

Applied AI in Traffic Engineering

Practical chatbot, AI, and automation workflows for traffic engineering

05.15.2026 // Bailee Allen-Arizpe



Agenda

01 // INTRODUCTION

02 // BEFORE WE TALK AI & AUTOMATION

03 // WHAT AI IS, AND WHAT IT ISN'T

04 // YOU STILL HOLD THE CONTROLLER

05 // NOW LET'S MAKE THIS REAL

06 // TURNING IDEAS INTO ACTION



01

INTRODUCTION



A Little About Me



Bailee Allen-Arizpe, PE

Education:

- Allen ISD
- Texas A&M University '21
 - BS in Civil Engineering
(Construction Management)
 - Minor in Project Management
 - Certificate in Holistic Leadership

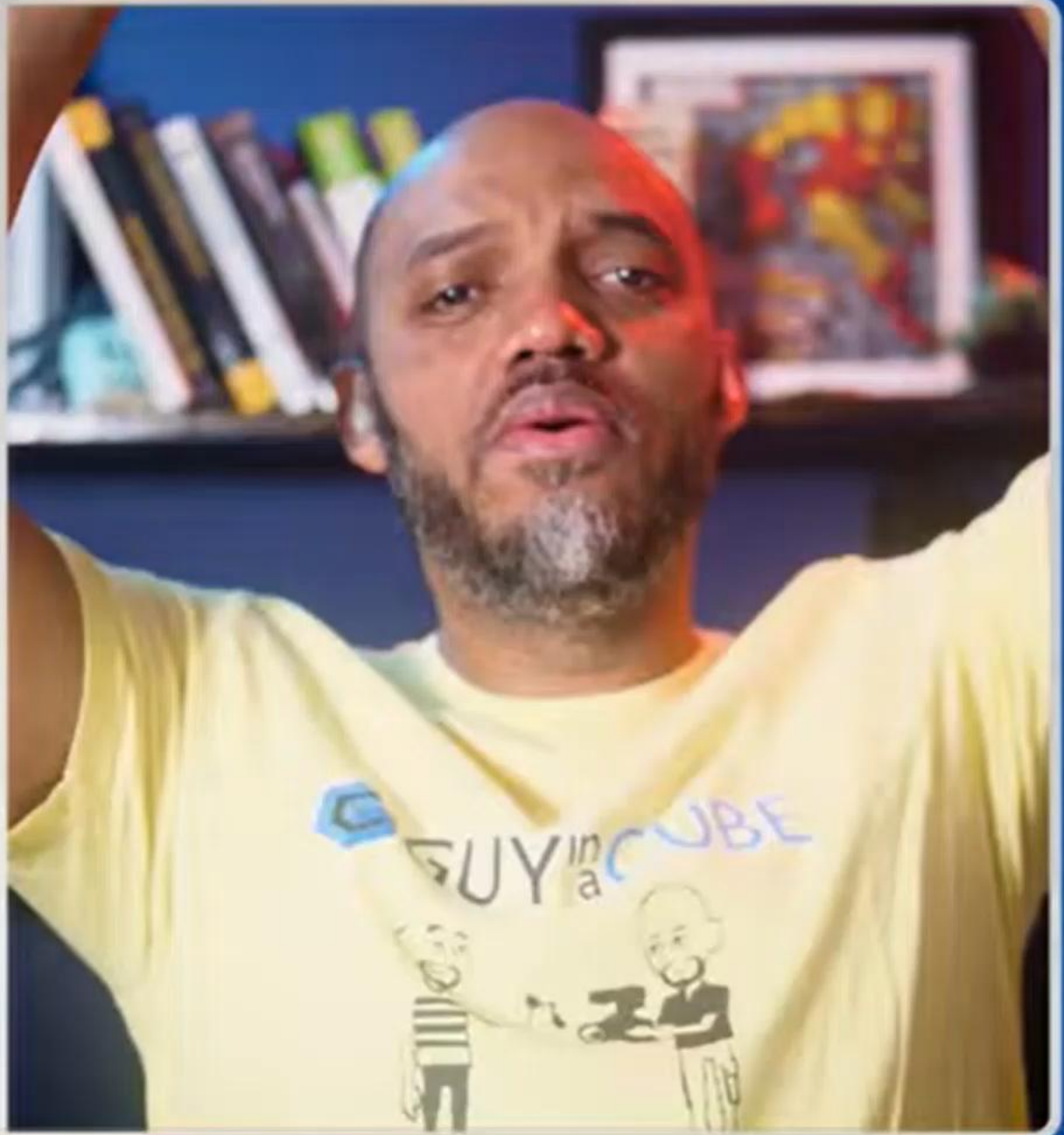
Career:

- 5 Years at Burns & McDonnell
 - Internship in Roadway Design
 - Traffic Engineer and Analyst

Personal:

- Coffee enthusiast
- Love of the outdoors and working out
- Enjoy traveling for new perspectives

