# CSE 162 Mobile Computing

## Voice UI

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# Goal: achieve the following features

- Speech to text conversion
- Use recognized voice command to display the calendar

# Voice interface

- Especialy useful for devices with small or no screens
  - such as a smartwatch

# The UI: use a calendar view

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:gravity="center"
    android:orientation="vertical">

    <CalendarView
        android:id="@+id/calendarView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginBottom="50dp"
        android:layout_marginLeft="50dp"
        android:layout_marginRight="50dp"/>

</LinearLayout>
```

# MainActivity.java

initialization: request permissions, setup the initial calendar view

```
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);



    if (ContextCompat.checkSelfPermission( context: MainActivity.this,
            Manifest.permission.CALL_PHONE) != PackageManager.PERMISSION_GRANTED) {
        ActivityCompat.requestPermissions( activity: MainActivity.this,
                new String[]{Manifest.permission.CALL_PHONE},REQUEST_PHONE_CALL);
    }


    calendarView = findViewById(R.id.calendarView);
    if (calendarView != null) {
        calendarView.setOnDateChangeListener(new CalendarView.OnDateChangeListener() {
            2 usages
            @Override
            public void onSelectedDayChange(@NonNull CalendarView view, int year, int month, int dayOfMonth) {
                // Note that months are indexed from 0. So, 0 means January, 1 means february, 2 means march etc.
                String msg = "Selected date is " + dayOfMonth + "/" + (month + 1) + "/" + year;
                  Toast.makeText(MainActivity.this, msg, Toast.LENGTH_SHORT).show();
            }
        });
    }

    displaySpeechRecognizer();

}
```

# Free-form voice-to-text conversion (the displaySpeechRecognizer function)

- generate an intent to invoke the Andoird speech recognition module
- RecognizerIntent

```
// Create an intent that can start the Speech Recognizer activity
private void displaySpeechRecognizer() {
    Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
    intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
            RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
// This starts the activity and populates the intent with the speech text.
    startActivityForResult(intent, SPEECH_REQUEST_CODE);
}
```

# Note: For emulator phones

- Your OS may not contain the Google App.
- Need to download and install the Google App

https://m.apkpure.com/google/com.google.android.googlequicksearchbox/download

# Exception Handling for phones without the Google App

```
1 usage
private void displaySpeechRecognizer() {



    try{
        Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
        intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
                RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
// This starts the activity and populates the intent with the speech text.
        startActivityForResult(intent, SPEECH_REQUEST_CODE);
    }
    catch(ActivityNotFoundException e)
    {

        String appPackageName = "com.google.android.googlequicksearchbox";
        try {
            startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse( uriString: "market://details?id=" + appPackageName)));
        } catch (android.content.ActivityNotFoundException anfe) {
            startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse(
                    uriString: "https://play.google.com/store/apps/details?id=" + appPackageName)));
        }
    }
}
```

# Exception handling continued

```
String appPackageName = "com.google.android.googlequicksearchbox";
        try {
           startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse("market://details?id=" + appPackageName)));
        } catch (android.content.ActivityNotFoundException anfe) {
           startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse(
                 "https://play.google.com/store/apps/details?id=" + appPackageName)));
        }
```

# Receive the texts converted from speech

- This callback is invoked when the Speech Recognizer returns.
- spokenText is what you have spoken.

```
protected void onActivityResult(int requestCode, int resultCode,
        Intent data) {
    if (requestCode == SPEECH_REQUEST_CODE && resultCode == RESULT_OK) {
        List<String> results = data.getStringArrayListExtra(
                RecognizerIntent.EXTRA_RESULTS);
        String spokenText = results.get(0);
        // Do something with spokenText.
    }
    super.onActivityResult(requestCode, resultCode, data);
}
```

# Search for  the date (replace the “do something with sponkenText”)

```
if (spokenText.equals("today")){
    long unixTime = System.currentTimeMillis();
    calendarView.setDate(unixTime);
}

if (spokenText.equals("tomorrow")){
    long unixTime = System.currentTimeMillis();
    calendarView.setDate(unixTime+86400000);
}
if (results.get(0).equals("call emergency")){
    StringBuilder sb=new StringBuilder();
    for (int i=1;i<results.size();i++){
        sb.append(results.get(i));
    }
    Intent callIntent = new Intent(Intent.ACTION_CALL,Uri.parse( uriString: "tel:"+R.string.emergency_number));
    startActivity(callIntent);
    Toast.makeText( context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();
}
```

# MainActivity Imports

