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PRACTICAL AI IN CONSTRUCTION

What types of AI
Asking the right question
Preprompting
Live Demo

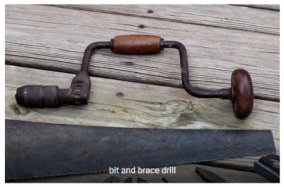
Who am I and What do I do?

- Started Using AutoCAD in 1993 DOS and Windows 3.11
- GIS Mapping Utilized A Pen Computer (tablet)
- Survey Crew Chief with CAD Knowledge
- Electrical Designer - MEP Engineering Firm
- Self Employed BIM Services and Consultant
- BIM/VDC Manager
- Director of Construction Technology
- Director of Technology and Innovation

I have always found ways to implement technology into the field with the mentality of:

"How can we use technology to make the field personnel's job more productive."

Regular tools evolved, so will digital tools



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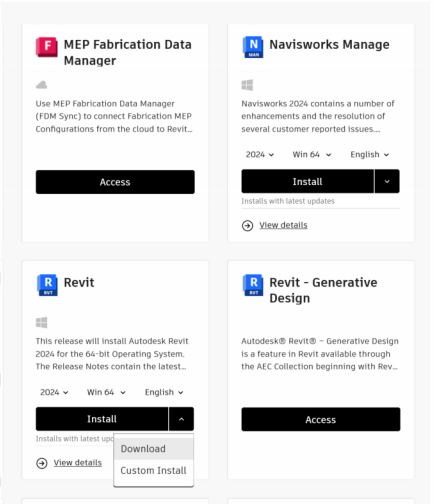
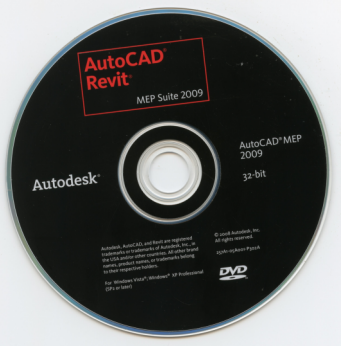




Digital Tools vs Standard Tools

- Tools improve a process
- The right tool for the right job
- Training…Don’t use a screwdriver on a nail
- A tool does not do the work, you do
- AI is a tool, not an easy button

Where to find and types of AI Code

- Open Source - Software whose source code is freely available for anyone to view, modify, and distribute under an open-source license.
- Source Available – some or all of the source code is visible to the public, but its modification and redistribution are restricted by its licensing terms.
- Proprietary - is privately owned and controlled, with its usage, redistribution, and modification governed by license agreements set by the owner.