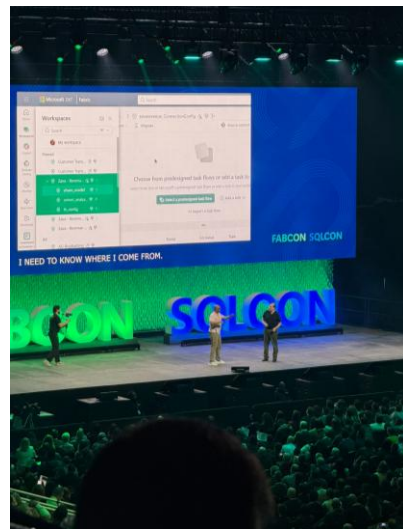




FABCON | SQLCON 2026



FABCON | SQLCON 2026



02

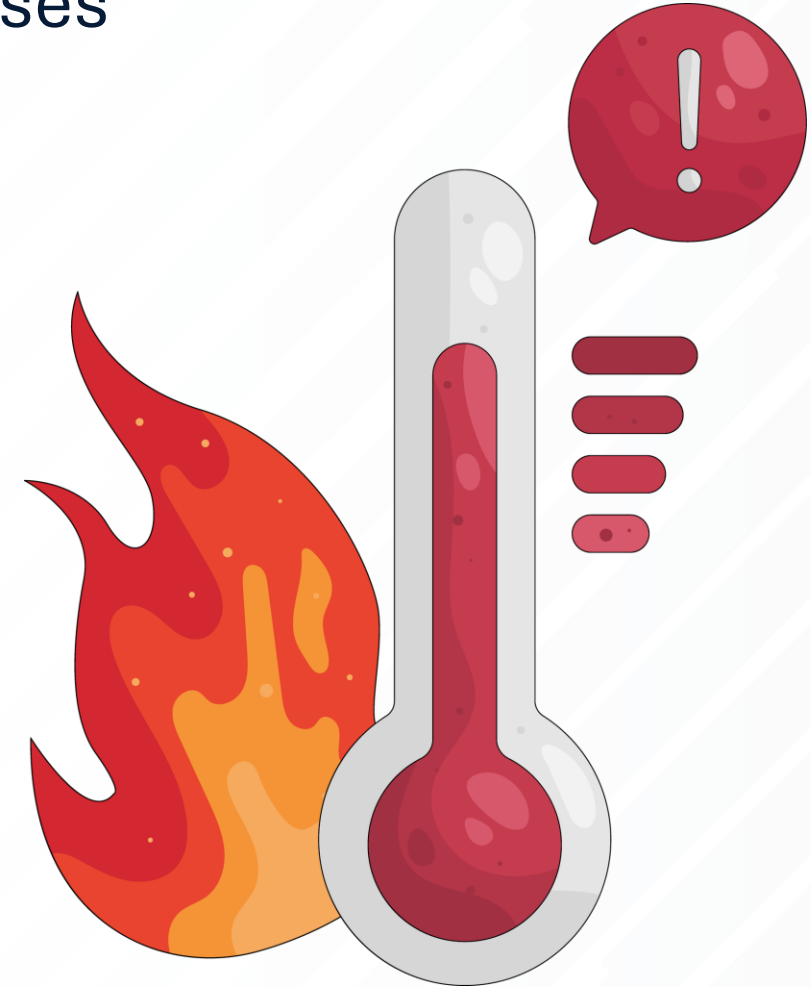
BEFORE WE TALK AI & AUTOMATION

A moment to reflect on safety, intent,
and how the projects we work on affect
people, including ourselves!





- Local Reality: 300+ Deaths and 1,700+ Illnesses
- Heat Illness Progression:
 - Stress → fatigue, headache
 - Exhaustion → dizziness, cramps
 - Stroke → confusion, collapse (often fatal)
- Stay Ahead of the Heat
 - Hydrate
 - Take frequent breaks
 - Watch your team

