

CESA TECHNOLOGY AND ENGINEERING INNOVATION WEBINAR SERIES

AI Implementation in Focus



 11 July 2025

 11:00 – 12:30

 Via Zoom

Guest Speaker



Rozina Lucy Myoya
Data Scientist and Civil Engineer

Guest Speaker

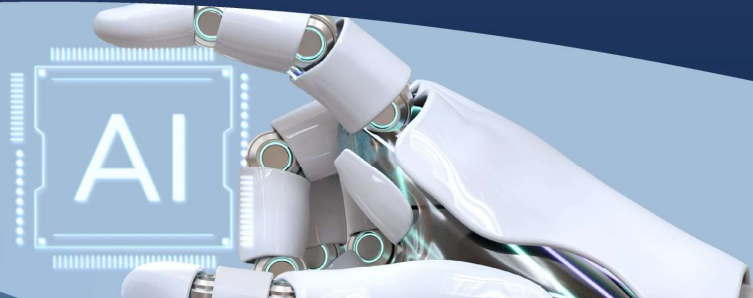


Dawit Seyoum
Pavement Engineer
(Airfields and Highway) ROMH Consulting

Webinar Facilitator



Amanda Masondo-Mkhize
CAD Technician
MPAMOT Africa



ENGINEERING WORKFLOW AUTOMATION AND INCORPORATION OF LARGE LANGUAGE MODELS INTO ENGINEERING WORKFLOW

DAWIT SEYOUM

11 July 2025

Brought to you
by:



ABOUT ME



Mr. Dawit Seyoum



2018 - BSc. Civil Engineering



2021 - MSc. Civil Engineering, Coastal Engineering



2025 - MEng. Civil Engineering, Pavement Engineering



Programming in Python, JS, HTML, CSS



Nedbank CIB (Analyst)

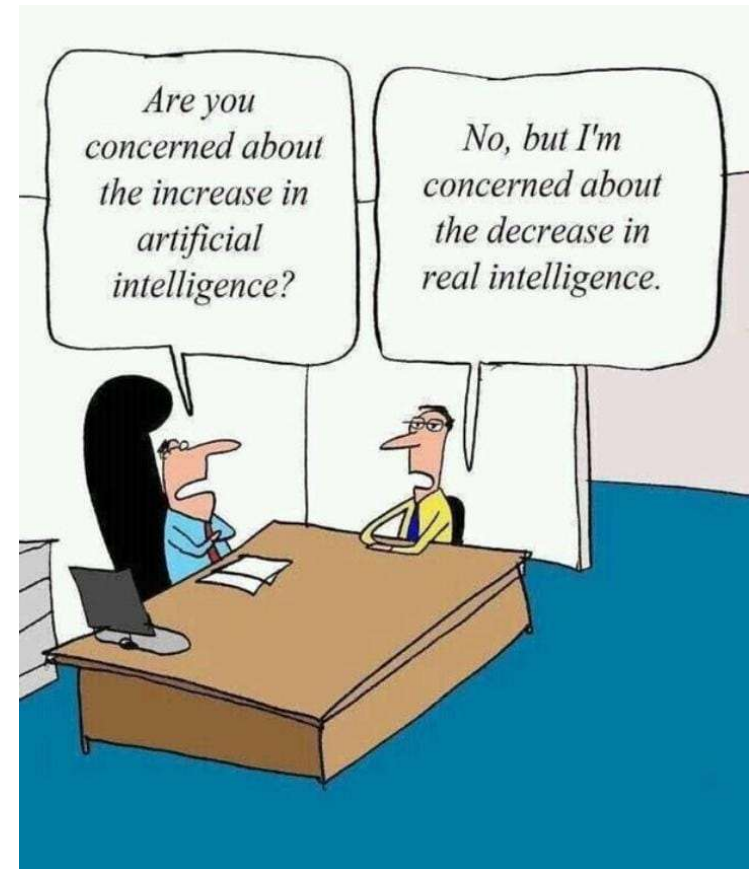


NACO(Airport Engineer)



ROMH (Pavement Engineer, Highway and Airfield)

THE STATE OF THE AI LANDSCAPE





NEXT GEN
TECHNOLOGY



Revolutionary



Revolutionary

THE AI REVOLUTION: GLOBAL MOMENTUM & SA'S OPPORTUNITY

Global AI Surge in Engineering:

- AI in Construction: \$2.93B (2023) -> ~27% annual growth to 2030.
- Generative AI Use: 55% (2023) -> 75% (2024) of companies.
- Investor Demand: \$1 invested -> \$3.7 return; 90% urge AI prioritization.