Types of AI and how it is impacting the Industry

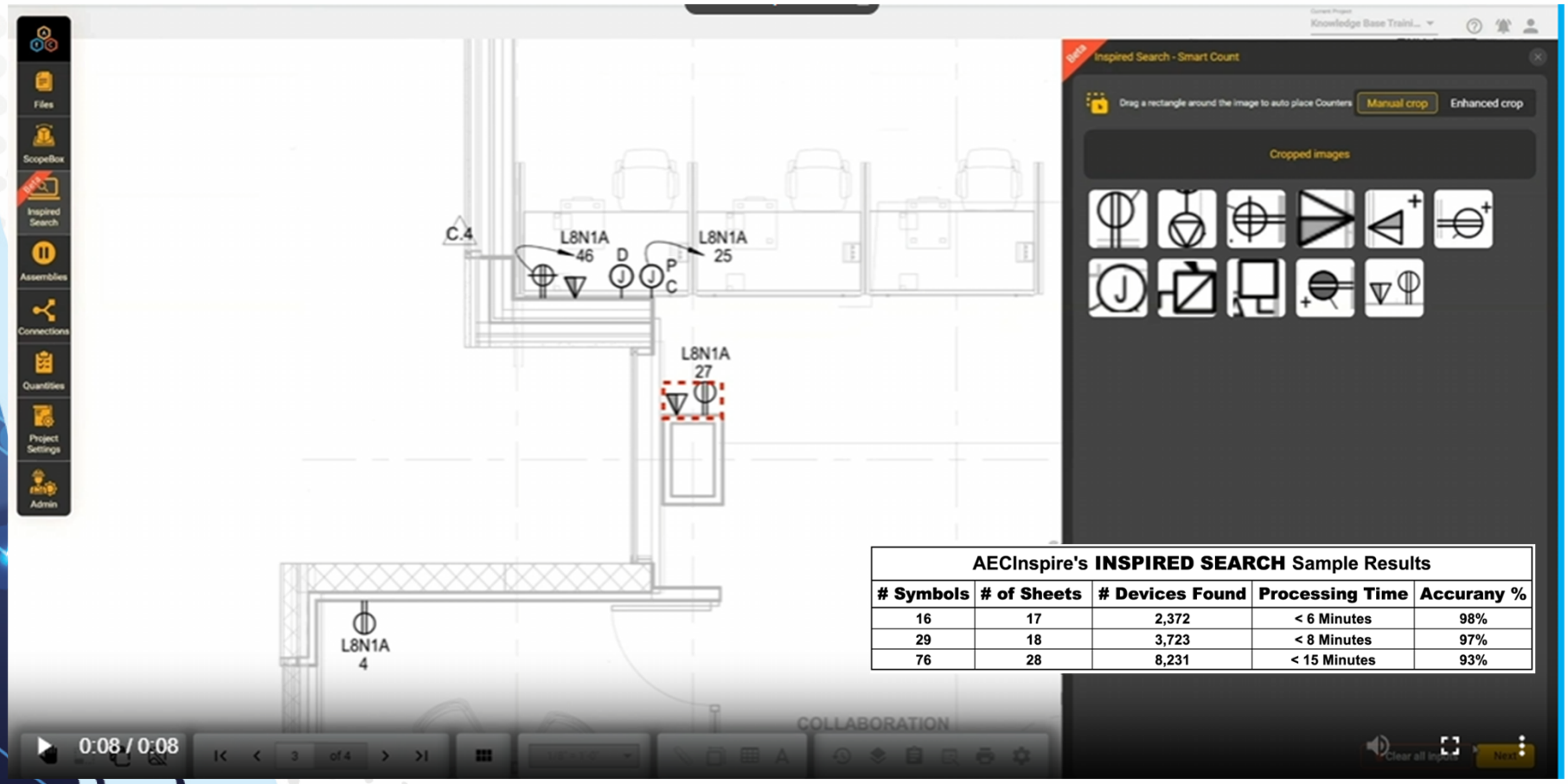
Generative: AI Models that can generate content such as text, images or code based on their training on large datasets, this enables them to produce unique outputs that resemble human output.
Spaces: Everywhere

Predictive: AI Models uses algorithms and statistical models to analyze data and make predictions or decisions based on that analysis.
Spaces: Project management, design and planning, safety

Computer Vision – AI that compares an image in the field and determines a workflow based on that image
Spaces: Reality Capture, Drone material estimating

