# TEXT TO SPEECH

MINOR PROJECT REPORT

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Under the guidance of   
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**FACULTY OF ENGINEERING AND TECHNOLOGY**

**SCHOOL OF COMPUTING**

**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**KATTANKULATHUR**

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**(Under Section 3 of UGC Act, 1956)**

**BONAFIDE CERTIFICATE**

Certified that this minor project report for the course **21CSC203P** **ADVANCED PROGRAMMING PRACTICE** entitled in "**Text to Speech** " is the bonafide work of **SANJEEV SITARAMAN (RA2211026010355), GAURI GUPTA (RA2211026010359), and MRINALINI VAISH (RA2211026010365)** who carried out the work under my supervision.

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# ABSTRACT

Text-to-speech (TTS) is a type of assistive technology that reads digital text aloud. All kinds of text files can be read aloud, including Word and Pages documents. Even online web pages can be read aloud. The voice in TTS is computer-generated. Voice quality varies, but some voices sound human. This speech or sound is synonymous with natural sounds and reacts to pitch, pronunciation, frequency, etc. Prominent TTS tools encompass web-based tools, chrome tools, text-to-speech apps, text-to-speech software, etc. It is noteworthy that TTS is entirely computer-generated and therefore is suitable for working with every digital device capable of interaction, including computers, tablets, Smartphones, etc.

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**INTRODUCTION**

1. Motivation

In a digitally evolving world, the necessity for accessibility is paramount. A significant portion of information is communicated through text, which can pose challenges for individuals with visual impairments or those in situations where reading is not feasible. The motivation behind this work lies in the earnest desire to bridge this gap, ensuring that information is universally accessible to all.

2. Objective

The primary aim of this project is to develop an advanced Text-to-Speech converter that not only translates text to speech but also ensures the delivery of high-quality, human-like audio outputs. This involves tackling the technical intricacies while keeping user experience at the forefront, thereby catering to the diverse needs of individuals requiring such accessibility tools.

3. Problem Statement

The lack of a comprehensive, universally applicable Text-to-Speech converter that seamlessly translates text to natural-sounding speech remains a prevalent issue. Current solutions often face challenges in accurately conveying emotions, dealing with varied languages and dialects, and maintaining a consistently human-like voice, thereby hindering the seamless accessibility for the visually impaired and other users in need.

This project addresses these issues by focusing on the development of an innovative and versatile Text-to-Speech converter, aiming to significantly enhance accessibility and user experience across multiple platforms and languages.

4. Challenges

Creating a reliable and natural-sounding text-to-speech (TTS) system presents multifaceted challenges. These encompass the need for accuracy in converting various text formats, maintaining natural intonation, and addressing language nuances. Additionally, the system must be adaptable to different content types and platforms, all while striving to achieve real-time conversion.

**LITERATURE SURVEY**

A literature survey for a text-to-speech (TTS) converter involves reviewing relevant research articles, papers, and publications related to various aspects of TTS technology. This survey helps you understand the existing methods, techniques, and challenges in the field, allowing you to identify gaps in the current research and propose innovative solutions. Here's a structured literature survey outline to get you started:

1. Introduction to Text-to-Speech (TTS) Technology
2. Definition and Importance of TTS
3. Applications of TTS Systems
4. Historical Development of TTS Technology
5. TTS System Architectures and Components
6. Text Analysis
7. Concatenative vs. Parametric Synthesis
8. TTS Techniques and Approaches
9. Concatenative TTS
10. Parametric TTS
11. Deep Learning Approaches
12. Challenges and Issues in TTS Systems
13. Naturalness and Intelligibility
14. Multilingual and Cross-Lingual TTS
15. Low-Resource Languages
16. Real-Time Processing
17. Voice Cloning and Ethical Considerations
18. Evaluation Metrics and Datasets
19. Objective Evaluation Metrics
20. Subjective Evaluation Methods
21. Benchmark Datasets for TTS Research
22. Recent Advancements and Trends
23. Neural TTS Models
24. Transfer Learning in TTS
25. End-to-End TTS Systems
26. Applications of TTS Technology
27. Accessibility Tools for Visually Impaired
28. Human-Computer Interaction
29. Virtual Assistants and Chatbots
30. Conclusion and Future Directions
31. Summary of Key Findings from the Literature Survey
32. References
33. List of Cited Articles, Papers, and Books

**REQUIREMENTS**

**Requirement Analysis**

Functional Requirements:

1. Text Input:

The system should accept various input formats, such as plain text, documents (PDF, DOCX), and web pages.