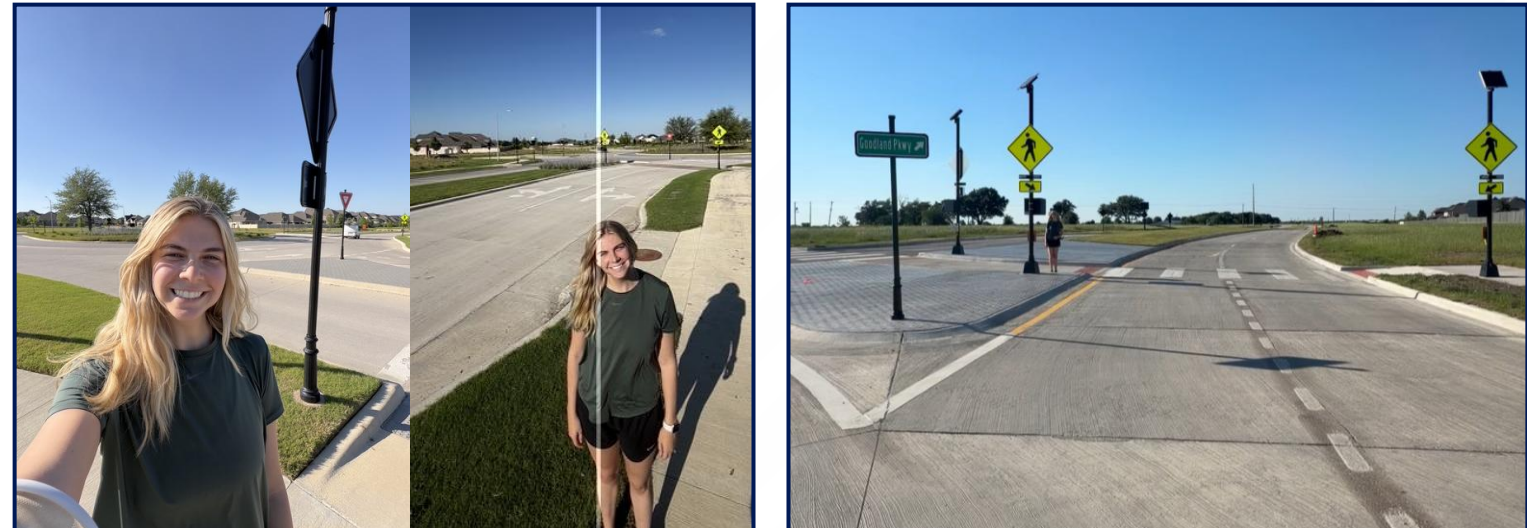




US 67 EXPRESS LANES



GOODLAND PARKWAY



03

WHAT AI IS, AND WHAT IT ISN'T

A practical look at AI capabilities, limitations, and common misunderstandings. Separating real capabilities from hype.







01. COST

M365 Copilot: **\$30**
Power Automate Premium: **\$15**
Power Apps Premium: **\$20**
GitHub Copilot Business: **\$19**
ChatGPT Business: **\$20**

Total \$ / month = **\$104 /month**

02. CAPACITY

- Data storage
- Topics per bot
- Requests per minute
- Message consumption
- Number of files
- File size
- Tokens or credits = capacity packs

03. CAPABILITIES

Fast, helpful, and **sometimes wrong**.

AI is a tool, not a replacement for engineering judgment.



ChatGPT

OpenAI



Brainstorming Partner

Strengths

Drafting
Automation

Weaknesses

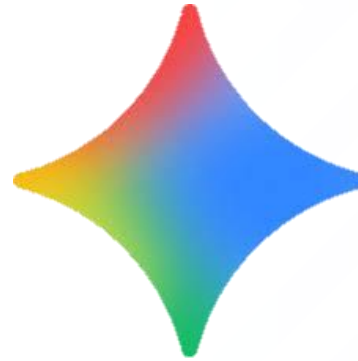
Specializing
Scaling

Applications: Emails and Memos,
Workflow Automation, General
Support

**In development since 2015, released in 2022*

Gemini

Google



Data Engine

Strengths

Analyzing
Researching

Weaknesses

Verifying
Refining

Applications: Large Dataset Review,
Research Tasks, Multimodal
Analyses

**In development since 2023, released in 2024*

Claude

Anthropic



Technical Reviewer

Strengths

Reviewing
Structuring

Weaknesses

Alternatives
Exploring

Applications: Technical Reports,
Code Review, Quality
Documentation

**In development since 2021, released in 2023*

04

YOU STILL HOLD THE CONTROLLER

Why engineering judgment, accountability, and decision-making remain human. Identifying the role of the engineer in an AI-assisted workflow.

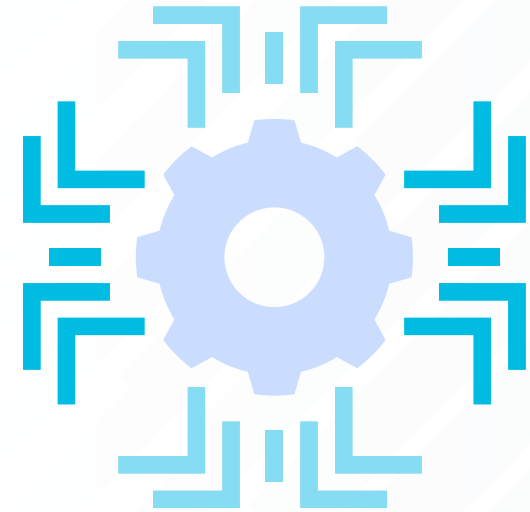




AI helps to accelerate processes but should not make the ultimate decision. You are still responsible for:

1. Defining the Problem
2. Validating the Output
3. Owning the Decision

AI is only as good as the decisions guiding it





- Limits of Local History
 - Unwritten Rules
 - Reviewer History
- Stakeholder Dynamics
 - Jurisdiction Preference
 - Sensitivity to Intersection Control Types
 - Local School Zones or Downtown Centers

Use AI for Decision Support not Decision Making

05

NOW LET'S MAKE THIS REAL

Concrete examples of AI and
automation in everyday engineering
workflows.





