



Superprompts: How to Talk with the Genie and Keep it in the Bottle

Article 4 of 6

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In the ever-evolving landscape of the geoprofessional industry, artificial intelligence continues to drive innovation, efficiency, and curiosity. This article is the fourth in a six-part series written to educate Geoprofessional Business Association (GBA) members on the implications of AI on the geoprofessions. The article was prepared by GBA Business Technology Committee member, Enrique Farfan, PhD, PE, ENV SP, of HDR.

In 1937, George Stibitz created the first digital computer. He built the simple device, which was dubbed the “Model K,” on his kitchen table. It was built from a few light bulbs, batteries, relays, and metal strips from a tin can.

Stibitz built the device as proof of concept for a two-binary calculator, and it was the first electromechanical computer built in America.

His calculator proved the concept of using a simple Boolean logic-based binary adder. The computer was very simple. It was operated by mechanically entering the binary numbers into the calculator, and the machine provided the response using the two attached bulbs. The Model K could add 1+1, but that was its maximum capability..

Since the Model K was invented, computers have been developed to use more complex languages. Beginning with the golden days of Fortran, a computer language created in 1954 by John Backus, users became acquainted with the

commands and formats that are needed to tell a computer what to do. Now, old Fortran punched cards are buried like fossils in dusty corners of old universities, and they serve as a testimony to the days when computer giants used to roam computer rooms.

Although Fortran still has its place in programming today, how people interact with computers has become more complex. These more complex interactions are particularly prevalent when interacting with large language models (LLM). Rather than communicating through lines of code, people can now converse with a computer through plain language. Conversation has begun to replace command lines.

As conversation as a means to talk to computers has become more widespread, prompt engineers have begun paving their way into the curricula of universities and programs focused on artificial intelligence (AI). Prompt engineers need to be well-versed in English and psychology; they need to use words in versatile ways to create elaborate commands that direct a computer to generate the desired response. Effective communication with AI algorithms requires users to use language precisely.

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In the context of LLM, a prompt is a phrase or a set of instructions that is input to generate a response. When inputting a prompt, a user must be precise. LLMs are like mischievous genies that require precise requests. Without precision, a genie might place caveats on a wish, and so will LLM when generating a response. One way to be precise is to use superprompts. Superprompts are prompts within other prompts that work as elaborate commands to secure relevant responses.

The following is a simple example of a prompt and a superprompt in ChatGPT4:

Prompt:

"Describe soil liquefaction."

Possible response:

"Soil liquefaction refers to the process where saturated soil temporarily loses strength and stiffness in response to an applied stress, often during an earthquake, causing it to behave like a liquid."

Superprompt:

"Describe soil liquefaction, detailing its causes, potential hazards, and common mitigation techniques used in construction."

Possible response:

"Soil liquefaction is a phenomenon where saturated soil temporarily loses its strength and stiffness due to an applied stress, often resulting from seismic activities like earthquakes. The primary cause is the increase in pore water pressure and the reduction of effective stress between soil grains, often in soils with poor drainage, like silty or sandy soils. This can lead to the ground collapsing, tilting of buildings, and the upward flow of water and soil, known as sand boils or mud volcanoes. To mitigate the risks of soil liquefaction, engineers employ various techniques such as soil compaction, vibro-compaction, installing stone columns, or using deep foundations like piles that bypass the liquefiable layer."

LLM can even be used to develop a prompt. Then, LLM can transform the prompt into a superprompt. The following example was generated using ChatGPT4:

Prompt:

> "Explain the process of soil compaction in construction."

To generate a superprompt, give LLM the following command:

"Transform the following prompt into a superprompt, including detailed context, specific instructions, constraints, and examples where appropriate. The basic prompt is: '[Insert basic prompt here].'"