It should support multiple languages and accents.

1. Speech Generation:

Generate high-quality, natural-sounding speech output.

Ensure accurate pronunciation of words, including proper nouns and technical terms.

Constraints:

1. Technological Constraints:

Identify the platforms and devices the TTS converter will support (web, mobile, desktop).

Consider compatibility with different operating systems (Windows, macOS, Linux, iOS, Android).

1. Resource Constraints:

Determine the computational resources (CPU, memory) required for speech synthesis.

Optimize algorithms and models for efficient resource utilization.

**Software Requirement**

1. Android studio
2. Operating server (here Linux)
3. Android studio and suitable emulator
4. Import libraries

**ARCHITECTURE AND DESIGN**

**A diagram of a company

Description automatically generated**

**IMPLEMENTATION**

**Code for Main\_Activity.java**

package com.example.text\_to\_speech\_sgm;

import android.os.Bundle;

import android.os.Handler;

import android.os.Looper;

import android.speech.tts.TextToSpeech;

import android.text.Spannable;

import android.text.SpannableString;

import android.text.style.BackgroundColorSpan;

import android.view.View;

import android.widget.Button;

import android.widget.EditText;

import androidx.appcompat.app.AppCompatActivity;

import java.util.Locale;

import android.content.SharedPreferences;

import android.content.Intent;

import android.net.Uri;

import java.io.BufferedReader;

import java.io.InputStream;

import java.io.InputStreamReader;

import android.widget.TextView;

public class MainActivity extends AppCompatActivity {

TextToSpeech tts;

EditText e1;

Button b1;

Button loadFileButton;

EditText manualEditText;

boolean isTTSInitialized = false;

private SharedPreferences sharedPreferences;

@Override

protected void onCreate(Bundle savedInstanceState) {

super.onCreate(savedInstanceState);

setContentView(R.layout.activity\_main);

e1 = findViewById(R.id.editTextTextMultiLine);

b1 = findViewById(R.id.button);

Button bInputNewText = findViewById(R.id.buttonInputNewText);

Button historyButton = findViewById(R.id.historyButton);

loadFileButton = findViewById(R.id.loadFileButton);

historyButton.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View view) {

// Create an intent to open the history activity

Intent intent = new Intent(MainActivity.this, HistoryActivity1.class);

startActivity(intent);

}

});

// Initialize SharedPreferences

sharedPreferences = getSharedPreferences("TextHistory", MODE\_PRIVATE);

// Set the previously used text in the EditText

//e1.setText(getTextHistory());

tts = new TextToSpeech(getApplicationContext(), new TextToSpeech.OnInitListener() {

@Override

public void onInit(int i) {

if (i == TextToSpeech.SUCCESS) {

tts.setLanguage(Locale.US);

tts.setSpeechRate(1f);

isTTSInitialized = true;

}

}

});

//TextView historyTextView = findViewById(R.id.historyTextView);

//historyTextView.setText("Text History:\n" + getTextHistory());

manualEditText = findViewById(R.id.manualEditText);

Button b1= findViewById(R.id.button);

loadFileButton.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View view) {

// Launch a file picker dialog or file explorer to let the user select a .txt file

Intent intent = new Intent(Intent.ACTION\_OPEN\_DOCUMENT);

intent.addCategory(Intent.CATEGORY\_OPENABLE);

intent.setType("text/plain");

startActivityForResult(intent, 1);

}

});

// Your code to generate and display the summary text

b1.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View view) {

if (isTTSInitialized) {

String text = manualEditText.getText().toString();

tts.speak(text, TextToSpeech.QUEUE\_FLUSH, null);

saveTextToHistory(text);

highlightText(text);

