

Session 3

Date: September 10, 2025.

AI Theory to Real-Time Implementation

Topics: T-Shaped Developer Model, Agentic AI, Transformer Architecture, and n8n Workflow with Gemini AI.

The T-Shaped Developer Model

The **T-Shaped Developer** model was introduced as a framework for professional growth. Imagine the letter 'T':

- **The Horizontal Bar:** Represents a **broad knowledge** across many different domains—like front-end development, back-end, databases, and cloud services.
- **The Vertical Bar:** Represents **deep specialization** and expertise in one specific area.

What is Agentic AI?

Agentic AI = AI that not only responds but can **act independently**, use tools, and pursue goals with minimal human prompting. The session explored how these agents rely on four key components:

1. **Input:** The data or prompt that starts the task.
2. **Chat Models:** The "brain" (like Gemini, ChatGPT) that processes information.
3. **Memory:** The ability to recall past interactions to maintain context.
4. **Tools:** The ability to use other applications or APIs to take action in the real world.

The discussion also covered advanced topics like Agentic AI frameworks, how to manage AI "hallucinations" (when an AI generates incorrect information), and vectorization.

AI Brain: Transformer Architecture

To understand how models like Gemini, ChatGPT work, the session broke down the core concepts of the **Transformer architecture**.

Think of the process like a master chef preparing a complex dish from a written recipe (your prompt):

1. **Tokenization:** The chef first reads the recipe and **chops the ingredients** into small, manageable pieces. This is tokenization, where input text is broken down into machine-readable units called tokens. ⁸
2. **Embedding:** The chef understands the **flavor profile and characteristics** of each chopped ingredient. This is embedding, where each token is converted into a numerical vector—a list of numbers that represents its meaning and relationship to other words.
3. **Attention Mechanism:** As the chef cooks, they **pay more attention** to key ingredients that define the dish's final taste. This is the attention mechanism, which allows the model to weigh the importance of different tokens in the input, focusing on the most relevant context.
4. **Transformer Layers:** The dish goes through **multiple cooking stations** (sautéing, simmering, baking), with each station refining the flavor. These are the transformer layers—multiple

stacked blocks that process the embeddings and their relationships over and over to build a deep understanding.

5. **Unembedding:** Finally, the chef **plates the finished dish** beautifully. This is Final step = linear projection from hidden states → probability distribution over vocabulary → decoding into text to form the output.

Hands-On Lab: Building a Real-Time AI Assistant

This practical lab involved building and deploying a live n8n workflow that uses AI to automate email handling.

The Workflow: Gmail Trigger → AI Agent (powered by Google Gemini Chat Model) → Telegram

- **Node 1: Gmail Trigger:** This node starts the entire workflow automatically whenever a new email is received.
- **Node 2: AI Agent (with Gemini):** This is the core of the workflow. It takes the content from the incoming email and feeds it to the Gemini Chat Model. ¹⁵The model is given a prompt (e.g., "You are an intelligent assistant. Read this email and craft a summary.") to guide its response.
- **Node 3: Telegram:** This final node takes the AI-generated summary from the Gemini model and sends it as a message to a specified Telegram chat.

The entire workflow was tested node-by-node to ensure functionality before being deployed live.

Assignments

1. Focus on **GitHub best practices**. You are to properly structure your GitHub repository, rename files logically, push all your work, and rely on CLI commands. **Crucially, ensure no API keys are pushed to the repository.**
2. Begin formal **project planning**. Create a new folder named project1-n8n and inside it, create detailed documentation outlining your project plan. This should include the tools you'll use, the workflow (flow), and the project's value proposition. After documenting, you can begin implementation.
3. Continue progress on the **full-stack application assignment**.