COPILOT
INTEGRATION



GITHUB
DEVELOPING



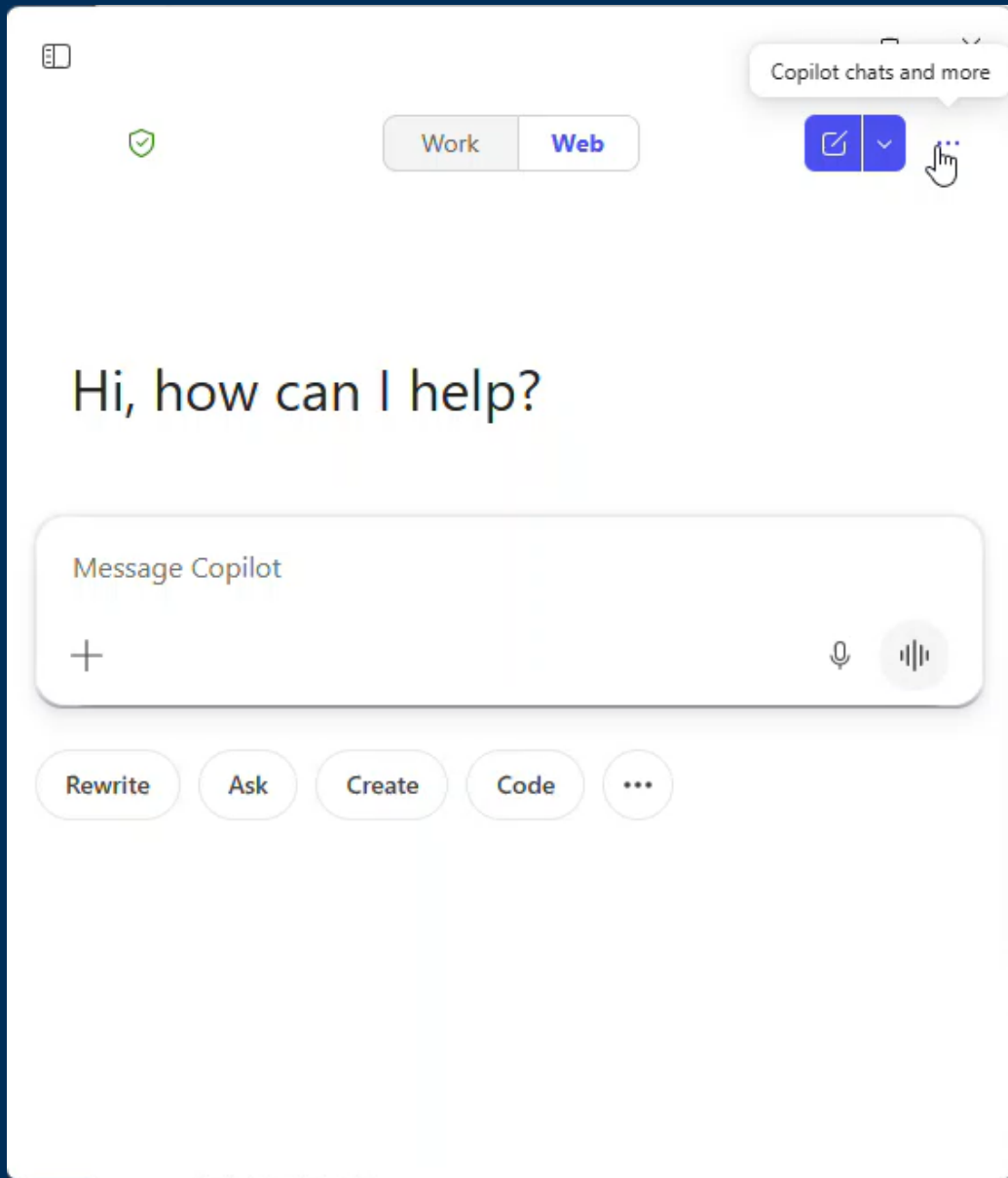


CHAT BOT USAGE

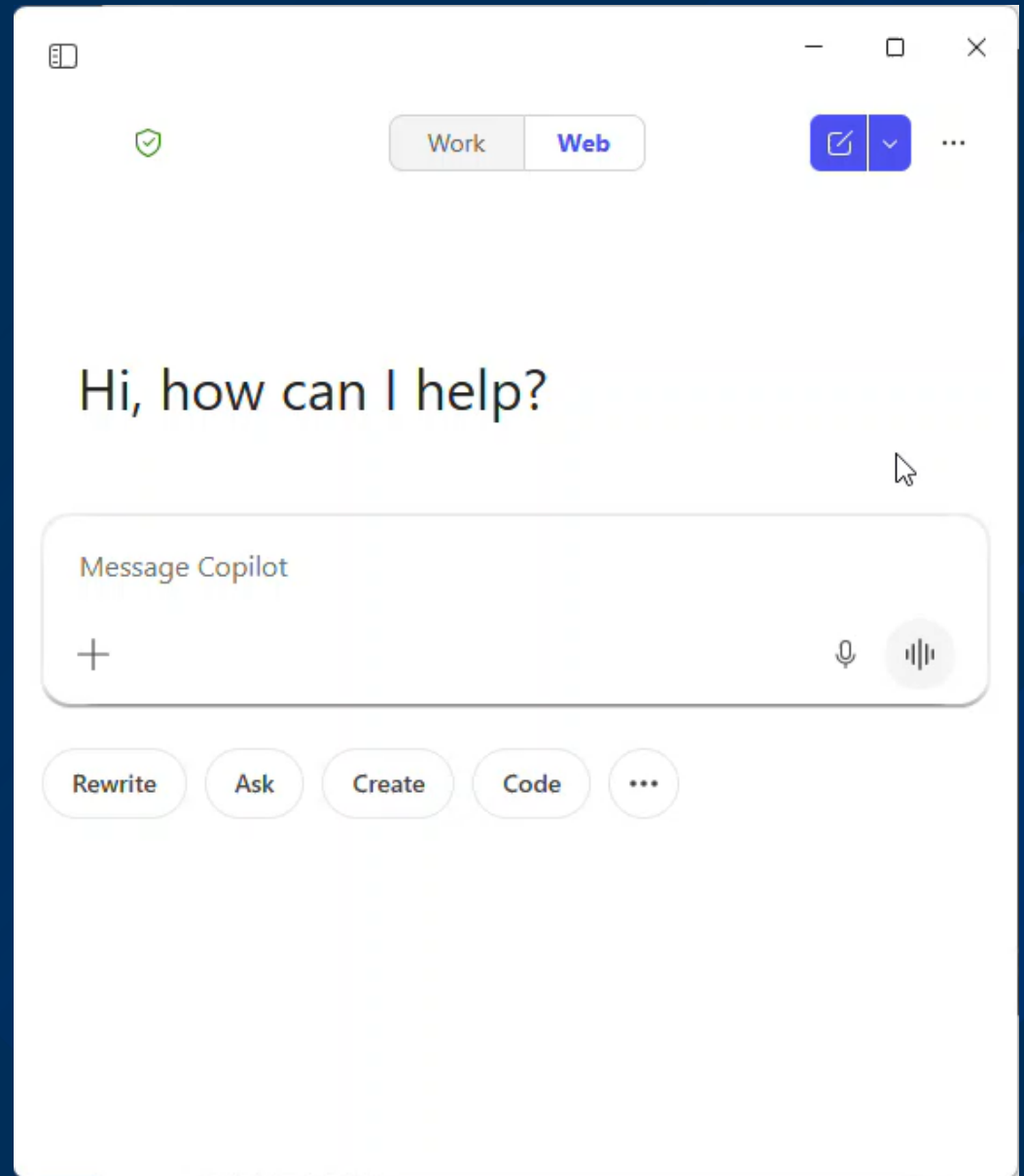
EIT FOCUSED DEMO | PRACTICAL ENGINEERING WORKFLOW

Entry level engineers don't struggle to **find information**, they struggle to apply and interpret it, and that's where **AI prompting** transforms search into understanding.





PUSH PROMPTING EXAMPLE



PULL PROMPTING EXAMPLE



PROMPTING

ASK QUESTIONS

PUSH PROMPTING...

USED FOR STRUCTURED TASKS WHERE YOU CLEARLY DEFINE INPUTS AND EXPECT A PRECISE, REPEATABLE OUTPUT FROM THE AI.

DEFAULT

DISCUSS TOPICS

PULL PROMPTING...

USED FOR OPEN-ENDED THINKING WHERE YOU INTERACT WITH THE AI TO EXPLORE IDEAS, REFINE DIRECTION, AND GUIDE PROBLEM-SOLVING.