}

}

});

bInputNewText.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View view) {

// Clear the text box

manualEditText.setText("");

e1.setText("");

tts = new TextToSpeech(getApplicationContext(), new TextToSpeech.OnInitListener() {

@Override

public void onInit(int i) {

if (i == TextToSpeech.SUCCESS) {

tts.setLanguage(Locale.US);

tts.setSpeechRate(1f);

isTTSInitialized = true;

}

}

});

if (tts != null) {

tts.stop();

}

}

});

e1.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View view) {

if (isTTSInitialized) {

String text = e1.getText().toString();

tts.speak(text, TextToSpeech.QUEUE\_FLUSH, null);

saveTextToHistory(text); // Save the clicked text to history

highlightText(text);

}

}

});

}

@Override

protected void onActivityResult(int requestCode, int resultCode, Intent data) {

super.onActivityResult(requestCode, resultCode, data);

if (requestCode == 1 && resultCode == RESULT\_OK) {

Uri uri = data.getData();

try {

// Read the content of the selected .txt file

InputStream inputStream = getContentResolver().openInputStream(uri);

BufferedReader reader = new BufferedReader(new InputStreamReader(inputStream));

StringBuilder text = new StringBuilder();

String line;

while ((line = reader.readLine()) != null) {

text.append(line).append("\n");

}

reader.close();

inputStream.close();

// Set the loaded text to the EditText

manualEditText.setText(text.toString());

} catch (Exception e) {

e.printStackTrace();

}

}

}

private void saveTextToHistory(String text) {

String existingText = sharedPreferences.getString("textHistory", "");

String newText = existingText + "\n" + text;

SharedPreferences.Editor editor = sharedPreferences.edit();

editor.putString("textHistory", newText);

editor.apply();

}

private void speakWithHighlighting(String text) {

String[] words = text.split("\\s+");

int startIndex = 0;

for (String word : words) {

SpannableString spannable = new SpannableString(text);

int wordStartIndex = text.indexOf(word, startIndex);

int wordEndIndex = wordStartIndex + word.length();

// Apply the background color to highlight the word

spannable.setSpan(new BackgroundColorSpan(0xFFFFFFFF), wordStartIndex, wordEndIndex, Spannable.SPAN\_INCLUSIVE\_INCLUSIVE);

// Set the text in the EditText to the SpannableString

e1.setText(spannable);

// Speak the current word

tts.speak(word, TextToSpeech.QUEUE\_FLUSH, null);

// Delay to give time for speech to complete (adjust as needed)

int speechLengthInMillis = word.length() \* 200;

try {

Thread.sleep(speechLengthInMillis);

} catch (InterruptedException e) {

e.printStackTrace();

}

// Remove the background color after speaking

spannable.removeSpan(spannable.getSpans(0, spannable.length(), BackgroundColorSpan.class)[0]);

e1.setText(spannable);

// Update the start index for the next word

startIndex = wordEndIndex;

}

}

private void highlightText(String text) {

// Create a new SpannableString to highlight the entire text

SpannableString spannable = new SpannableString(text);

// Apply the background color to highlight the entire text

spannable.setSpan(new BackgroundColorSpan(0xFFADD8E6), 0, text.length(), Spannable.SPAN\_INCLUSIVE\_INCLUSIVE);

// Set the text in the EditText to the SpannableString

e1.setText(spannable);

// Delay to show the highlighting (adjust as needed)

int highlightingDurationInMillis = text.length() \* 200;

new Handler(Looper.getMainLooper()).postDelayed(new Runnable() {

@Override

public void run() {

// Remove the background color after highlighting

spannable.removeSpan(spannable.getSpans(0, spannable.length(), BackgroundColorSpan.class)[0]);

e1.setText(spannable);

}

}, highlightingDurationInMillis);

}

private String getTextHistory() {

return sharedPreferences.getString("textHistory", "");

}

@Override

public void onBackPressed() {

super.onBackPressed();

finishAffinity();

System.exit(0);

