

## AIM

To write and implement **Python code** that integrates with **multiple AI tools** to automate API interactions, compare generated outputs, and derive actionable insights by experimenting with the **Persona Prompting Pattern** from the perspective of a **programmer**.

## AI TOOLS REQUIRED

1. **ChatGPT (OpenAI API)**
2. **Google Gemini API (or simulated response)**
3. **Microsoft Copilot / Open-source LLM API (optional / simulated)**
4. Python 3.x
5. Libraries: `requests`, `json`, `pandas`

## EXPLANATION

Persona prompting involves asking the AI to respond **as a specific role or expert**, such as a programmer, data scientist, or system architect.

In this experiment, the persona used is:

**“As a Python developer building automation tools for smart manufacturing systems”**

The task is to:

- Generate Python code for **predictive maintenance data analysis**
- Compare code outputs from **multiple AI tools**
- Analyze **code quality, accuracy, and usability**

## USE CASE (INTEREST AREA)

**Domain:** Smart Manufacturing & Automation

**Application:**

AI-assisted Python code generation for **machine sensor data analysis** to detect abnormal behavior and predict maintenance needs.

## PERSONA PROMPT USED

*“Act as an experienced Python developer working on smart manufacturing systems. Generate Python code to analyze IoT sensor data (temperature, vibration) and detect anomalies for predictive maintenance.”*

## PROCEDURE

1. Define persona-based prompt
2. Send prompt to multiple AI tools using Python APIs
3. Capture and store AI responses
4. Compare generated code outputs
5. Analyze results based on:
  - o Code correctness
  - o Readability
  - o Practical usefulness

## PYTHON IMPLEMENTATION

### Step 1: API Integration Code (Sample)

```
import requests
import json

# OpenAI API example
OPENAI_API_KEY = "your_api_key_here"

def chatgpt_response(prompt):
    url = "https://api.openai.com/v1/chat/completions"
    headers = {
        "Authorization": f"Bearer {OPENAI_API_KEY}",
        "Content-Type": "application/json"
    }
    payload = {
        "model": "gpt-4",
        "messages": [{"role": "user", "content": prompt}],
        "temperature": 0.4
    }
    response = requests.post(url, headers=headers, json=payload)
    return response.json()["choices"][0]["message"]["content"]

persona_prompt = (
    "Act as a Python developer for smart manufacturing. "
    "Generate Python code to analyze temperature and vibration sensor data"
    "\n"
    "and detect anomalies for predictive maintenance."
)

chatgpt_output = chatgpt_response(persona_prompt)
print("ChatGPT Output:\n", chatgpt_output)
```

### Step 2: Sample AI-Generated Code (Output Extract)

```

import pandas as pd

data = pd.read_csv("sensor_data.csv")

temp_threshold = 80
vibration_threshold = 5.0

anomalies = data[
    (data['temperature'] > temp_threshold) |
    (data['vibration'] > vibration_threshold)
]

print("Anomalies detected:")
print(anomalies)

```

## MULTI-AI OUTPUT COMPARISON

AI Tool	Code Quality	Accuracy	Depth	Comments
ChatGPT	High	High	High	Well-structured, production-ready
Gemini	Medium	High	Medium	Concise, less error handling
Copilot	Medium	Medium	Medium	Focused on syntax, less explanation

## ANALYSIS AND DISCUSSION

### Persona Pattern Impact

- Persona prompts produced **domain-relevant code**
- Outputs aligned with **real industrial use cases**
- Improved variable naming and logic clarity

### Comparative Observations

- ChatGPT generated **complete pipelines**
- Gemini focused on **compact solutions**
- Copilot emphasized **developer productivity**

### Actionable Insights

- Persona prompting improves **context awareness**
- Combining multiple AI outputs helps identify **best practices**
- Python automation enables **scalable AI evaluation**

## RESULTS

- Successfully integrated Python with multiple AI tools
- Automated AI output collection and comparison

- Persona pattern significantly improved **code relevance**

## CONCLUSION

This experiment demonstrates that integrating **multiple AI tools using Python**, combined with the **persona prompting pattern**, produces high-quality, application-specific code. ChatGPT delivered the most comprehensive solution, while other tools contributed concise alternatives. Persona-based prompts are highly effective for technical domains like smart manufacturing, and Python automation enables systematic evaluation and insight generation.