VALUE





AUTOMATION USAGE

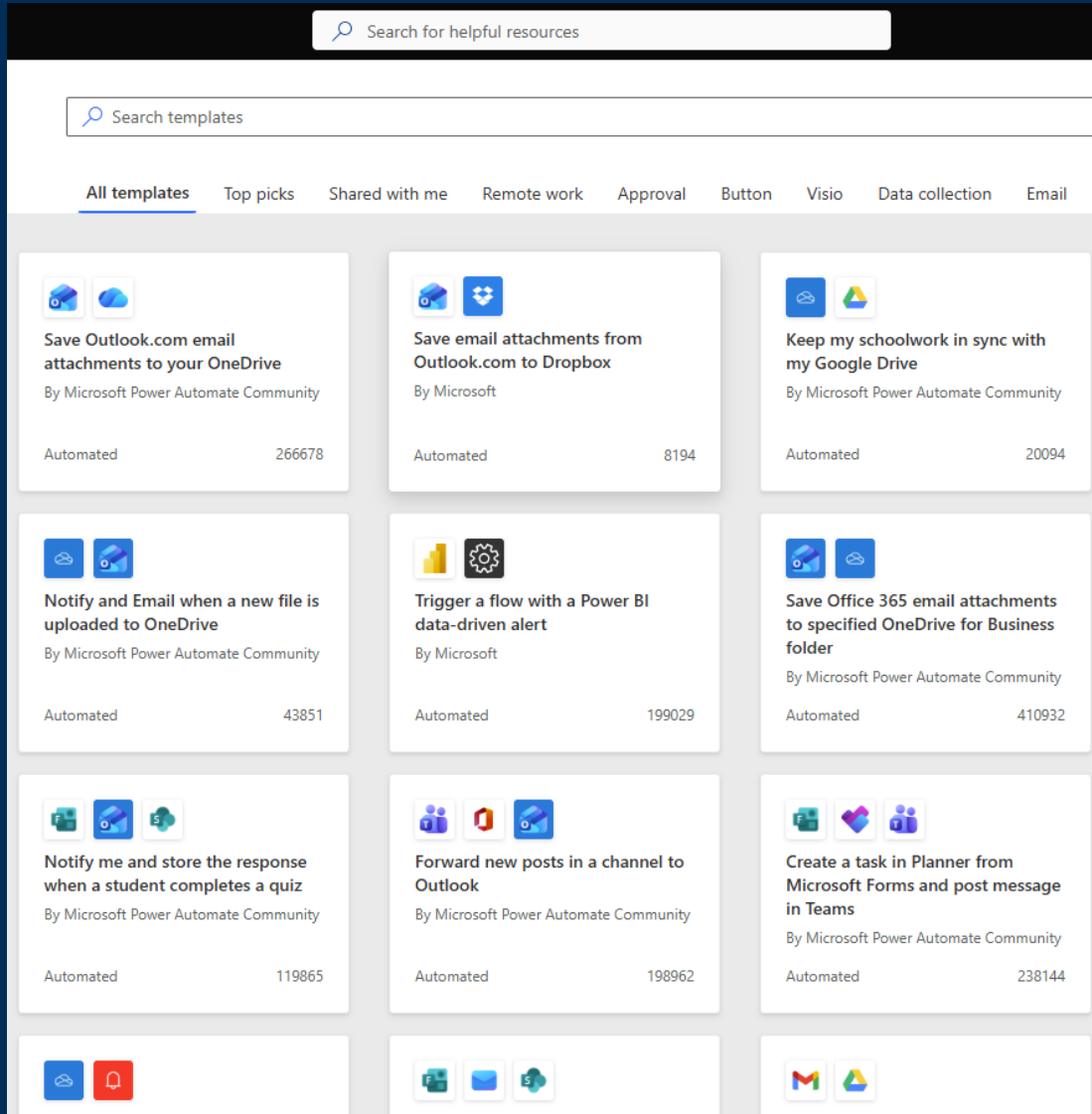
PROJECT MANAGER & TASK LEAD FOCUSED DEMO | PRACTICAL AUTOMATION FLOWS

Traditionally, task leads keep projects moving by **manually** chasing updates across emails, spreadsheets, and reminders... spending time managing the process instead of progressing the work.



DEMO #2: LEVERAGING AI

Power Automate // Templates



- Templates are pre-built automation flows that make it easy to get started
- Why use templates?
 - Built on proven, working logic
 - Reduce trial & error
 - Common applications
- Where AI is still important
 - Niche applications or connections
 - Understanding the workflow



DEMO #2: LEVERAGING AI

Power Automate // Workflow Ideas



All templates **Top picks** Shared with me Remote work Approval Button Visio Data collection Email Calendar Mobile ...

Workflow Title	By	Frequency	Views
Follow up on a message	Microsoft Power Automate Community	Instant	1147442
Schedule a reply to send at the perfect time	Microsoft Power Automate Community	Instant	655896
Forward your emails to a channel	Microsoft Power Automate Community	Automated	306669
Automate weekly reminders and updates in a chat	Microsoft Power Automate Community	Scheduled	255694
Analyze emails sentiment with AI Builder and send results to Teams	Microsoft	Automated	128263
Forward your emails to a chat	Microsoft Power Automate Community	Automated	100159
Automate weekly reminders and updates in a channel	Microsoft Power Automate Community	Scheduled	97176
Automatically schedule a meeting with a message sender	Microsoft Power Automate Community	Instant	95920
Summarize emails using GPT	Microsoft	Automated	74662
Get notified privately when someone fills out a form	Microsoft Power Automate Community	Automated	31635
Notify a chat when Planner tasks change status	Microsoft	Automated	20421
Create an Asana task from a message	Microsoft	Instant	12972

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ANALYTICAL USAGE

TECHNICAL FOLKS & DATA ENGINEERS FOCUSED DEMO | HOLISTIC AI APPLICATION

Before AI, building an analytical pipeline meant not just understanding the data, but knowing how to **structure** models, **build** visuals, and **create** tools to interact with it.



- [Crash tree analysis - Pedestrian and Pedalcyclist injuries](#)

Obtaining crash data

Specific, publicly available crash data may be requested by completing and submitting the [online request form](#).

Automated crash data extract files

In cases where users want large amounts of crash data and their requests cannot be fulfilled through a Crash Data Request or through the Query tool, TxDOT offers an automated process for users to obtain crash data directly from CRIS in the form of comma separated value (CSV) extract files. The process to obtain the file allows users to make requests at their convenience after an easy, one-time, self-registration process.

The file includes crash data collected in TxDOT's Crash Records Information System from the Texas Peace Officer's Crash Report (form CR-3) for the previous 10 years, plus the current year (Jan. 1, 2014 to present). There are two file types available.

- The standard extract provides crash data for crashes occurring on the state highway system. This file includes personally identifiable information and is only available to certain governmental agencies in accordance with Texas law.
- The public extract includes all publicly available crash data. All personally identifiable information has been excluded from this file and the file is available to the public upon request.

The [CRIS Automated Interface Guide](#) provides instructions on how to register and receive the extract files. The extract specification files below contain all of the data in fields that are included in each type of extract file along with their codes and effective beginning and end dates.

Extract files

Date	Title
06/13/25	Standard Extract File Specification
06/13/25	Public Extract File Specification

For additional information (not to submit a request), please [email us](#) or contact the CRIS Help Desk at 844-CRIS-HLP (844-274-7457).

AI Front to End Solution // Open Source Data

- TxDOT Open Crash Data Request
- Raw Data Information
 - Multiple files extracted
 - What are the relationships between the data sets?