```
1  package ucmerced.hua.cse162.calendar;
2  import java.util.ArrayList;
3  import android.Manifest;
4  import android.content.ActivityNotFoundException;
5  import android.content.Intent;
6  import android.content.pm.PackageManager;
7  import android.net.Uri;
8  import android.os.Build;
9  import android.os.Bundle;
10 //import android.support.annotation.NonNull;
11 //import android.support.v7.app.AppCompatActivity;
12 import android.speech.RecognizerIntent;
13 import android.util.Log;
14 import android.widget.CalendarView;
15 import android.widget.Toast;
16 import android.widget.ImageButton;
17 import android.widget.TextView;
18 import androidx.annotation.NonNull;
19 import androidx.annotation.RequiresApi;
20 import androidx.appcompat.app.AppCompatActivity;
21 import androidx.core.app.ActivityCompat;
22 import androidx.core.content.ContextCompat;
23 import android.view.View;
24 import java.time.Instant;
25 import java.util.Date;
26 import java.util.List;
```

# MainActivity OnCreate

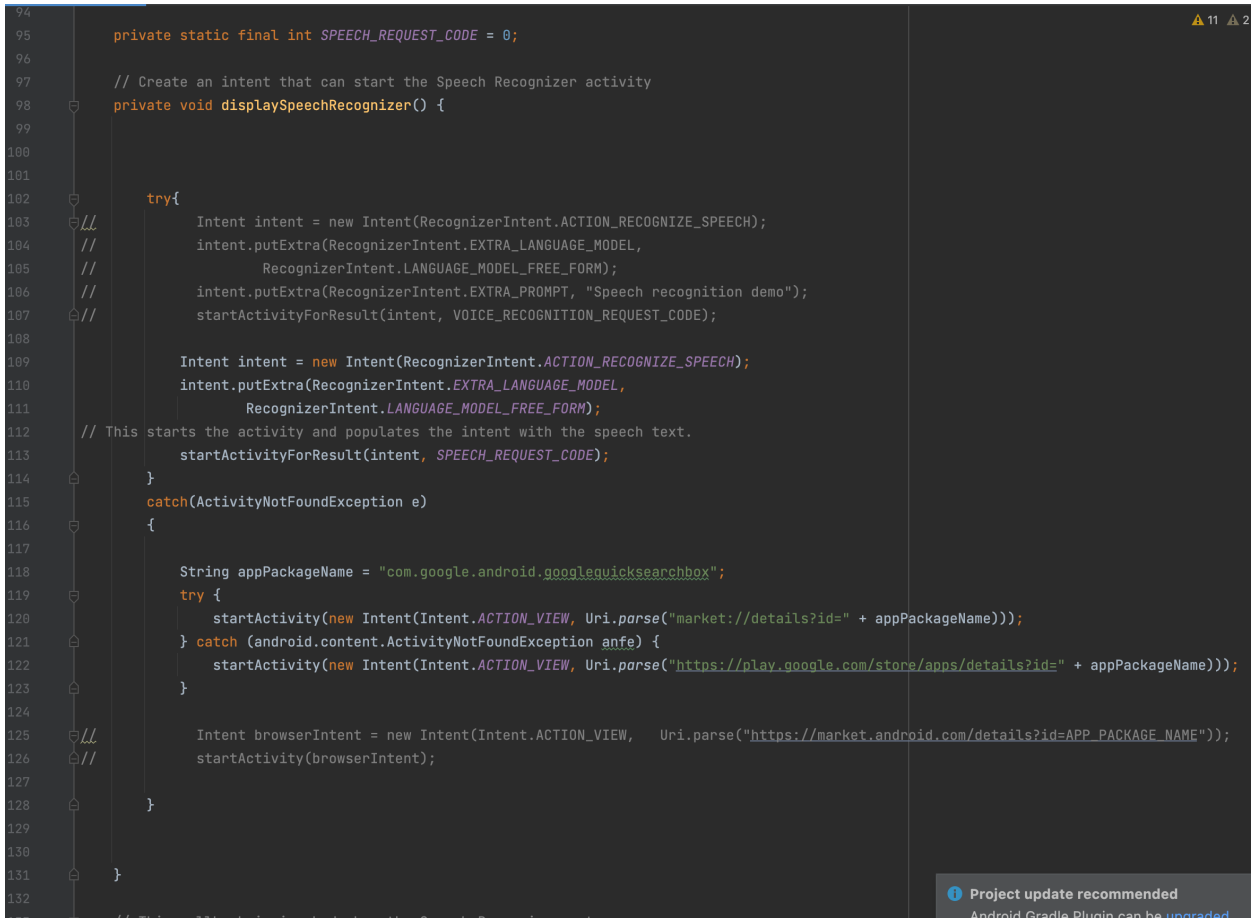
```java
public class MainActivity extends AppCompatActivity {