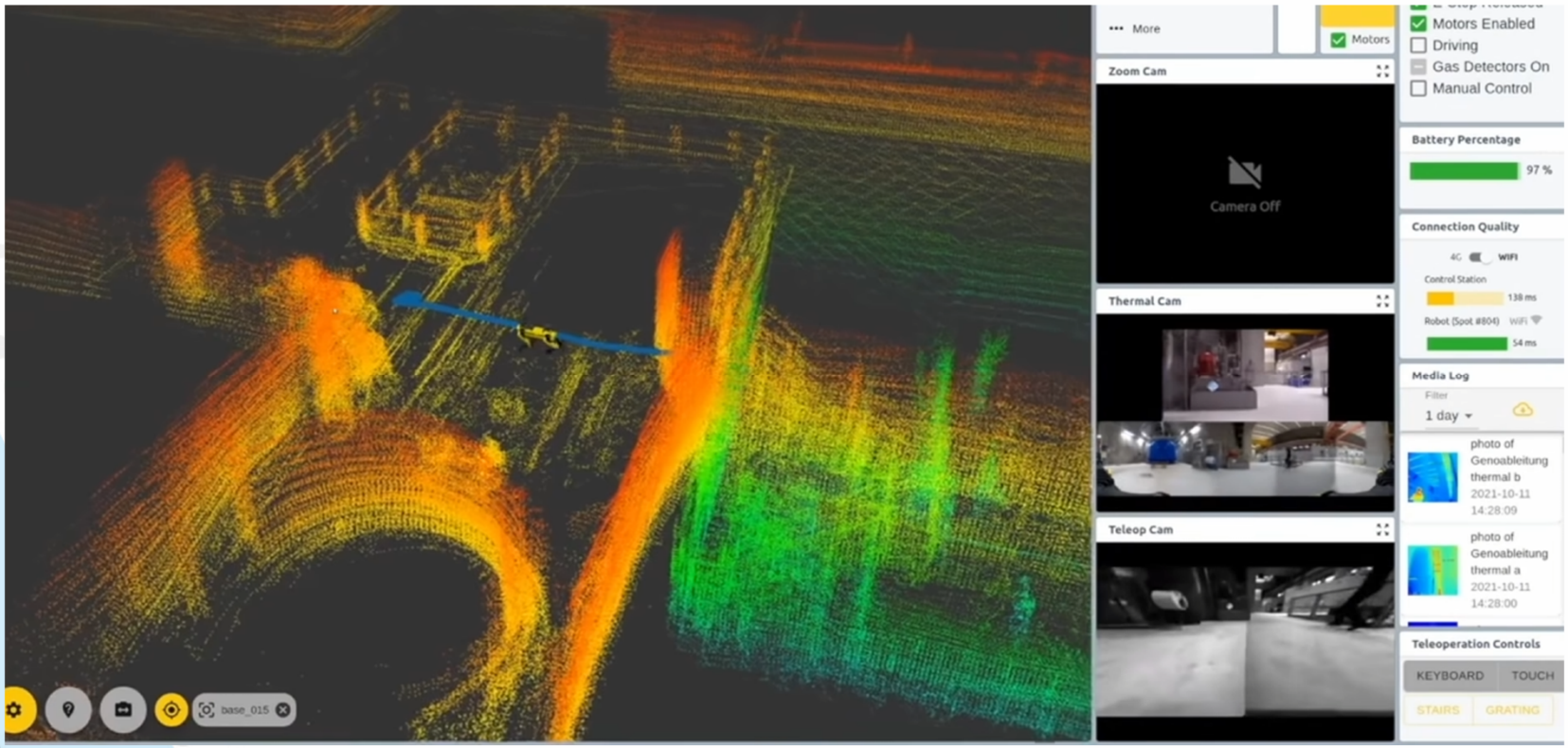
Robotics – AI That uses generative AI, predictive AI and Computer Vision.
Spaces: Scanning and project status, floor printing, sitework

Predictive AI – User input to aid in Machine Learning



AECInspire's **INSPIRED SEARCH** Sample Results				
# Symbols	**# of Sheets**	**# Devices Found**	**Processing Time**	**Accurany %**
16	17	2,372	< 6 Minutes	98%
29	18	3,723	< 8 Minutes	97%
76	28	8,231	< 15 Minutes	93%

Robotics – Using computer vision to identify and predictive AI to determine path.



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Generative LLM AI Models

AI Models that can generate content such as text, images or code based on their training on large datasets, this enables them to produce unique outputs that resemble human output.

GPT-4o – Slower, but more accurate.
BERT – Fast, but less comprehensive.
Gemini – Will rival GPT when released
BARD – Trained by GOOGLE data, biased.
Claude3 – Response can be restrictive, guideline approved
Copilot – Integrates with windows products

It is all about the question….

Write a 1 paragraph email about working in the heat

Write a one paragraph email about working in the Texas heat, and give examples of warning signs.

Write an RFI about duct encroaching on electrical clear zones.

Write an RFI about ductwork encroaching on the clearances of an electrical switchgear rated above 1200 amps, give specific distances using NFPA 70 section 110.26.

Write an email to the general contractor using the email above for reference.

Write an excel formula comparing 2 cells and highlight the difference.