Superprompt:

> "You are a seasoned geotechnical engineer tasked with educating a group of civil engineering students about soil compaction in construction. Write a detailed explanation covering the following aspects:

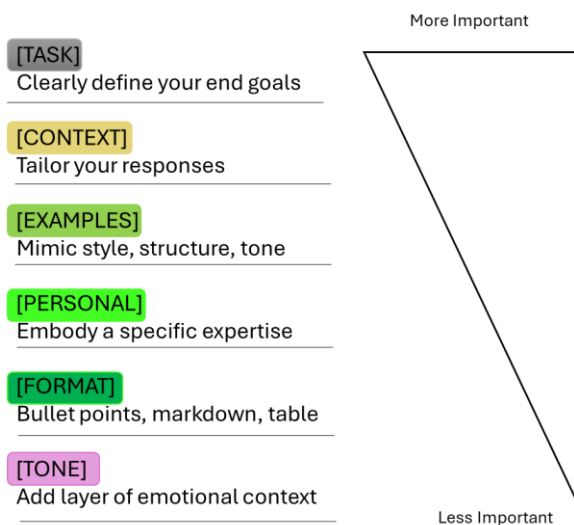
- 1. Definition and Importance: Define soil compaction and explain why it is crucial in construction projects.*
- 2. Methods of Compaction: Describe at least three common methods of soil compaction, including the equipment used and the scenarios in which each method is most effective.*
- 3. Compaction Testing: Explain the different types of compaction tests (e.g., Proctor test, field density test) and their significance in ensuring proper compaction.*
- 4. Factors Affecting Compaction: Discuss the various factors that influence the compaction process, such as soil type, moisture content, and compaction effort.*
- 5. Case Study: Provide a brief case study or real-world example where proper soil compaction played a critical role in the success of a construction project.*

6. *Diagrams and Illustrations: Include suggestions for diagrams or illustrations that could help in visualizing the concepts being discussed.*
7. *Ensure your explanation is clear, thorough, and suitable for students with a basic understanding of civil engineering principles."*

Generally, observe the following guidelines when writing precise prompts or superprompts.

- Start with an action word
- Provide context
- Use role-play
- Use references
- Use double quotes
- Be specific
- Give examples
- Include the length of the response
- Handhold the AI
- Don't hesitate to refine
- Specify the tone
- Get summaries after a long chat

The following six-step prompt checklist (from @ChatGPTTricks) is a good reference for writing effective prompts:



Task. Accurate verbs at the start of a prompt define the end goal of the response.

- Generate
- Analyze
- Summarize
- Categorize

Context. Context is the backdrop of a prompt; provide relevant information to maximize the output.

- Audience and knowledge level?
- Objectives or goals?
- Key aspects or subtopics?

Examples. Examples provide a framework that allows LLM to mimic the style, structure, and tone of almost anything.

Personal. Persona or character descriptions allow LLM to embody a domain of expertise in a particular area.

- *You are a senior geotechnical engineer tasked with...*
- *You are a geotechnical engineer specializing in slope stability analysis.*
- *You are a geotechnical engineer working in a consultancy firm.*
- *You are a geotechnical engineer focusing on researching and developing a...*

Format. Format establishes the layout and structure of the response.

- Table format
- Bullet points
- Email format
- Code blocks
- Paragraphs
- Markdown

Tone. Tone describes the desired tone and style of the response.

- Casual tone
- Formal tone
- Witty output
- Enthusiasm
- Pessimistic

How people communicate with computers has come a long way since the 1950s. Technology professionals no longer just need to understand coding language. Now, they must be able to generate precise and effective prompts and superprompts for communicating with LLM. Focusing on this crucial skill and emphasizing the need for precise, clear, and strategic thinking will allow AI to be leveraged for solving problems and innovating in the future.

Previous Articles in the Series

[AI Unveiled: The Wizardry Behind Chatbots and Intelligent Systems](#)

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Applications of LLM in Geotechnical Engineering: Use it or Lose

ABOUT THE AUTHOR



Enrique Farfan is a Geotechnical and Structural Engineer with a Ph.D. in Engineering and a Master's in Civil Engineering from the University of New Mexico. His expertise spans across various projects in mining, energy, water resources, and transportation, including work on dams, levees, canals, waterfront structures, bridges, foundations, and seismic analysis. Enrique has implemented diverse design solutions using customized computer programs and database implementations. During his graduate years, he developed an interest in fuzzy logic, optimization, inverse problems, neural networks, and computer programming. Now, he enjoys exploring the fascinating universe of AI and its applications.