South Africa's Awakening:

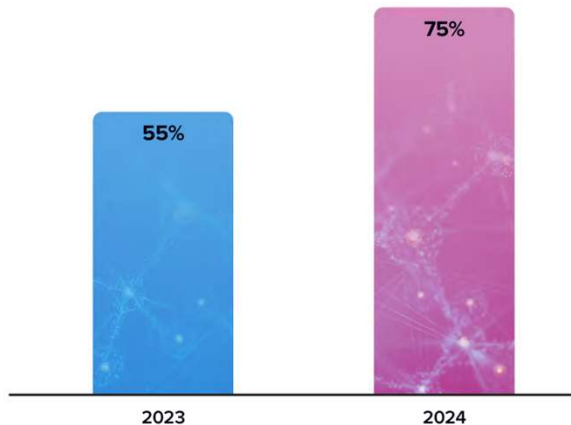
- Gauteng's construction: "Quieter revolution" with AI tools.
- National AI Institute (AIISA) launched (2022): Govt calls AI "most transformative tool," emphasizes re-skilling.

The Opportunity for SA Civil Engineers:

- Localize global AI for SA challenges: transport, housing, smart infrastructure.
- Augment human expertise for better, faster outcomes.

Current and Planned Use of GenAI, 2023 versus 2024

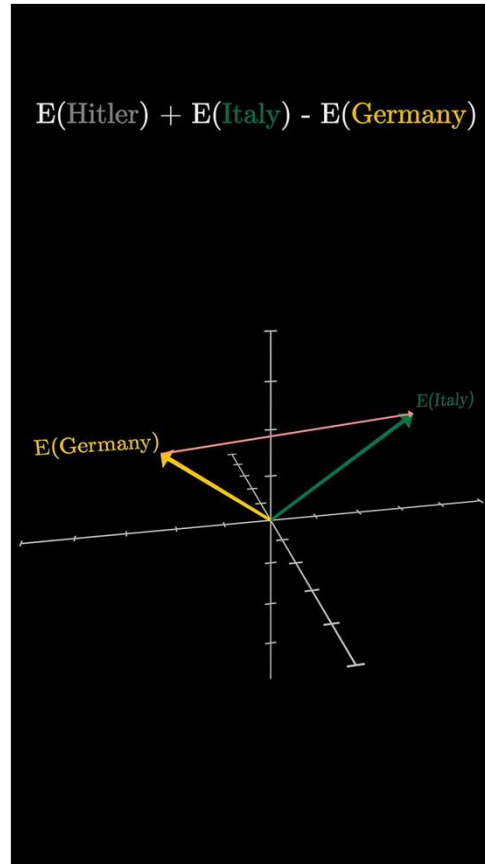
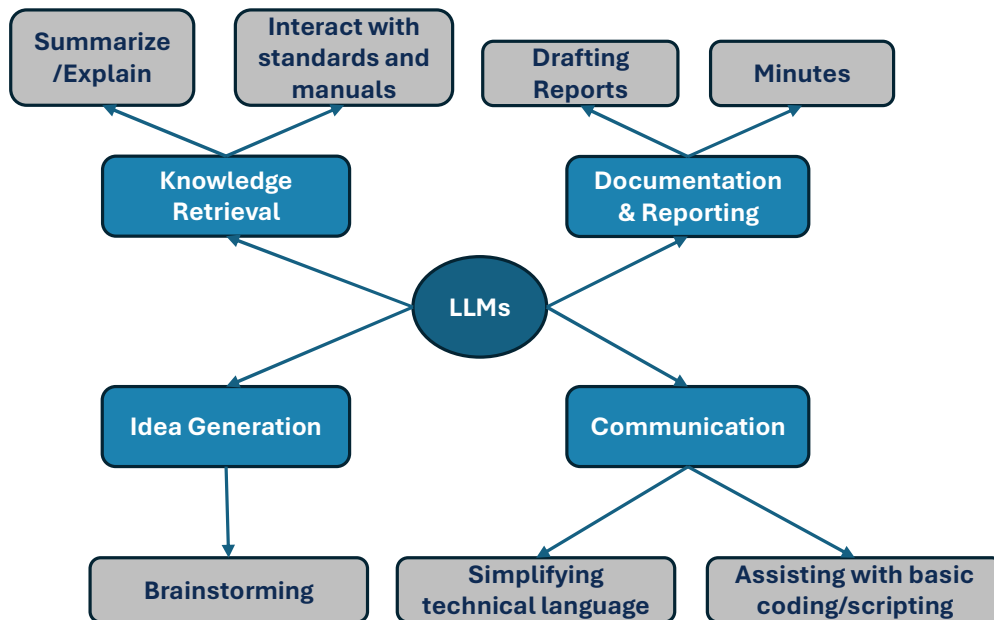
(Percentage of respondents)



DEMYSTIFYING THE TOOLS – EWA & LLMs

Large Language Models (LLMs)

- AI systems trained on vast text & code datasets (e.g., ChatGPT, Code Llama).
- Capable of understanding, generating, and summarizing human-like language & code.