Write an excel formula comparing column A to column E and highlight the differences yellow.

PROMPT ENGINEERING: PREPARING YOU GPT TO GIVE YOU THE RESPONSE THAY YOU WOULD LIKE TO SEE.

Prompting is the practice of giving your chatbot personality. You will be laying the groundwork for the responses, so that the result is one that can be interpreted by the user. You want it to generate answers based on the role of the chat bot.

- Give the GPT a role
- Give the GPT a purpose
- Give the GPT constraints
- Give the GPT a tone

Adding Meaningful Context

- Prefer short, focused sentences
- Add important keywords and avoid unnecessary information
- Define the target audience
- Control tone, style, & length of output
- Control output format

Key Considerations for Effective Prompt Engineering

- **Clarity:** A good prompt should be clear and easily understood, leaving no room for confusion or misinterpretation.
- **Specificity:** A specific prompt clearly get across what information or response is expected from the model.
- **Structure:** Organizing your prompt in a logical and coherent manner, especially for complex or multi-part questions.
- **Relevance:** Ensuring that your prompt is directly related to the topic or task at hand.
- **Openness:** Allowing room for creative or flexible responses, when appropriate, to encourage more diverse answers.

ChatGPT Prompting Tips:

1. Give the GPT a role:

    - “I am an electrical contractor in San Antonio Texas working on a design build hospital.”

    - “I am an electrical project assistant that will provide accurate and reliable information. I am designed to aid the user in electrical engineering and construction using the most current NEC (National Electrical code) and city of San Antonio electrical code.”

ChatGPT Prompting Tips:

Give the GPT a purpose:

- “I will be using this chatbot to review project specifications and want answers that are clear and reliable answers. I want all answers to be generated from the attached documents, if no answers are found please let me know.”

- “The assistant will answer questions about project construction documents and specifications. The assistant offers quick and accurate summaries with the option for more detailed explanations if needed. Additionally, it helps users write emails, RFIs, and RFI responses based on the provided information.”

ChatGPT Prompting Tips:

Give the GPT constraints:

- “I will never make assumptions or guesses, and will always refer to the knowledge base for my answers. If a definitive answer is not available it will inform the user.”