}

}

**Code for Main\_Activity.xml**

<androidx.constraintlayout.widget.ConstraintLayout

xmlns:android="http://schemas.android.com/apk/res/android"

xmlns:app="http://schemas.android.com/apk/res-auto"

xmlns:tools="http://schemas.android.com/tools"

android:layout\_width="match\_parent"

android:layout\_height="match\_parent"

android:orientation="vertical"

android:padding="0dp"

tools:context=".MainActivity">

<ImageView

android:id="@+id/LinearLayout01"

android:layout\_width="fill\_parent"

android:layout\_height="fill\_parent"

android:background="@drawable/greenbg"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="1.0"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="0" />

<EditText

android:id="@+id/editTextTextMultiLine"

android:layout\_width="250dp"

android:layout\_height="80dp"

android:layout\_marginBottom="480dp"

android:contentDescription="Enter your text here"

android:ems="10"

android:gravity="start|bottom"

android:inputType="textMultiLine"

android:lines="10"

android:textColor="@color/black"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="0.496"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="1.0" />

<Button

android:id="@+id/button"

android:layout\_width="122dp"

android:layout\_height="45dp"

android:backgroundTint="#0a6680"

android:elevation="20dp"

android:text="Convert"

android:textColor="@color/white"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="@+id/LinearLayout01"

app:layout\_constraintHorizontal\_bias="0.498"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="0.572" />

<ImageView

android:id="@+id/imageView2"

android:layout\_width="180dp"

android:layout\_height="90dp"

android:layout\_marginTop="-6dp"

android:layout\_marginLeft="-10dp"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="0.0"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="0.0"

app:srcCompat="@drawable/speakscribesgm" />

<Button

android:id="@+id/buttonInputNewText"

android:layout\_width="wrap\_content"

android:layout\_height="wrap\_content"

android:backgroundTint="#0a6680"

android:text="Input New Text"

android:textColor="@color/white"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="0.178"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="@+id/LinearLayout01"

app:layout\_constraintVertical\_bias="0.656" />

<Button

android:id="@+id/loadFileButton"

android:layout\_width="122dp"

android:layout\_height="45dp"

android:text="Load File"

android:textColor="@color/white"

android:backgroundTint="#0a6680"

android:textSize="14sp"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="0.837"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="@+id/LinearLayout01"

app:layout\_constraintVertical\_bias="0.655" />

<EditText

android:id="@+id/manualEditText"

android:layout\_width="268dp"

android:layout\_height="59dp"

android:layout\_margin="16dp"

android:hint="Enter text to convert"

android:inputType="textMultiLine"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="0.496"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="0.485" />

<Button

android:id="@+id/historyButton"

android:layout\_width="110dp"

android:layout\_height="30dp"

android:layout\_margin="10dp"

android:layout\_marginBottom="-5dp"

android:text="View History"

android:textSize="-500dp"

android:textColor="#0a6680"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="parent"

app:layout\_constraintHorizontal\_bias="1.0"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="1.0"

android:backgroundTint="@color/white"/>

</androidx.constraintlayout.widget.ConstraintLayout>

**Code for History.java**

package com.example.text\_to\_speech\_sgm;

import android.content.SharedPreferences;

import android.os.Bundle;

import android.widget.TextView;

import androidx.appcompat.app.AppCompatActivity;

import android.view.View;

import android.widget.Button;

public class HistoryActivity1 extends AppCompatActivity{

private SharedPreferences sharedPreferences;

private TextView historyTextView;

@Override

protected void onCreate(Bundle savedInstanceState) {

super.onCreate(savedInstanceState);

setContentView(R.layout.activity\_history1);

sharedPreferences = getSharedPreferences("TextHistory", MODE\_PRIVATE);

historyTextView = findViewById(R.id.historyTextView);

historyTextView.setText("Text History:\n" + getTextHistory());

Button clearHistoryButton = findViewById(R.id.clearHistoryButton);

clearHistoryButton.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View view) {

clearHistory();

}

});

}

private void clearHistory() {

// Clear the text history in shared preferences

SharedPreferences.Editor editor = sharedPreferences.edit();

editor.remove("textHistory"); // Remove the history key from shared preferences

editor.apply();

// Update the displayed history

historyTextView.setText("Text History:\n");

}

private String getTextHistory() {

return sharedPreferences.getString("textHistory", "");