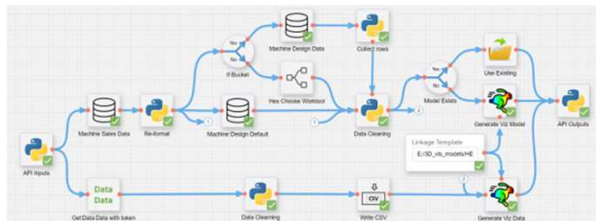
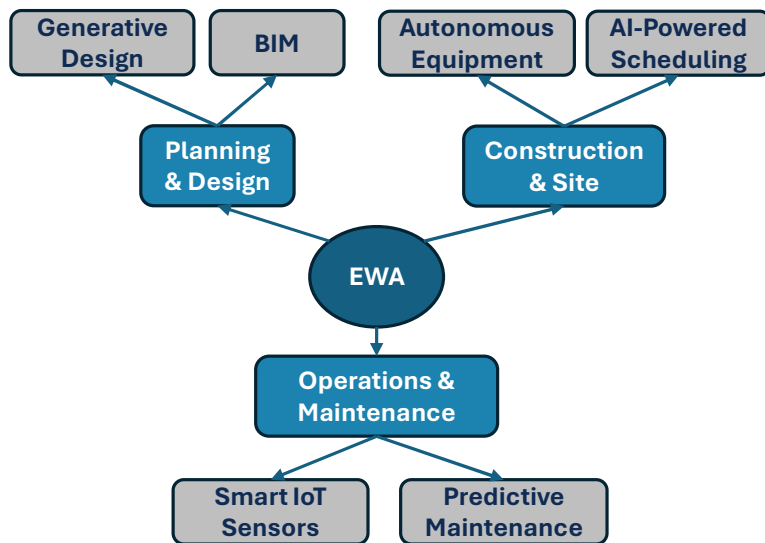


Youtube: 3Blue1Brown

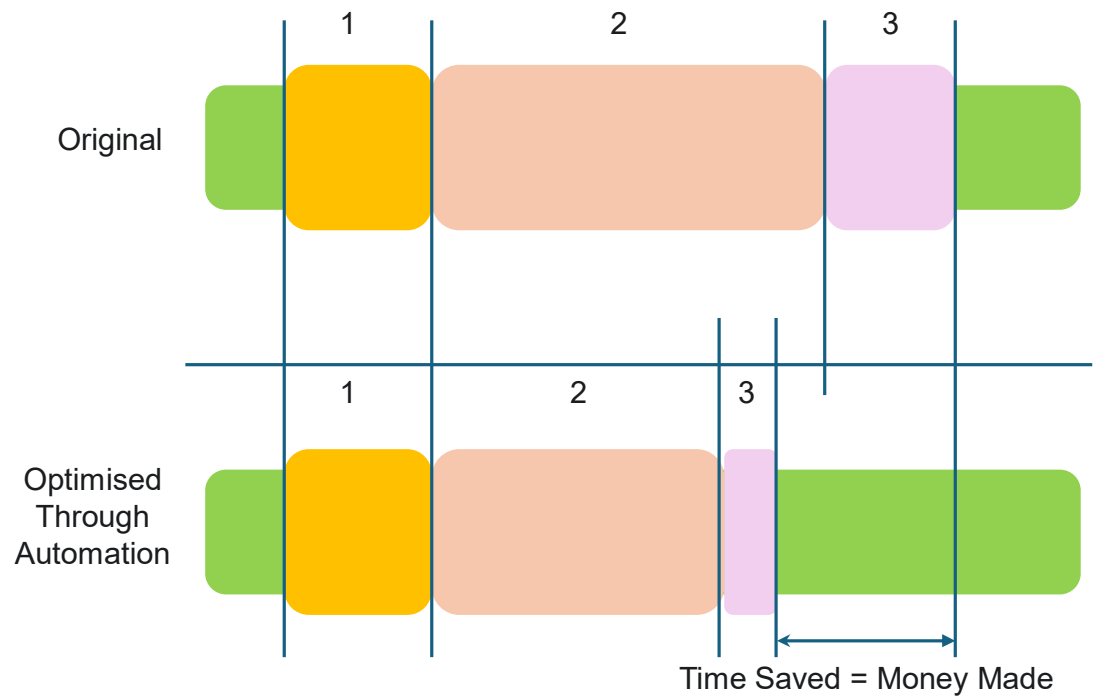
DEMYSTIFYING THE TOOLS – EWA & LLMs

Engineering Workflow Automation (EWA)

Using digital technologies (software, robotics, AI) to perform routine or complex engineering tasks with minimal human intervention.



