

IBM SKILLBUILD INTERNSHIP PROJECT

TIKZBUILDER AGENT

Presented By:

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OUTLINE

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PROBLEM STATEMENT

An intelligent agent that automatically converts natural language descriptions and sketches into professional TikZ code for LaTeX documents. It provides real-time feedback, accepts plain English refinement commands, and delivers publication-ready diagrams while eliminating manual coding complexity for researchers.

PROPOSED SOLUTION

I proposed **TikzBuilder**, an AI-powered chatbot agent deployed directly in **IBM Agent Lab** using **IBM Cloud**. The agent accepts **plain English text prompts** and generates **publication-ready LaTeX TikZ code**. It eliminates the need for manual TikZ coding by outputting full, compilable LaTeX documents. The agent provides real-time responses within the IBM Agent Lab interface. This solution streamlines academic diagram creation for researchers through intuitive natural language interaction.

TECHNOLOGY USED

- ❑ **IBM cloud lite services** - IBM Cloud Lite is a free-tier offering from IBM. It includes access to essential services like object storage, compute, and AI tools without billing.
- ❑ **Natural Language Processing (NLP)** - NLP enables machines to understand, interpret, and generate human language. It is the foundation for converting user-provided text prompts into structured TikZ LaTeX code.
- ❑ **Retrieval Augmented Generation (RAG)** - RAG combines retrieval of relevant external information with generative AI models to enhance response quality. It helps the agent generate contextually accurate LaTeX diagrams from complex academic queries.
- ❑ **IBM Watsonx AI Agent Lab** - IBM Watsonx AI Agent Lab is a platform to build, deploy, and test AI agents using IBM foundation models. It supports real-time interaction, model refinement, and prompt engineering in a no-code environment.

IBM CLOUD SERVICES USED

- ❑ **IBM Cloud Watsonx AI Studio** - Watsonx AI Studio is a collaborative environment for building, training, and tuning AI models using foundation models or custom data. It enables prompt engineering, model evaluation, and experimentation in a low-code interface.
- ❑ **IBM Cloud Watsonx AI runtime** - Watsonx AI Runtime provides the infrastructure to deploy and serve foundation models securely and at scale. It ensures reliable inference, model versioning, and performance monitoring for production-ready AI workloads.
- ❑ **IBM Cloud Agent Lab** - Watsonx AI Runtime provides the infrastructure to deploy and serve foundation models securely and at scale. It ensures reliable inference, model versioning, and performance monitoring for production-ready AI workloads.
- ❑ **IBM Granite model** - I use the “granite-3-3-8b-instruct” model for the agent.

WOW FACTORS

- ❑ **Plain English to Perfect TikZ** - Transforms even informal or vague natural language into fully structured, compilable LaTeX TikZ diagrams - no coding required.
- ❑ **Instant Feedback and Refinement** - Understands commands like "make the arrows curved" or "add a label to the node", enabling real-time diagram edits through conversation.
- ❑ **Zero Syntax Errors Output** - All outputs are guaranteed to be error-free LaTeX code, fully wrapped with \documentclass and required packages - ready to copy-paste and compile.
- ❑ **Academic-Grade Clarity** - Designed specifically for academic use cases - flowcharts, block diagrams, neural nets - with optimal layout, spacing, and styling defaults.
- ❑ **Understands Structural Context** - The agent can infer diagram relationships like data flow, process chains, and hierarchies even from loosely described text - no need for technical phrasing.

END USERS

- ❑ **Academic Researchers** - To effortlessly convert conceptual ideas into publication-ready diagrams for journals, theses, and papers.
- ❑ **University Students** - For generating LaTeX-compatible diagrams for reports, lab records, and project documentation without learning TikZ syntax.
- ❑ **Professors & Educators** - To create clear, structured teaching visuals (e.g., flowcharts, algorithms, models) for lectures and course materials.
- ❑ **Technical Authors & Publishers** - To speed up the creation of professional diagrams in LaTeX books, manuals, and whitepapers.
- ❑ **Data Scientists & AI Engineers** - To visually explain model architectures, pipelines, and data flow in research reports and presentations.

RESULTS

IBM watsonx

Upgrade ? Bell Muthu Harish's Account Dallas MH

Projects / TikzBuilder / Agent Lab

Share feedback 0 Unsaved New agent Deploy

Build

AI Model: granite-3-3-8b-instruct

Setup

Name
TikzBuilder

Description
71/100
Draw it with words - I'm your TikZ genie granting Latex diagram wishes!