Name	Status	Date modified	Type	Size
2018	🟢	6/19/2025 1:35 PM	Compressed (zipp...	159,230 KB
extract_public_2018_20250619113359_charges_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	54,548 KB
extract_public_2018_20250619113359_crash_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	279,242 KB
extract_public_2018_20250619113359_damages_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	2,693 KB
extract_public_2018_20250619113359_endorsements_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	17,009 KB
extract_public_2018_20250619113359_lookup_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	428 KB
extract_public_2018_20250619113359_person_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	26,540 KB
extract_public_2018_20250619113359_primaryperson_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	87,535 KB
extract_public_2018_20250619113359_restrictions_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	16,953 KB
extract_public_2018_20250619113359_unit_20180101-20181231Texas	🟢	6/19/2025 12:11 PM	Microsoft Excel C...	219,376 KB
extract_public_2018_20250619113359695_111873_20180101-20181231Texas_manifest	🟢	6/19/2025 12:11 PM	XML File	20,896 KB



EXPLORER

- UNTITLED (WORKSPACE)
 - Automation
 - .venv
 - .vscode
 - Data Extraction (Traffic Counts)
 - OneNote to Template
 - Synchro Automation
 - Trip Distribution (TIA) Prompts
 - TxDOT CRIS Crash Data
 - 2015
 - 2016
 - 2017
 - 2018
 - 2019
 - 2020
 - 2021
 - 2022
 - 2023
 - 2023_transition_deduped
 - 2024
 - 2025
 - Config
 - build_2023_transition_dataset.py
 - POWERBI_MODEL_BLUEPRINT.md**
 - public-extract-file-specification.xlsx
 - Volume Figure Automation

```

1 # TxDOT CRIS → Power BI Semantic Model Blueprint
2
3 ## Star Schema Design
4
5
6
7     FACT: fCrash
8     (one row per crash, key: Crash_ID)
9
10
11     dCrashAttributes (1:1)
12     dLocation (1:1)
13     dRoadway (1:1)
14     dWeather (1:1)
15     dInvestigation (1:1)
16     fUnit (1:∞)
17
18         dVehicle (1:1)
19         dCMV (1:0-1)
20         fPerson (1:∞)
21
22             dPerson (1:0-1)
23             dDriver (1:0-1 if primaryperson)
24             fCharges (1:∞)
25
26                 dChargeCodex (1:1)
27
28     fDamages (1:∞ from fCrash)
29     dDamageCodex (1:1)
30
31     fEndorsements (1:∞ from fUnit)
32     fRestrictions (1:∞ from fUnit)
33
34     dLookup: Universal codex for all ID fields
35
36
37 ---
38
39 ## Table Design & Column Strategy
40
41 ### Fact Tables (Keep detail rows; minimal aggregation)
42
43 #### **fCrash** (core facts)
44 **Key: Crash_ID**
  
```

CHAT

TxDOT DATA SEMANTIC MODEL SETUP

Created POWERBI_MODEL_BLUEPRINT.md

Done! I've created a comprehensive Power BI semantic model blueprint tailored to your TxDOT CRIS data. It's saved as **POWERBI_MODEL_BLUEPRINT.md** in your TxDOT folder.

The blueprint includes:

- Star Schema Design**
Visual hierarchy showing how fCrash (core fact) connects through fUnit → fPerson → fCharges, plus fDamages, fEndorsements, fRestrictions, and a universal dLookup codex.
- Table Design & Column Strategy**
Exactly which columns to keep/drop in each table (crash, unit, person, primaryperson, charges, damages, endorsements, restrictions, lookup). Separated into fact tables (keep detail) and dimension tables (denormalize for speed).
- Power Query M Code**
Ready-to-use templates for:
 - Combining year-by-year CSVs from your folder structure
 - Loading each fact/dimension table with correct data types
 - Left-outer joins to decode all ID fields via dLookup
- DAX Measures Starter Pack**
~40 production-ready measures covering:
 - Volume:** Crashes, Units, Persons, Injuries, Deaths
 - Rates:** Fatal crash %, CMV involvement %, School bus %
 - Severity:** By crash type, injury class, demographic
 - Time:** Hour of day, day of week, year-over-year trends
 - Location:** By county, corridor, urban/rural