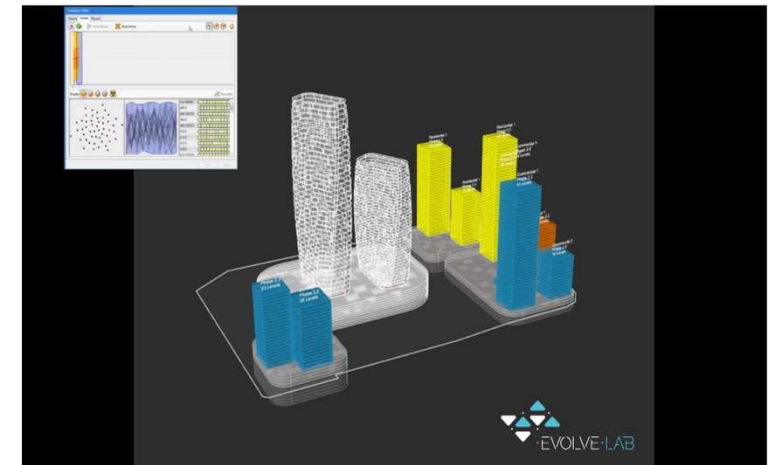
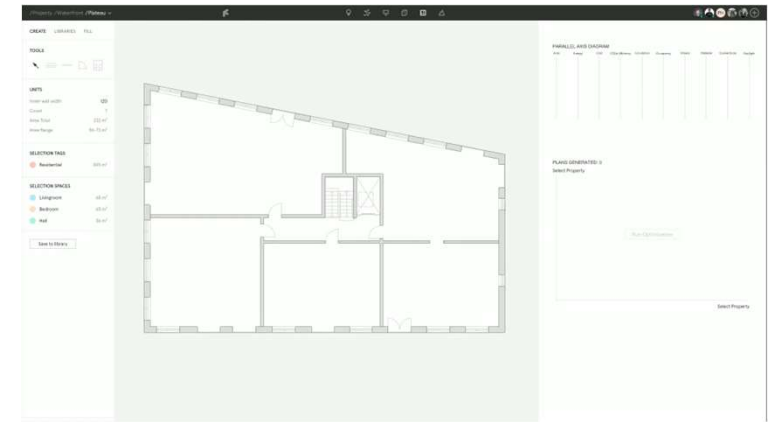
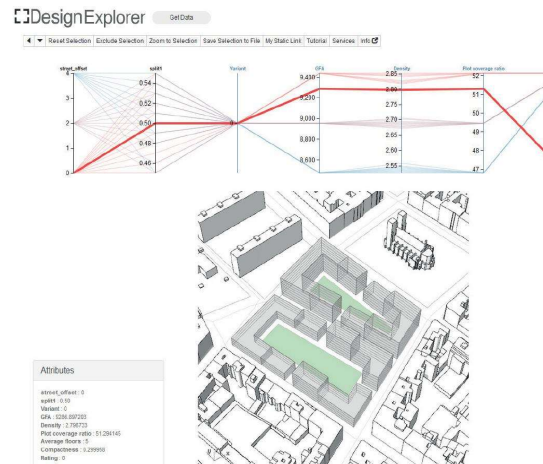
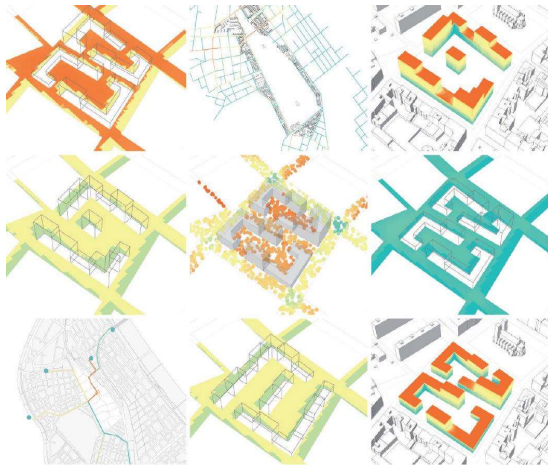
Work Flow optimisation illustration (series of tasks)



AI-POWERED DESIGN & SMARTER PLANNING

Generative Design & Optimization

- AI rapidly generates multiple design options (site layouts, structures) under constraints.
- Tools: Autodesk Civil 3D, Bentley OpenRoads (AI-enhanced features), and Rhino.



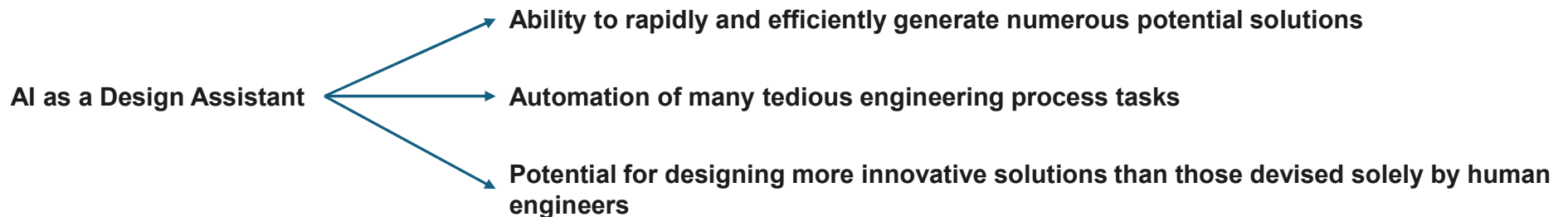
LLMS AUTOMATING DOCUMENTATION & COMPLIANCE

Accelerated Report, Specification Drafting, Knowledge Retrieval, Enhanced Communication & Stakeholder Engagement

LLMs can generate professional, structured documents based on minimal input—be it bullet points, site notes, or raw tabular data. Engineers can now draft initial versions of design reports, method statements, or EIA summaries in a fraction of the usual time.