Icon

Placeholder image

Quick start questions

Model parameters

Frequency penalty
-2 2 0.1

Presence penalty
-2 2 0.1

Temperature
0 2 0.39

Top P (nucleus sampling)
0.01 1 1

Max tokens
1500

Random seed

Stop sequences

Agent preview

TikzBuilder 02:53 PM

Welcome to TikzBuilder
Draw it with words - I'm your TikZ genie granting Latex diagram wishes!

Sample questions


Can you draw a basic flowchart with three steps: Start, Process, and End? →

Make a simple circular diagram with four labeled points connected in a loop. →

Type something...

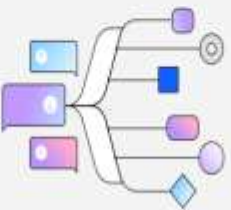
RESULTS

Agent preview

 TikzBuilder 06:45 PM

Welcome to TikzBuilder

Draw it with words - I'm your TikZ genie granting LaTeX diagram wishes!



Sample questions

Can you draw a basic flowchart with three steps: Start, Process, and End?


→

Make a simple circular diagram with four labeled points connected in a loop.


→

Type something...

Agent preview

 You: 06:21 PM

Make a simple circular diagram with four labeled points connected in a loop.

 TikzBuilder 06:21 PM

```
\documentclass{article}
\usepackage{tikz}
\usetikzlibrary{arrows.meta, positioning}

\begin{document}

\begin{tikzpicture}[node distance=2.5cm, every node/.style={draw, circle, minimum size=1cm}]
\node (A) {A};
\node (B) [below right of=A] {B};
\node (C) [below left of=A] {C};
\node (D) [below of=A, node distance=3cm] {D};

\draw[->, thick] (A) -- (B);
\draw[->, thick] (B) -- (C);
\draw[->, thick] (C) -- (D);
\draw[->, thick] (D) -- (A);
\end{tikzpicture}

\end{document}
```

► How did I get this answer?

↺

Type something...

Agent Preview

RESULTS

Agent preview

You: 06:21 PM
Can you draw a basic flowchart with three steps: Start, Process, and End?

TikzBuilder 06:21 PM

```
\documentclass{article}
\usepackage{tikz}
\usetikzlibrary{arrows.meta, positioning}

\begin{document}

\begin{tikzpicture}[node distance=2.5cm, every node/.style={draw, rectangle, minimum
height=1cm, minimum width=2.5cm}]
  \node (start) {Start};
  \node (process) [below of=start] {Process};
  \node (end) [below of=process] {End};

  \draw[->, thick] (start) -- (process);
  \draw[->, thick] (process) -- (end);
\end{tikzpicture}

\end{document}
```

► How did I get this answer?

Type something...