}

}

**Code for History.xml**

<?xml version="1.0" encoding="utf-8"?>

<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schemas.android.com/apk/res/android"

xmlns:app="http://schemas.android.com/apk/res-auto"

xmlns:tools="http://schemas.android.com/tools"

android:layout\_width="match\_parent"

android:layout\_height="match\_parent"

android:padding="8dp">

<RelativeLayout

android:id="@+id/relativeLayout2"

android:layout\_width="match\_parent"

android:layout\_height="match\_parent">

<ScrollView

android:layout\_width="match\_parent"

android:layout\_height="match\_parent"

android:padding="4.5dp">

<LinearLayout

android:layout\_width="match\_parent"

android:layout\_height="match\_parent"

android:orientation="vertical">

<TextView

android:id="@+id/historyTextView"

android:layout\_width="wrap\_content"

android:layout\_height="wrap\_content"

android:text="Text History:"

android:textSize="16sp"

android:textStyle="bold"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="@+id/LinearLayout01"

app:layout\_constraintHorizontal\_bias="0.176"

app:layout\_constraintStart\_toStartOf="@+id/LinearLayout01"

app:layout\_constraintTop\_toTopOf="parent"

app:layout\_constraintVertical\_bias="0.844" />

</LinearLayout>

</ScrollView>

</RelativeLayout>

<Button

android:id="@+id/clearHistoryButton"

android:layout\_width="wrap\_content"

android:layout\_height="wrap\_content"

android:layout\_gravity="center\_horizontal"

android:layout\_marginLeft="242dp"

android:layout\_marginBottom="670dp"

android:backgroundTint="#0a6680"

android:text="Clear History"

android:textColor="@color/white"

app:layout\_constraintBottom\_toBottomOf="parent"

app:layout\_constraintEnd\_toEndOf="@+id/relativeLayout2"

app:layout\_constraintStart\_toStartOf="parent"

app:layout\_constraintTop\_toTopOf="@+id/relativeLayout2" />

</androidx.constraintlayout.widget.ConstraintLayout>

**Code for Splashscreen**

package com.example.text\_to\_speech\_sgm;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;

import android.os.Bundle;

import android.os.Handler;

public class splashscreen extends AppCompatActivity {

@Override

protected void onCreate(Bundle savedInstanceState) {

super.onCreate(savedInstanceState);

setContentView(R.layout.splashscreen);

Runnable r = new Runnable() {

@Override

public void run() {

startActivity(new Intent(splashscreen.this, MainActivity.class));

}

};

Handler h = new Handler();

// The Runnable will be executed after the given delay time

h.postDelayed(r, 3000);

}

}

**Code for splashscreen.xml**

<?xml version="1.0" encoding="utf-8"?>

<androidx.constraintlayout.widget.ConstraintLayout

xmlns:android="http://schemas.android.com/apk/res/android"

xmlns:tools="http://schemas.android.com/tools"

xmlns:app="http://schemas.android.com/apk/res-auto"

android:layout\_width="match\_parent"

android:layout\_height="match\_parent"

tools:context=".splashscreen"

android:background="@drawable/splashwhitebluefinal">

</androidx.constraintlayout.widget.ConstraintLayout>

**RESULTS**

A screenshot of a computer screen

Description automatically generated

A screenshot of a phone

Description automatically generated

A black square with white text

Description automatically generated with medium confidence

**CONCLUSION**

In conclusion, the development of an advanced Text-to-Speech converter represents a significant stride towards inclusivity and accessibility in the digital sphere. Throughout this project, the emphasis remained on addressing the critical challenges in TTS systems, striving to provide an intuitive and high-quality solution for individuals with visual impairments or those seeking efficient, text-based content consumption. By amalgamating technical expertise with a user-centric approach, we aimed to create a versatile, natural-sounding system capable of accurately conveying emotions and nuances across various languages and content types. This innovation not only bridges the accessibility gap but also fosters an inclusive environment, ensuring that information is universally accessible to diverse audiences. As we move forward, the continual refinement and integration of user feedback will be pivotal in enhancing the performance and user experience of the Text-to-Speech converter, further advancing its impact on accessibility across different platforms and languages.