LLMs can quickly interpret and summarise complex codes like SANS, COLTO, or local municipal bylaws. For instance, you can ask an LLM to “summarise the drainage requirements under SANS 2001-CS1” or generate a checklist based on TMH9 for materials testing.

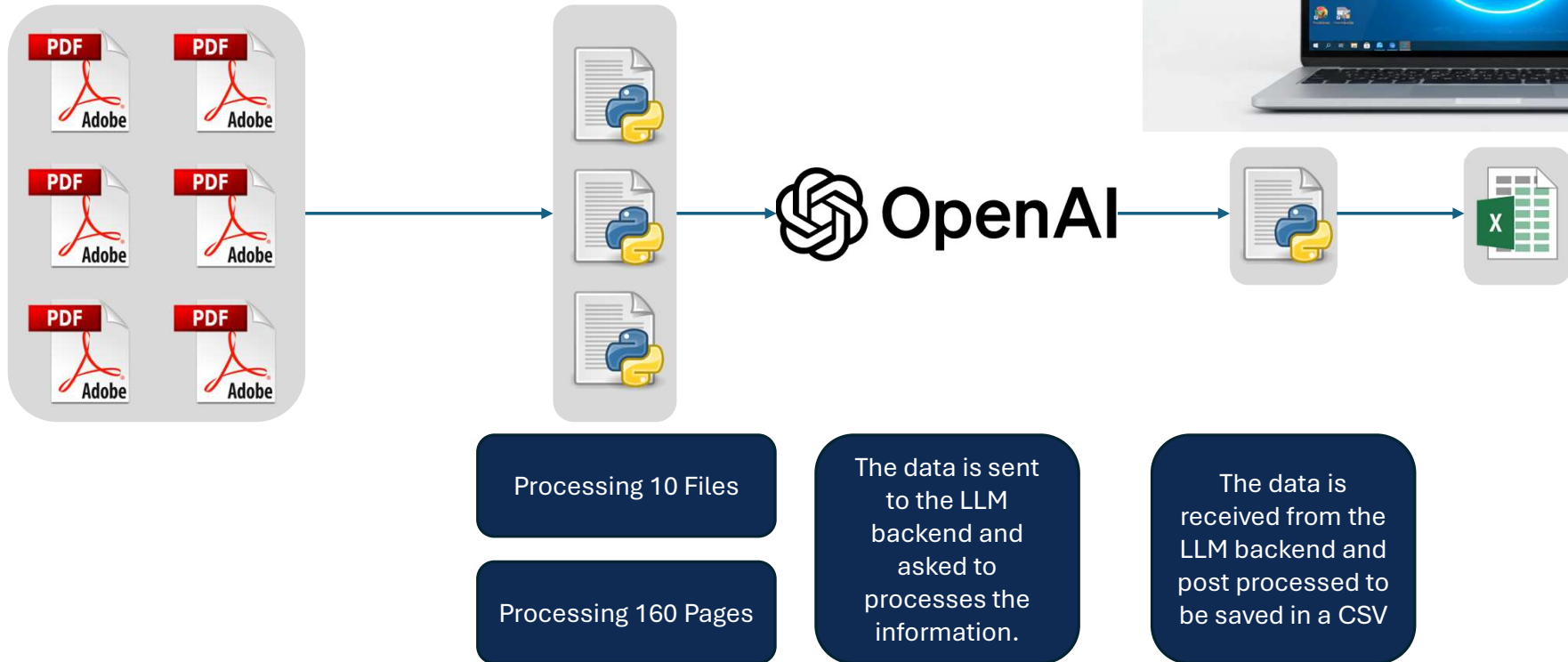
One of the lesser-known strengths of LLMs is their ability to translate technical content into plain language—making engineering outputs more accessible to clients, municipalities, and the public. Whether it’s a community engagement summary or a client briefing, LLMs help tailor communication to the audience.



Burns & McDonnell (2023) LLMs in Technical Documentation, Engineering Innovation Series.

