

## Report on The Following:

### Natural Language Processing (NLP)

NLP is a field of AI that enables machines to understand and process human language.

Its key components are:

- Tokenization: Breaking text into words or phrases
- Parts - of - speech Tagging: Labeling words by grammatical roles.
- Named Entity Recognition: Identifying names of people, places, etc.
- Semantic Analysis: Understanding meaning in text.
- Text Summarization and Machine Translation are additional applications

## Sentiment Analysis

Sentiment analysis determines emotional tone in text, classifying it as positive, negative or neutral. It is widely used for social media monitoring, customer feedback, and market analysis. Techniques include:

**Lexicon-Based:** Using predefined sentiment words.

**Machine Learning-Based:** Using models to classify text.

**Hybrid Approach:** This combines lexicon-based and machine learning techniques to improve accuracy.

There are three main types of sentiment analysis are:

- Polarity-Based Sentiment Analysis
- Emotion-Based Sentiment Analysis
- Aspect-Based Sentiment Analysis



# Speech Synthesis

Speech Synthesis is the artificial production of human speech. It is a critical component of text to speech systems, which convert written text into

spoken words. Speech synthesis is used in a variety of applications, including virtual assistants, navigation systems, accessibility tools for the visually impaired and more.

The two primary methods for speech synthesis:

- Concatenative synthesis: Uses pre-recorded speech units.
- Parametric synthesis: Generates speech using model for more flexibility.

Neural TTS has improved naturalness in synthesized speech.

# Architecture of Chatbot, Designing Elements and Best Practices

A chatbot is an AI-driven program that interacts with user via natural language, often through text or voice. It can be used for customer support, personal assistance or other interactive applications.

## Architecture:

UI: Interface for user interaction.

NLU: Understands user intents and entities

Dialog Manager: Manage conversation flow.

NLG: Generates responses.

Backend/API: Handles integrations and data retrieval.



## Design Elements:

Intent Recognition: Understanding user goals.

Entity Recognition: Identifying key information.

Contextual Awareness: Maintaining conversation flow.

## Best Practices:

- Define clear use cases
- focus on user experience
- Ensure security and privacy.