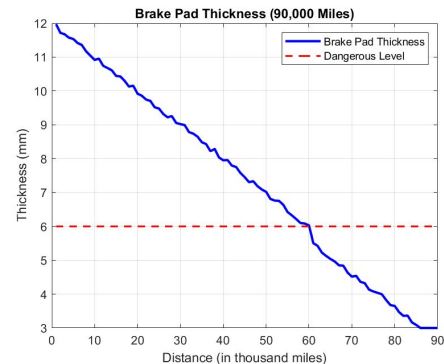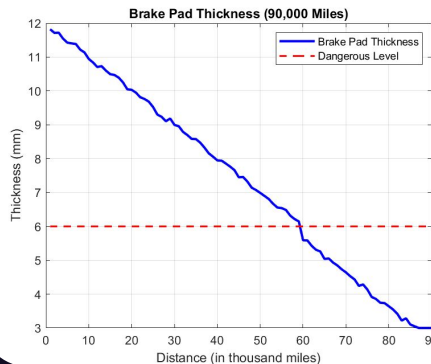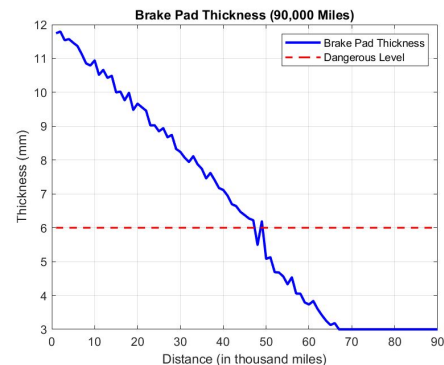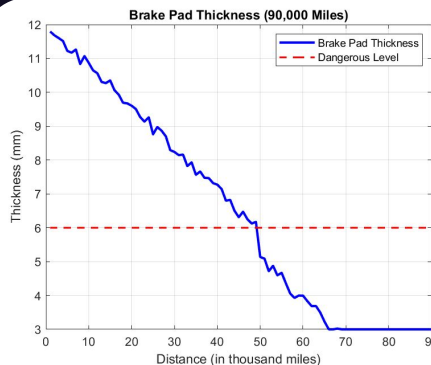Initial Thickness: **12mm**

Miles till **6mm**
FLW -⇢ **49,012 Miles**
FRW -⇢ **47,332 Miles**
RLW -⇢ **59,143 Miles**
RRW -⇢ **60,001 Miles**

More Pressure -⇢ Higher Coefficient of Friction -⇢ Faster Degradation

Borawski, Andrzej. "Testing Passenger Car Brake Pad Exploitation Time's Impact on the Values of the Coefficient of Friction and Abrasive Wear Rate Using a Pin-on-Disc Method." Materials (Basel, Switzerland), U.S. National Library of Medicine, 8 Mar. 2022, www.ncbi.nlm.nih.gov/pmc/articles/PMC8952483/.
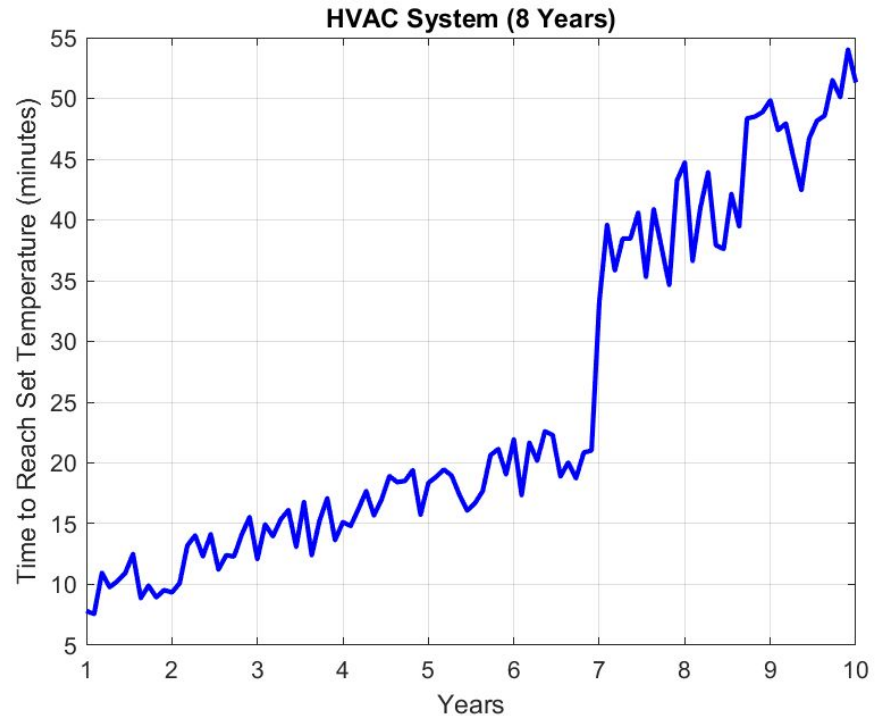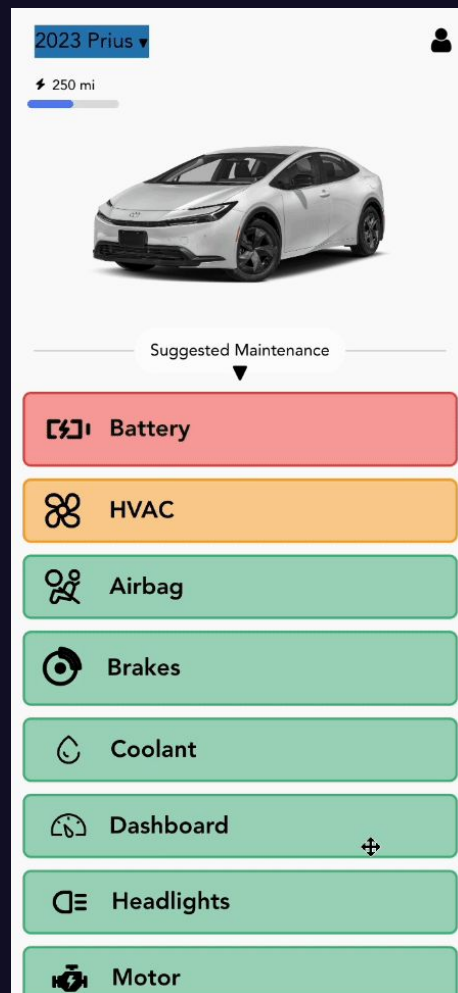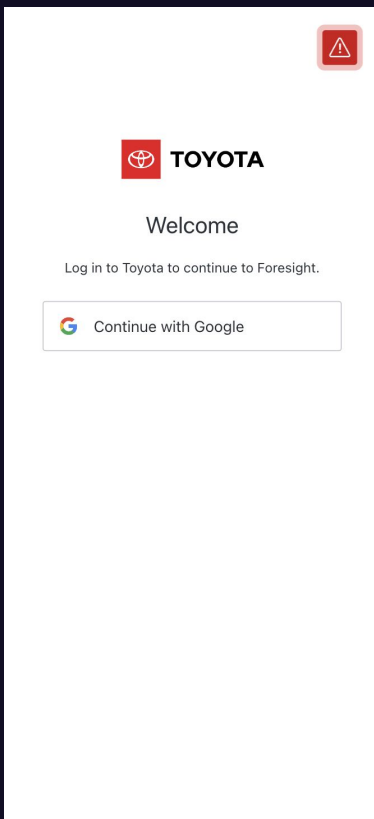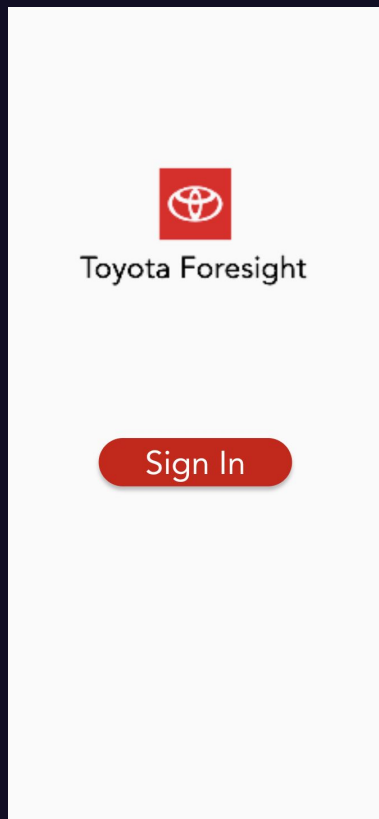
HVAC: Time to Setpoint