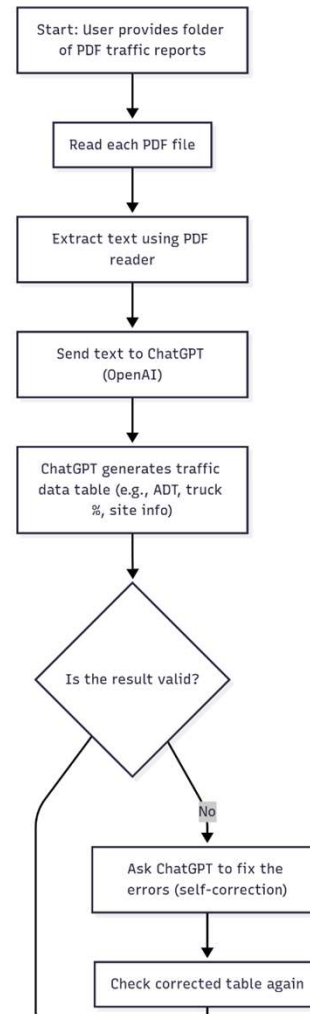
LLMS AUTOMATING

Automation of many tedious engineering process tasks (Case Study 1)



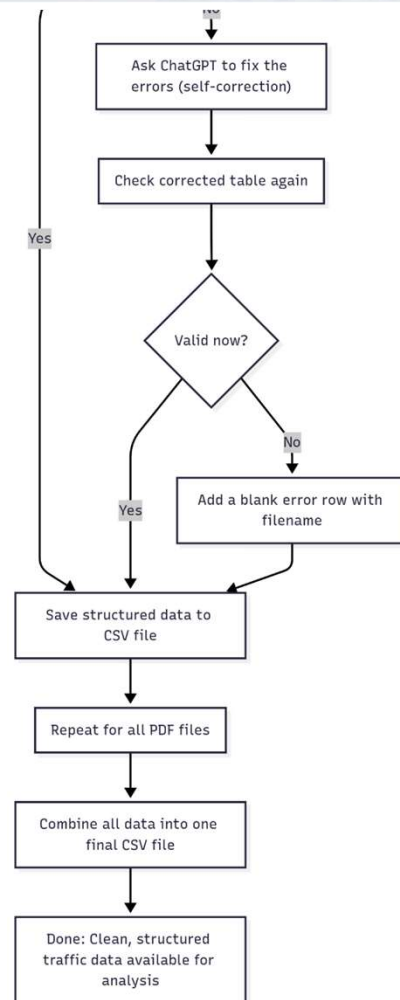
LLMS AUTOMATING

Automation of many tedious engineering process tasks (Case Study 1)