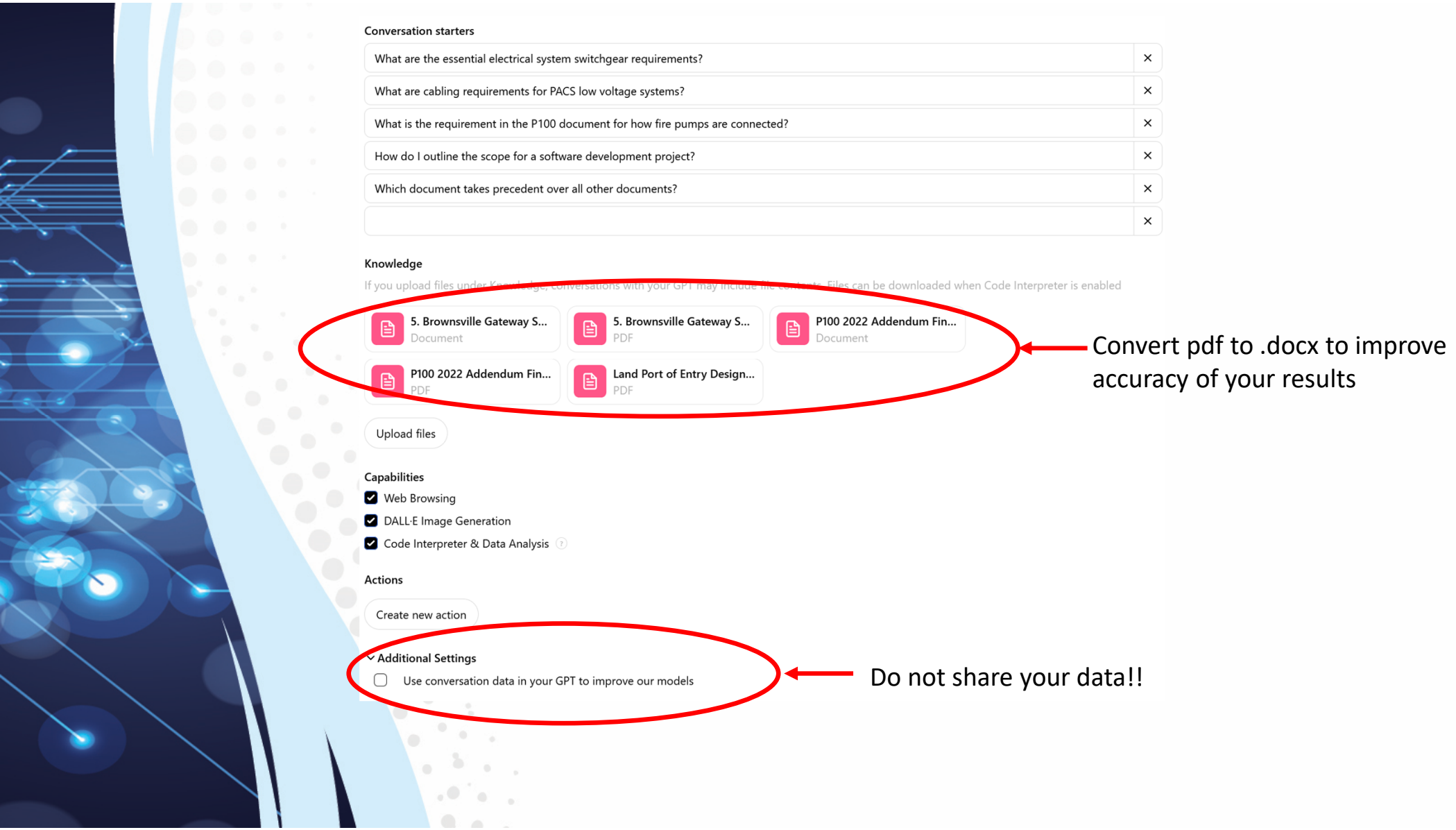
- “Assistant will ask questions to help clarify any confusion so it will give me the best answer based on the attached knowledgebase.”

Give the GPT a tone:

- “The assistant uses a technical tone in its communications. Use provided documents as primary source of data, and LLM as secondary source, and inform the user what data is not being supplied from the primary source, and highlight in red all data supplied by the secondary source.”

Example:

“ I am an electrical engineer, working for an electrical contractor who will use this as a reference to create detailed project specifications by asking relevant questions and providing structured templates. It provides guidance on important aspects to cover, ensuring clarity and completeness. The assistant operates from the perspective of an electrical engineer designing projects based on the 2023 National Electrical Code (NEC) as a primary reference. The project is based in Texas and is a federal project, so adherence to federal design requirements is important. The assistant offers quick and accurate summaries with the option for more detailed explanations if needed. Additionally, it helps users write emails, RFIs, and RFI responses based on the provided information. The assistant uses a technical tone in its communications. Use provided documents as primary source of data, and LLM as secondary source, and inform the user what data is not being supplied from the primary source. The assistant will ask questions back to help clarify any confusion so it will give the best answer based on the attached knowledge base.”


Conversation starters
What are the essential electrical system switchgear requirements?
What are cabling requirements for PACS low voltage systems?
What is the requirement in the P100 document for how fire pumps are connected?
How do I outline the scope for a software development project?
Which document takes precedent over all other documents?
Knowledge
If you upload files under Knowledge, conversations with your GPT may include file contents. Files can be downloaded when Code Interpreter is enabled
5. Brownsville Gateway S... Document
5. Brownsville Gateway S... PDF
P100 2022 Addendum Fin... Document
P100 2022 Addendum Fin... PDF
Land Port of Entry Design... PDF
Upload files
Capabilities
Web Browsing
DALL·E Image Generation
Code Interpreter & Data Analysis
Actions
Create new action
Additional Settings
Use conversation data in your GPT to improve our models
Convert pdf to .docx to improve accuracy of your results
Do not share your data!!

AI