# Leveraging Python and LLMs for Innovative 3D Printing Projects

PyCon APAC 2024

# Introduction

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# About the Title

**"Leveraging Python and LLMs for Innovative 3D Printing Projects"**

- Sounds a bit strange?
- Clickbait?

# Actually... generated by an AI!

Important Dates:
Submission Deadline: July 14th 2024 23:59:59 UTC+7
Notification of Acceptance: we use a rolling review, we will send a notification for the accepted talks every 2 weeks. So, the sooner you submit the better.
For any questions or further information, please contact our organizing committee at pycon@python.or.id or visit our conference website at https://2024-apac.pycon.id/.

We look forward to receiving your submissions and seeing you at PyCon APAC 2024!

You can enter proposals until 2024-07-14 23:59 (Asia/Jakarta), 1 week, 3 days from now.

i want submit proposal to this event, i want talk about utilize python & llm to make cretaive things using 3d print

Memory updated

That sounds like a fantastic topic! Here's a draft proposal for your submission:

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**Title:** Empowering Creativity: Leveraging Python and LLMs for Innovative 3D Printing Projects

## What do I actually want to share?

What I really want to share today is my journey of learning and experimenting with Python and Large Language Models for 3D printing projects, This journey culminated in creating a simple application to generate 3D models.

Project Repository: https://github.com/ibrahim4529/llm3dprint

## Why LLMs for 3D Printing?

- Addressing the "skill issue" in 3D modeling
- LLMs open up new possibilities in design, especially for those of us who aren't experts in 3D modeling.

## How To solve that?

1. Using Existing text-to-3D model llms
    - Example: OpenAI's Shape-E
2. Generating OpenSCAD Code
    - LLMs writing 3D modeling scripts

## What role does Python play in my project?

- Help me to interact with the llm model.
- Help me to generate the 3d model.
- Help me visualize the 3d model.

https://www.python.org/

https://pyvista.org/

https://openrouter.ai/

# Approach 1: Using Existing Models

- Focus of exploration: OpenAI's Shape-E
- Purpose: Text-to-3D model generation
- How it works:
  - Input: Text description of the 3D model
  - Output: 3D model
- Limitations:
  - Still in early stages.
  - Lack of control over the 3D model like size, shape, etc.

https://github.com/openai/shap-e

## Approach 2: Generating OpenSCAD Code

When we hear about LLMs, the first thing that often comes to mind for us as software engineers is their ability to help us generate code for our applications. This is where the idea struck me: what if we use LLMs to generate OpenSCAD code? For those unfamiliar, OpenSCAD is a programming language for creating 3D solid models. It's like coding, but for 3D objects.

```
cylinder(h = 10, r1 = 5, r2 = 3);
translate([0, 0, 10])
sphere(r = 3);
```

https://openscad.org/

# Demo

- Demo: Generating a 3D model using OpenAI's Shape-E
- Challenges:
  - Model still in erly stages
  - Need to know how to use this model (utilize openrouter api)
  - Lack of control over the 3d model like size, shape, etc.
- Demo: Generating OpenSCAD code using LLMs
- Challenges:
  - Generate complex models

## Conclusion And Feasibility

- Still in early stages
- Requires a lot of experimentation and learning
- Can using RAG for better results (future work)
- Can try fine-tuning for better results (future work)

# Thank You!

Any questions?