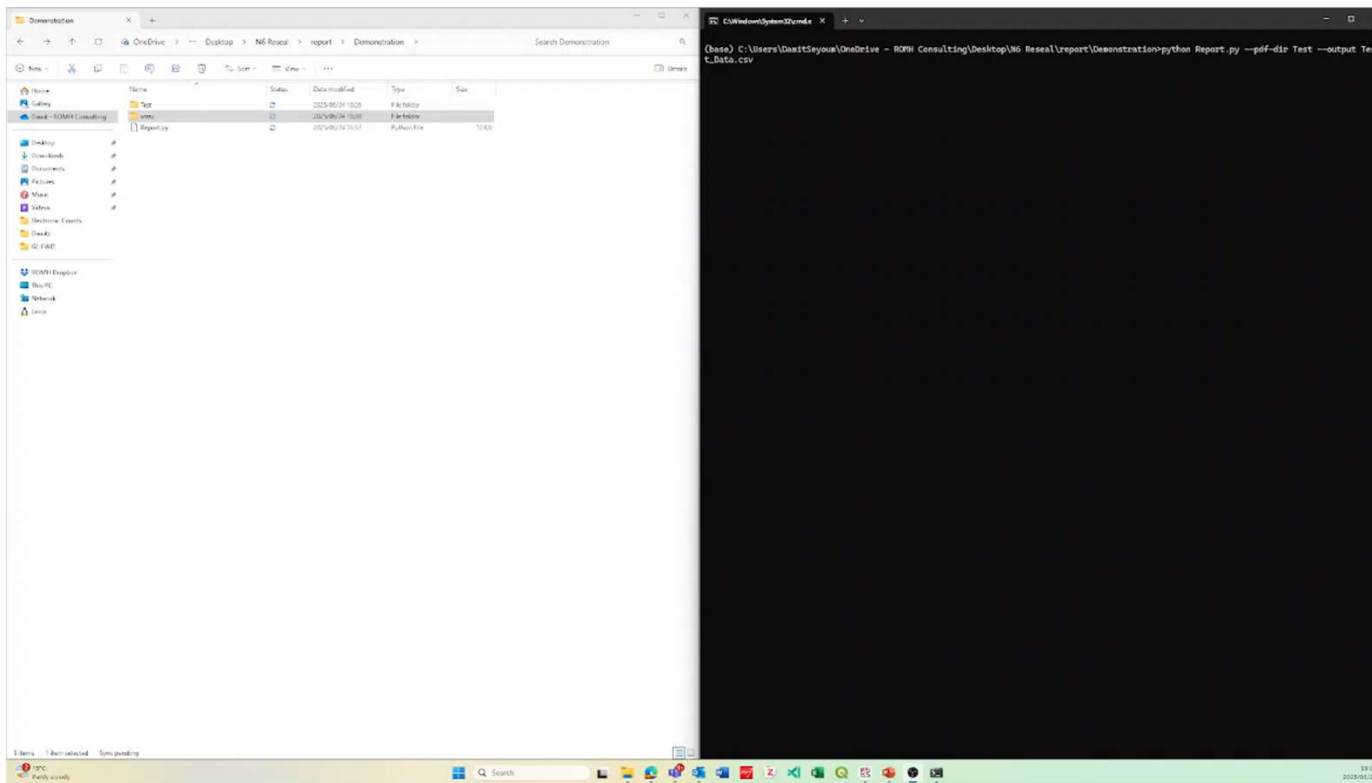
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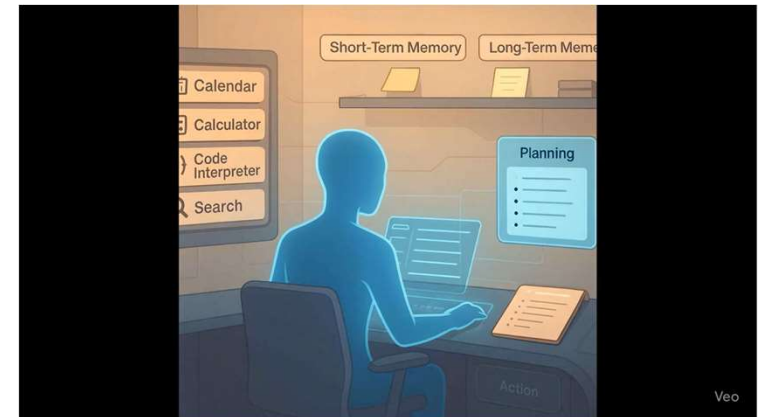
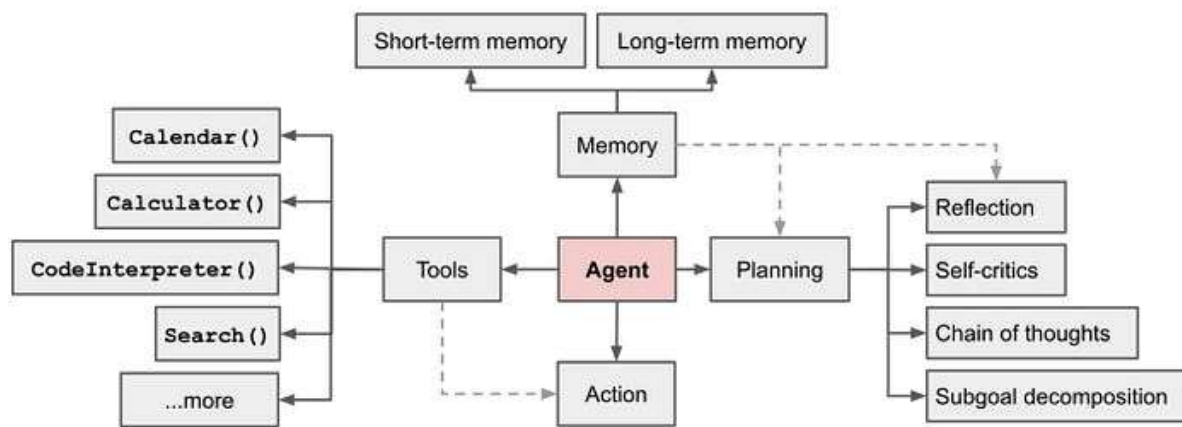
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time
>2hrs

PROPOSED MODEL OF INTEGRATING LLMs IN AUTOMATING

The use of LLM agents



RISKS ASSOCIATED WITH THE WRONG USE OF LLMS

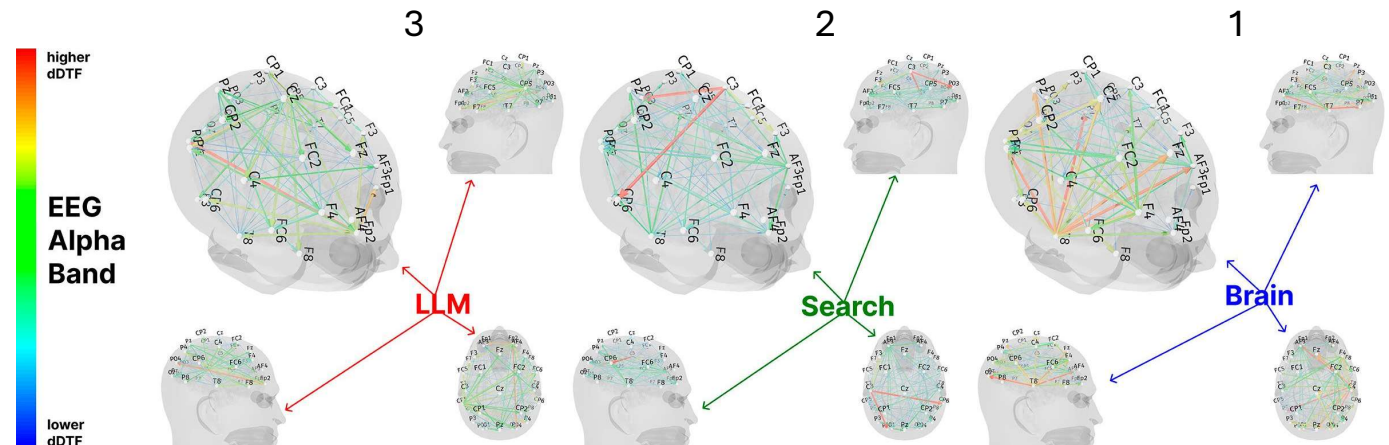
It's a tool not a replacement to critical thinking.