    CalendarView calendarView;
    private static final int REQUEST_PHONE_CALL = 1;
    protected static final int RESULT_SPEECH = 1;

    private ImageButton btnSpeak;
    private TextView txtText;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        txtText = (TextView) findViewById(R.id.txtText);

        btnSpeak = (ImageButton) findViewById(R.id.btnSpeak);

        btnSpeak.setOnClickListener(new View.OnClickListener() {

            @Override
            public void onClick(View v) {

                Intent intent = new Intent(
                        RecognizerIntent.ACTION_RECOGNIZE_SPEECH);

                intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL, value: "en-US");

                try {
                    startActivityForResult(intent, RESULT_SPEECH);
                    txtText.setText("");
                } catch (ActivityNotFoundException a) {
                    Toast t = Toast.makeText(getApplicationContext(),
                            text: "Opps! Your device doesn't support Speech to Text",
                            Toast.LENGTH_SHORT);
                    t.show();
                }
            }
        });
```

Oncreate (1)

```java
        if (ContextCompat.checkSelfPermission( context: MainActivity.this, Manifest.permission.CALL_PHONE) != PackageManager.PERMISSION_GRANTED) {
            ActivityCompat.requestPermissions( activity: MainActivity.this, new String[]{Manifest.permission.CALL_PHONE},REQUEST_PHONE_CALL);
        }


        calendarView = findViewById(R.id.calendarView);
        if (calendarView != null) {
            calendarView.setOnDateChangeListener(new CalendarView.OnDateChangeListener() {
                @Override
                public void onSelectedDayChange(@NonNull CalendarView view, int year, int month, int dayOfMonth) {
                    // Note that months are indexed from 0. So, 0 means January, 1 means february, 2 means march etc.
                    String msg = "Selected date is " + dayOfMonth + "/" + (month + 1) + "/" + year;
//                    Toast.makeText(MainActivity.this, msg, Toast.LENGTH_SHORT).show();
                }
            });
        }

        displaySpeechRecognizer();

    }
```

Oncreate (2)

# Main Activity



```
    private static final int SPEECH_REQUEST_CODE = 0;

    // Create an intent that can start the Speech Recognizer activity
    private void displaySpeechRecognizer() {



        try{
//            Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
//            intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
//                    RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
//            intent.putExtra(RecognizerIntent.EXTRA_PROMPT, "Speech recognition demo");
//            startActivityForResult(intent, VOICE_RECOGNITION_REQUEST_CODE);

            Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
            intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
                    RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
// This starts the activity and populates the intent with the speech text.
            startActivityForResult(intent, SPEECH_REQUEST_CODE);
        }
        catch(ActivityNotFoundException e)
        {

            String appPackageName = "com.google.android.googlequicksearchbox";
            try {
                startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse("market://details?id=" + appPackageName)));
            } catch (android.content.ActivityNotFoundException anfe) {
                startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse("https://play.google.com/store/apps/details?id=" + appPackageName)));
            }

//            Intent browserIntent = new Intent(Intent.ACTION_VIEW,   Uri.parse("https://market.android.com/details?id=APP_PACKAGE_NAME"));
//            startActivity(browserIntent);