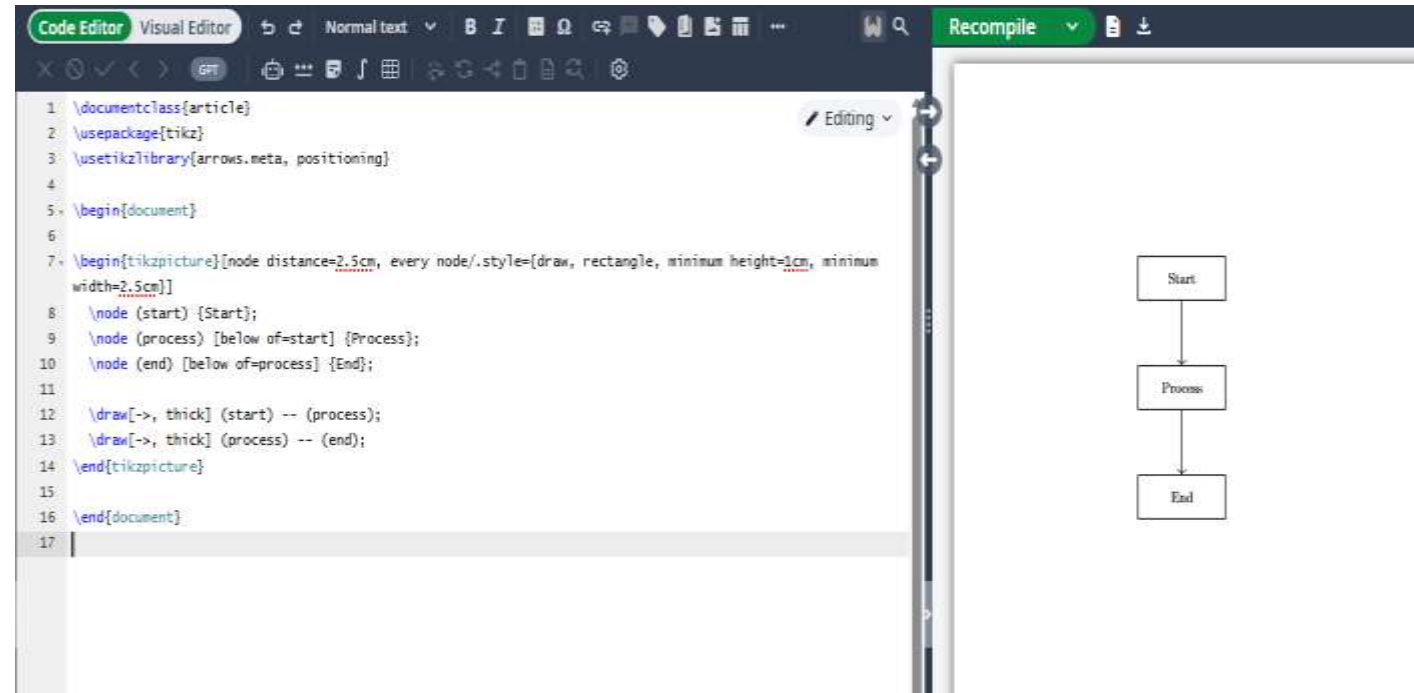








Diagram for the generated code

Agent Generated Code

RESULTS

Name	Type	Status	Asset	Asset type	Tags	Last modified
 TikzBuilder	Online	 Deployed	TikzBuilder	Ai service	 	in 14,894 seconds Muthu Harish (You)

Deployment spaces / Latex / TikzBuilder /

TikzBuilder  Deployed 

API reference Test Preview

New Chat

You 02:42 PM

Can you draw a basic flowchart with three steps: Start, Process, and End?

TikzBuilder 02:43 PM

```
\documentclass[article]{
\usepackage{tikz}
\usetikzlibrary{arrows.meta, positioning}

\begin{document}

\begin{tikzpicture}[node distance=0.5cm, every node/.style={draw, rectangle, minimum height=1cm,
minimum width=2.5cm}]
\node (start) {Start};
\node (process) [below of=start] {Process};
\node (end) [below of=process] {End};

\draw[->, thick] (start) -- (process);
\draw[->, thick] (process) -- (end);
\end{tikzpicture}

\end{document}
```

How did I get this answer?

Type something...

Deployed Agent

CONCLUSION

- ❑ TikzBuilder transforms natural language into professional LaTeX diagrams, eliminating the need to learn TikZ syntax manually.
- ❑ It enhances productivity and creativity for researchers, students, and educators by providing fast, accurate, and customizable diagram generation.
- ❑ Leveraging IBM Watsonx AI Agent Lab, it demonstrates the potential of intelligent agents in simplifying academic workflows.
- ❑ The project exemplifies how AI can make technical content creation accessible, precise, and publication - ready with minimal effort.

GITHUB LINK

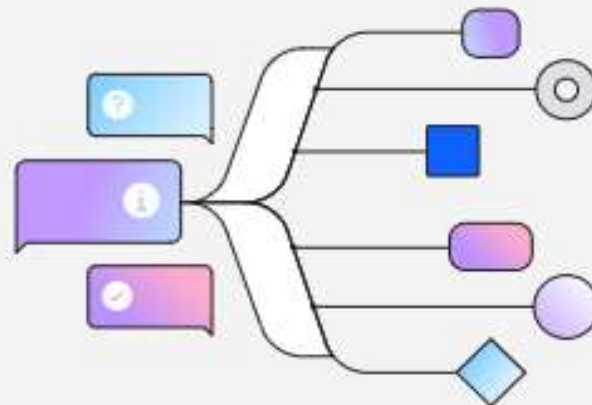
❑ <https://github.com/harish040120/TikzBuilder>



TikzBuilder 05:45 PM

Welcome to TikzBuilder

Draw it with words - I'm your TikZ genie granting LaTeX diagram wishes!



FUTURE SCOPE

- ❑ Add image-to-TikZ diagram conversion using vision - language models
- ❑ Enable voice input for hands-free diagram generation
- ❑ Integrate real-time LaTeX preview for TikZ output
- ❑ Support multilingual natural language input
- ❑ Provide interactive visual editing for diagrams
- ❑ Integrate TikzBuilder with LaTeX editors like Overleaf and VS Code

IBM CERTIFICATIONS

- Screenshot/ credly certificate(getting started with AI)

In recognition of the commitment to achieve
professional excellence

Getting Started with
Artificial Intelligence
IBM SkillsBuild



Muthu Harish.T

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 19, 2025

Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/53aeb234-7c74-4955-8fd2-e16e21931518>



IBM CERTIFICATIONS

- Screenshot/ credly certificate(Journey to Cloud)

In recognition of the commitment to achieve
professional excellence



Muthu Harish.T

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution



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RAG LAB CERTIFICATE

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Muthu Harish.T

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 19 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU