

Lab 1: Introduction to ChatGPT

Objective:

To understand the basics of ChatGPT, including its origin, architecture, capabilities, and real-world applications.

What is ChatGPT?

ChatGPT is a conversational AI model developed by **OpenAI**, based on the **GPT (Generative Pre-trained Transformer)** architecture. It is trained on a massive amount of text data and is capable of generating human-like responses to prompts, making it useful for a wide range of applications like answering questions, coding, writing, tutoring, and more.

Origin and Evolution:

- **GPT-1** (2018): Introduced the transformer-based generative model.
 - **GPT-2** (2019): Larger and more powerful, but initially restricted due to misuse concerns.
 - **GPT-3** (2020): 175 billion parameters, enabled advanced NLP tasks.
 - **GPT-4/GPT-4o** (2023–2024): Multimodal (text + image), highly interactive, more reliable and safer.
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Transformer Architecture (Simplified):

ChatGPT uses the **Transformer** model, which relies on:

- **Self-attention**: Determines the importance of each word in a sentence.
- **Positional encoding**: Preserves the word order.
- **Layers of encoders and decoders**: Process and generate text efficiently.

Visualization tools like attention heatmaps help in understanding which words the model focuses on when generating responses.

Capabilities of ChatGPT:

- Text generation
 - Code writing and debugging
 - Summarization
 - Translation
 - Sentiment analysis
 - Question answering
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Real-World Applications:

Domain	Use-Case Example
Education	Personal tutor for subjects like math or programming, language learning aid
Health	Symptom checker, mental health chatbot, medical information summarizer
Business	Automating customer service, email writing, business report summarization
Creativity	Story generation, songwriting, scriptwriting, art prompts

Lab 2: Types of Prompts and Prompt Engineering Basics

Objective:

To understand different types of prompts (instructional, interrogative, zero-shot, few-shot) and apply prompt engineering techniques to generate better responses using ChatGPT.

What is a Prompt?

A **prompt** is any input given to an AI model to guide its response. It can be a question, command, or detailed scenario. The goal is to generate useful and relevant outputs.

What is Prompt Engineering?

Prompt Engineering is the method of crafting prompts strategically to guide AI outputs. Good prompt design includes:

- Clear instructions
 - Providing context
 - Giving examples (few-shot)
 - Structured output (tables, JSON, etc.)
 - Step-by-step reasoning
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Types of Prompts & Examples

♦ 1. Instructional Prompts

Tell the AI what to do.

Example	Prompt	Output Summary
1	Summarize the paragraph below in 2 lines.	Gives concise summary.

2	Write a Python function to calculate factorial.	Returns correct code.
3	Generate a business name for an eco-friendly brand.	Suggests creative names.
4	Convert the sentence to passive voice.	Applies correct transformation.
5	Write a 4-line poem about the ocean.	Produces original poem.

Lab 3: Precision Prompting for Information Extraction

Objective

To learn how to design precise prompts that extract structured data (like JSON or tables) from natural language text using ChatGPT.

Activities Performed

Activity 1: Extract in JSON Format

Prompt:

"Extract the following details from the paragraph and return in JSON format:

- Name
- Email
- Phone
- Skills"

Input Paragraph:

"My name is Riya Sharma, and I am a software developer based in Pune. You can reach me at riya.sharma@example.com or call me at +91-9876543210. My core skills include Python, JavaScript, and React."

```
{
  "Name": "Riya Sharma",
  "Email": "riya.sharma@example.com",
  "Phone": "+91-9876543210",
  "Skills": ["Python", "JavaScript", "React"]
}
```

Accuracy:  100%
Format Quality:  Well-structured JSON



Activity 2: Extract Resume Sections

Prompt:
"From the following text, extract and format the Education, Experience, and Skills sections as a table."

Input Text:
"John Doe has a B.Tech in Computer Science from IIT Delhi. He worked as a Software Engineer at Infosys for 2 years. His skills include Java, AWS, and Docker."

Output (Table):

Section	Details
Education	B.Tech in Computer Science from IIT Delhi
Experience	Software Engineer at Infosys (2 years)
Skills	Java, AWS, Docker

Accuracy:  100%
Format Quality:  Proper table formatting

Activity 3: Keyword Extraction



Prompt:
"Extract the keywords from the following abstract (in list format):"

Abstract:







"This research explores machine learning applications in healthcare. We focus on disease prediction using neural networks and decision trees."

Output:

- Machine learning
- Healthcare
- Disease prediction
- Neural networks
- Decision trees

Accuracy:  Extracted all key terms
Format Quality:  Clean list

Final Output Summary

Activity	Prompt Type	Output Format	Accuracy	Format Quality
1	JSON Extraction	JSON		
2	Resume Structuring	Table		
3	Keyword Extraction	List		

Lab 4: Summarization and Text Transformation

Objective:

To explore how ChatGPT can assist in summarizing content, rewriting text, and transforming tone for different communication needs.

Activities Performed

Activity 1: Summarize News Article

Original (News Excerpt):

"India has launched its first solar mission, Aditya-L1, aimed at studying the outer atmosphere of the Sun. The spacecraft will be positioned at the Lagrange Point 1, about 1.5 million kilometers from Earth, and will monitor solar activity such as solar flares and coronal mass ejections that can impact satellites and power grids on Earth."


Prompt:

"Summarize the following news article in 2-3 lines."

Output (Summary):

India launched its first solar mission, Aditya-L1, to study the Sun's outer atmosphere. Positioned at Lagrange Point 1, it will observe solar activity that may affect Earth's satellites and power systems.

Accuracy: 

Transformation Quality:  Clear, concise, and retains key information

Activity 2: Summarize Research Abstract

Original Abstract:

"This study proposes a novel convolutional neural network model for skin cancer classification. The model was trained on a dataset of 10,000 dermatoscopic images and achieved 92% accuracy in distinguishing between malignant and benign skin lesions. The results demonstrate the model's potential for aiding dermatologists in early cancer detection."

Prompt:

"Summarize this research abstract in simple language."

Output (Summary):

Researchers developed a new AI model to identify skin cancer using images. It correctly classified cancer in 92% of cases and can help doctors detect it early.

Accuracy: 

Transformation Quality:  Simplified for general understanding

Activity 3: Rewrite Email – Informal to Formal**Original (Informal Email):**

"Hey, I can't make it to the meeting today. Got some other stuff lined up. Can we shift it to tomorrow?"

Prompt:

"Rewrite this email in a formal tone."

Output (Formal Email):

"Dear [Recipient],
I regret to inform you that I will be unable to attend today's meeting due to prior commitments. Would it be possible to reschedule it for tomorrow?
Best regards,
[Your Name]"

Transformation Quality:  Formal, respectful, and professional tone

Activity 4: Rewrite Email – Formal to Informal**Original (Formal Email):**

"Dear Team,
Kindly note that the deadline for project submissions is Friday, August 9th. Please ensure timely completion.
Best regards,
Manager"

Prompt:

"Rewrite this in an informal tone suitable for a student group chat."

Output (Informal Version):

"Hey everyone! Just a reminder that the project's due on Friday (Aug 9). Let's make sure we wrap it up on time 👍"

Transformation Quality: ✅ Friendly, relaxed tone suitable for peers

Final Summary Table

Activity	Type	Original Format	Transformed Output	Quality
1	News Summarization	News Paragraph	2-Line Summary	✅
2	Research Abstract Summary	Abstract	Simple Summary	✅
3	Informal to Formal Email	Casual Email	Formal Email	✅
4	Formal to Informal Email	Professional Note	Student Chat Style	✅

Lab 5: ChatGPT in Code Generation and Debugging

Objective:

To explore how ChatGPT can help in generating code and debugging errors in Python, C++, or Java programs.

Activities Performed

Activity 1: Code Generation from Prompt (Python)

Prompt:


"Write a Python function to check whether a number is prime."

ChatGPT Output:

```
def is_prime(n):
    if n <= 1:
        return False
    for i in range(2, int(n**0.5) + 1):
        if n % i == 0:
            return False
    return True
```

Expected Output Check:

- `is_prime(7) → True`
- `is_prime(10) → False`

Result:  Output matches expectations

Analysis: The code is optimized using square root logic and works efficiently.

Activity 2: Code Generation (C++)

Prompt:

"Write a C++ program to calculate the factorial of a number using recursion."

ChatGPT Output:

```
#include <iostream>
using namespace std;


int factorial(int n) {
    if (n <= 1)
        return 1;
    else
        return n * factorial(n - 1);
}

int main() {
    int num;
```

```
    cout << "Enter a number: ";
    cin >> num;
    cout << "Factorial: " << factorial(num);
    return 0;
}
```

Expected Output Example:

Input: 5 → Output: 120

Result:  Matches expected result

Analysis: Recursion is correctly implemented; output is accurate.

Activity 3: Debugging Python Code

Given Buggy Code:

```
def add_numbers(a, b):
    return a + b

print(add_number(3, 4)) # Typo in function name
```

Prompt to ChatGPT:


"Debug this Python code."

ChatGPT Suggested Fix:

```
def add_numbers(a, b):
    return a + b

print(add_numbers(3, 4)) # Fixed function name
```

Expected Output: 7

Result:  Bug fixed correctly

Analysis: ChatGPT identified the naming error and provided the corrected version.

Activity 4: Debugging C++ Code

Buggy Code:

```
#include<iostream>
```

```
using namespace std;

int main() {
    int a = 5, b = 0;
    cout << "Division: " << a / b; // Division by zero
    return 0;
}
```

ChatGPT Debugging Suggestion: `#include<iostream>`
`using namespace std;`





```
int main() {
    int a = 5, b = 0;
    if (b != 0)
        cout << "Division: " << a / b;
    else
        cout << "Error: Division by zero";
    return 0;
}
```

Expected Behavior: Prevent crash due to divide-by-zero

Result:  Corrected with safe condition

Analysis: Code now handles runtime errors gracefully.

Final Comparison Table

Activity	Task Type	Language	Input Type	Output Accuracy	Notes
1	Code Generation	Python	Text Prompt		Prime check function works
2	Code Generation	C++	Text Prompt		Recursion implemented
3	Debugging	Python	Buggy Code		Function name fixed
4	Debugging	C++	Runtime error (0 div)		Error handled with condition

Lab 6: Domain-Specific Applications

Objective:

To explore domain-specific use cases of ChatGPT by designing prompts for a selected field and evaluating its output.

Selected Activity:

☒ Educational Quiz Generation

Prompt Design:

Prompt:

"Create a 5-question multiple-choice quiz for second-year engineering students on the topic: *Digital Logic Design*. Include 4 options per question and mark the correct answer."

ChatGPT Output:

Quiz Title: Digital Logic Design – MCQ Quiz

1. **Which of the following is a combinational circuit?**




- A. Flip-Flop
- B. Counter
- C. Multiplexer
- D. Register

☒ **Correct Answer: C. Multiplexer**





2. **The output of a NOT gate is:**

- A. Same as input
- B. Always high
- C. Always low
- D. Complement of input

☒ **Correct Answer: D. Complement of input**

3. **Gray code is used in digital systems to:**
A. Reduce power consumption
B. Simplify multiplication
C. Prevent errors during transitions
D. Increase speed
 **Correct Answer: C. Prevent errors during transitions**
4. **In a 4-bit binary number, the MSB represents:**
A. The smallest bit
B. The parity bit
C. The most significant bit
D. The clock signal
 **Correct Answer: C. The most significant bit**
5. **What is the binary equivalent of decimal 13?**
A. 1110
B. 1101
C. 1011
D. 1001
 **Correct Answer: B. 1101**
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Output Evaluation:

Criteria	Evaluation
Relevance	 Questions are relevant to 2nd-year engineering syllabus
Clarity	 Questions and options are clearly stated
Accuracy	 All correct answers verified
Usefulness	 Suitable for self-assessment or quizzes