1 file changed +673 -1

POWERBI_MODEL_BLUEPRINT.md

Describe what to build

Local Default Approvals

SESSIONS

New Session

YESTERDAY 1

- TxDOT data semantic model setup +673 -1 · 1 day ago

LAST 7 DAYS 1

- Building a semantic model with TxDOT data 6 days ago

OLDER 2

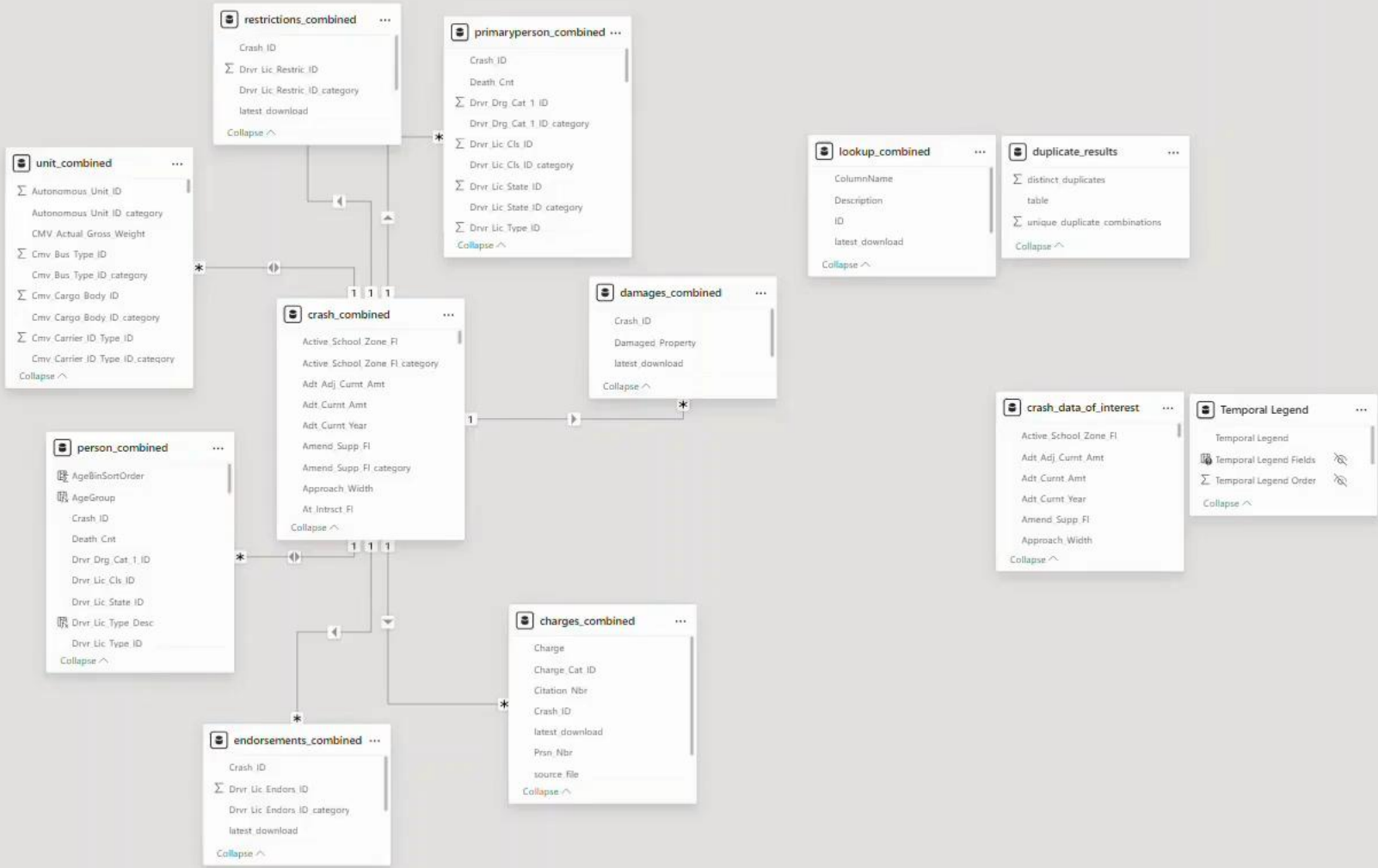
- Sorting Traffic Data Files with Python Script 2 mos ago
- General greeting inquiry 3 mos ago

OUTPUT

Filter (e.g. text, lexcludeText, t...)

Python Environments

C:\Users\baallen\AppData\Local\Programs\Python\Python314\python.exe



Data

Tables Model

Search

- charges_combined
- crash_combined
- crash_data_of_interest
- damages_combined
- duplicate_results
- endorsements_combined
- lookup_combined
- person_combined
- primaryperson_combined
- restrictions_combined
- Temporal Legend
- unit_combined

06

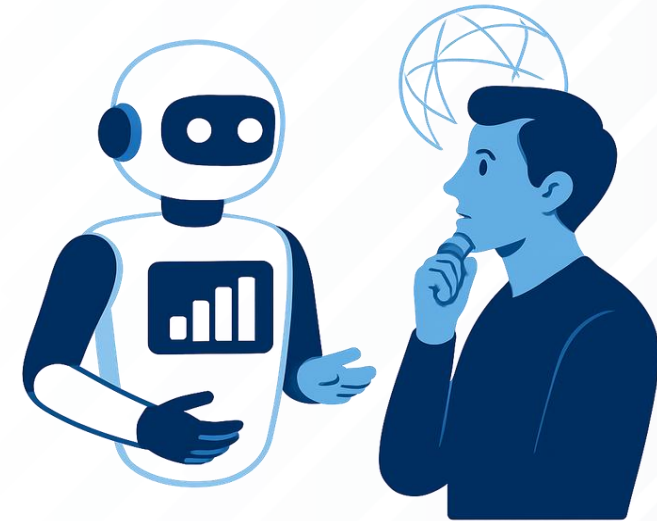
TURNING IDEAS INTO ACTION

How to move from curiosity to implementation. Practical ways to start small and apply these ideas responsibly.





- Low risk ways to get started... pick one pain point to improve and remember progress > perfection.
- Option #1: Create a Notebook
- Option #2: Practice Pull Prompting
- Option #3: Join a Community
- This is about shared momentum
 - Building on what works and learning collectively over time
 - Share what works and use what works!



“ AI is raising the floor, but
human ingenuity will
raise the ceiling.

Dara Treseder

CMO of Autodesk





Thank You