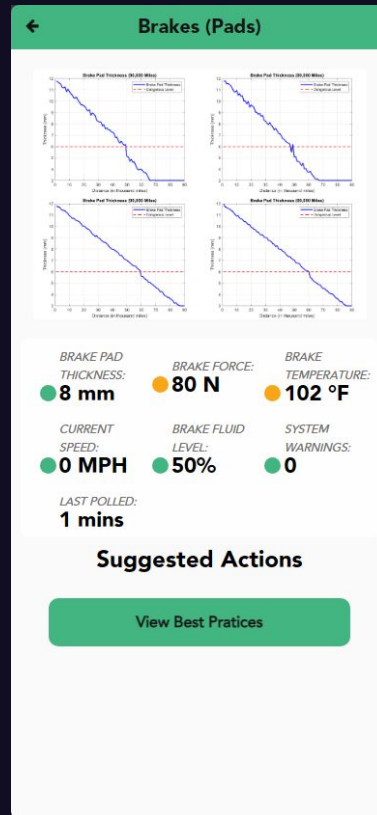Period: *10 Years*
Initial Setpoint Time: *5-10 Minutes*
Final Setpoint Time: *47-53 Minutes*

König, Adrian, et al. "The Impact of HVAC on the Development of Autonomous and Electric Vehicle Concepts." MDPI, Multidisciplinary Digital Publishing Institute, 9 Jan. 2022, www.mdpi.com/1996-1073/15/2/441.

▶ **Prototype**

▶ Prototype

Battery

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Battery Capacity (8 years)

VOLTAGE: 🟢 320 V	TEMPERATURE: 🔴 92 °F	CURRENT: 🟢 80 A
CHARGING: Yes	CHARGING SPEED: 🟢 40 kW	DISCHARGING SPEED: 🟢 0 kW
BATTERY HEALTH: 🔴 68 %	SYSTEM WARNINGS: 🔴 2	LAST POLLED: 3 mins

Suggested Actions

Schedule Repair

Contact Dealer

View Best Pratices

HVAC

←

HVAC System (8 Years)

INDOOR TEMP: 🟢 72 °F	OUTDOOR TEMP: 🟢 80 °F	FAN SPEED: 🟡 High
AIRFLOW: 🟢 50%	AIR QUALITY: 🟢 72%	ENERGY USAGE: 🟢 5 kW
SYSTEM WARNINGS: 🟡 1	LAST POLLED: 5 mins	

Suggested Actions

Schedule Repair

Order Replacement

View Best Pratices

Brakes (Pads)

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BRAKE PAD THICKNESS: 🟢 8 mm	BRAKE FORCE: 🟢 80 N	BRAKE TEMPERATURE: 🟡 102 °F
CURRENT SPEED: 🟢 0 MPH	BRAKE FLUID LEVEL: 🟢 50%	SYSTEM WARNINGS: 🟢 0
LAST POLLED: 1 mins		

Suggested Actions

View Best Pratices

Our Application Tech Stack

Future Implementations

-→ Inclusion of additional sensors and components

-→ Integrating with the existing Toyota app