A recent MIT study suggests that over-reliance on AI tools like ChatGPT may reduce cognitive engagement and critical thinking, but researchers argue this effect depends more on how AI is used than on the technology itself.

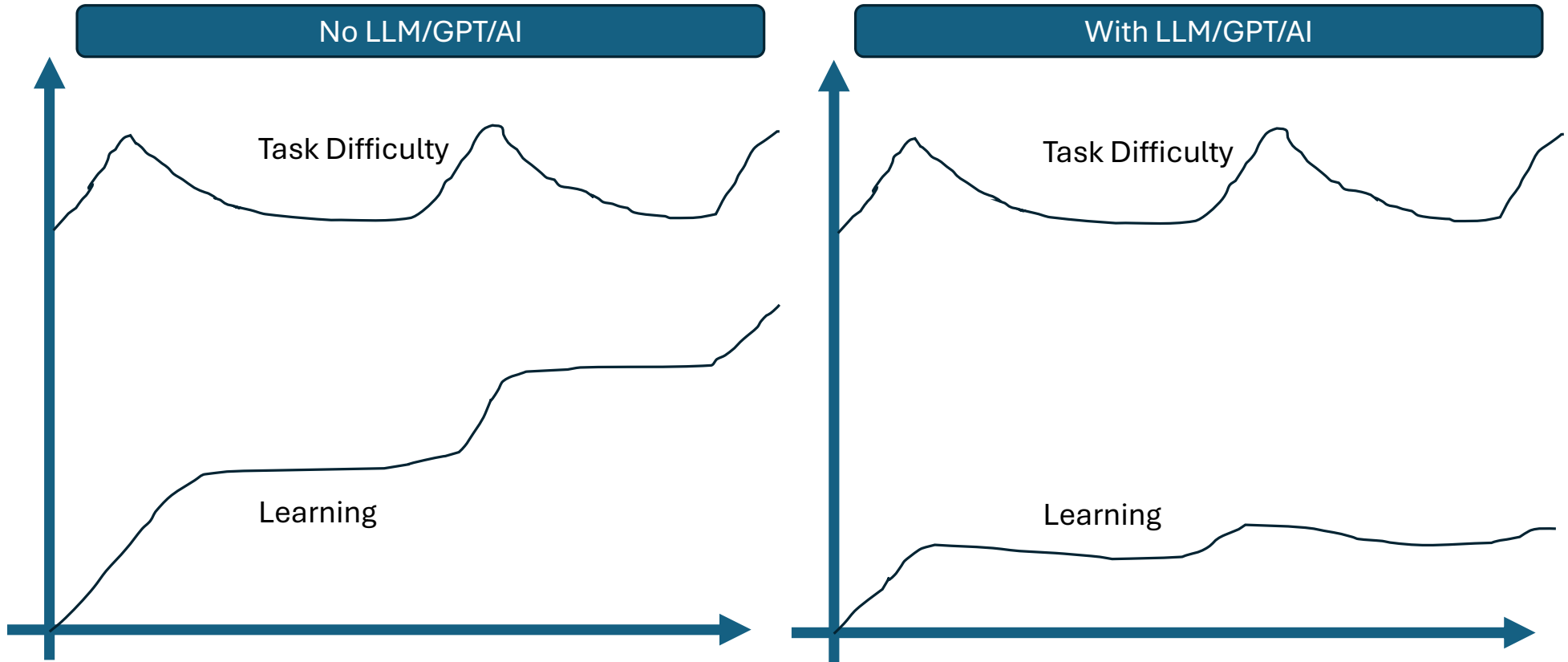
The experiment was simple:
Group 1: No tools (just brain)
Group 2: Google search
Group 3: ChatGPT (GPT-4o)

All students wrote 3 essays.

Some switched tools in session 4. Meanwhile, EEG scanners tracked live brain activity.



RISKS ASSOCIATED WITH THE WRONG USE OF LLMS





When we outsource our thinking, what remains?

**KNOWLEDGE
RETRIEVAL**



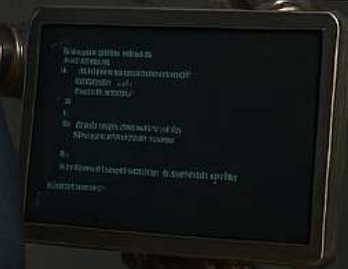
**Generate numerous
potential solutions**



**Accelerated Script
Development
(programming)**



**More time for
analytical thinking,
less time on admin**



DISCUSSION



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