        }


    }
```

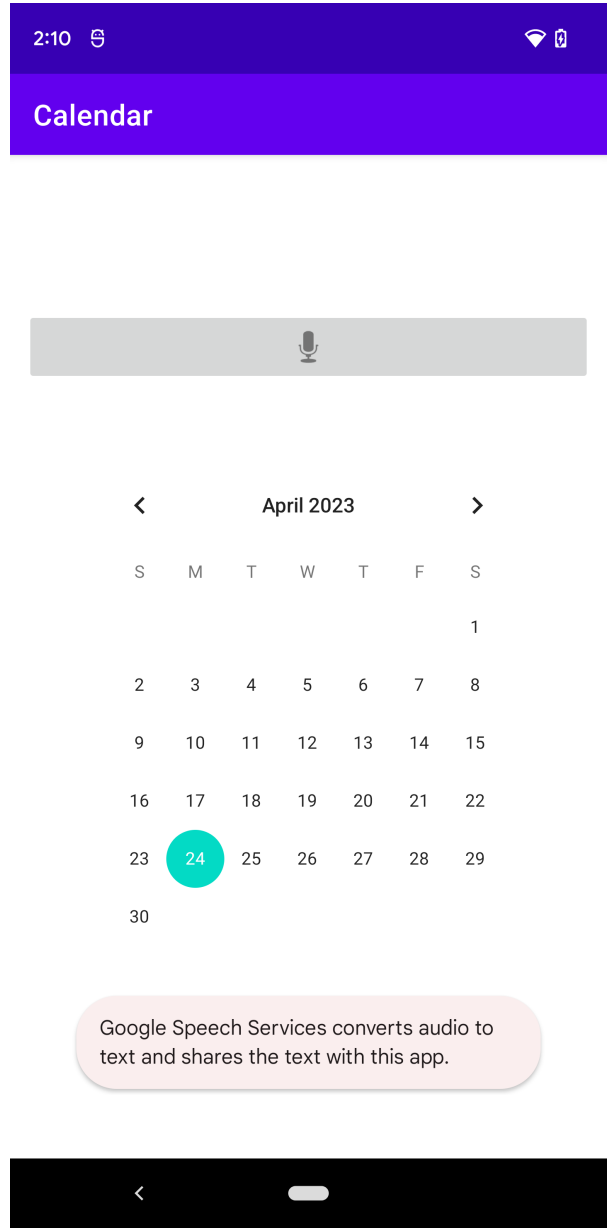
# Main Activity

```
    // This callback is invoked when the Speech Recognizer returns.
// This is where you process the intent and extract the speech text from the intent.
    @RequiresApi(api = Build.VERSION_CODES.O)
    @Override
    protected void onActivityResult(int requestCode, int resultCode,
                                    Intent data) {

        super.onActivityResult(requestCode, resultCode, data);
        switch (requestCode){
            case RESULT_SPEECH:{
                if (resultCode == RESULT_OK && null != data) {

                    ArrayList<String> text = data
                            .getStringArrayListExtra(RecognizerIntent.EXTRA_RESULTS);

                    txtText.setText(text.get(0));
                    if (text.get(0).equals("today")){

                        long unixTime = System.currentTimeMillis();
                        calendarView.setDate(unixTime);
                    }

                    if (text.get(0).equals("tomorrow")){

                        long unixTime = System.currentTimeMillis();
                        calendarView.setDate(unixTime+86400000);
                    }
                    if (text.get(0).equals("day after tomorrow")){

                        long unixTime = System.currentTimeMillis();
                        calendarView.setDate(unixTime+172800000);
                    }
                    if (text.get(0).equals("call emergency")){
                        StringBuilder sb=new StringBuilder();
                        for (int i=1;i<text.size();i++){
                            sb.append(text.get(i));
                        }

                        Intent callIntent = new Intent(Intent.ACTION_CALL,Uri.parse("tel:"+R.string.emergency_number));
                        startActivity(callIntent);
```

```
                        Toast.makeText( context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();
                    }


                    if (text.get(0).equals("take note")){

                        StringBuilder sb=new StringBuilder();
                        for (int i=1;i<text.size();i++){
                            sb.append(text.get(i));
                        }

                        Toast.makeText( context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();
                    }
                }
                break;
            }
        }


    }


}
```

# Activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:gravity="center"
    android:orientation="vertical">
    <ImageButton
        android:id="@+id/btnSpeak"
        android:layout_width="fill_parent"
        android:layout_height="wrap_content"
        android:layout_margin="10dp"
        android:layout_marginRight="10dp"
        android:layout_marginTop="10dp"
        android:contentDescription="Speak Now"
        android:src="@android:drawable/ic_btn_speak_now" />

    <TextView
        android:id="@+id/txtText"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginLeft="10dp"
        android:layout_marginRight="10dp"
        android:layout_marginTop="10dp"
        android:textAppearance="?android:attr/textAppearanceLarge" />
    <CalendarView
        android:id="@+id/calendarView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginBottom="50dp"
        android:layout_marginLeft="50dp"
        android:layout_marginRight="50dp"/>

</LinearLayout>
```


2:10
Calendar
April 2023
S M T W T F S
1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30
Google Speech Services converts audio to text and shares the text with this app.

# Extra credit

- text to speech conversion
  - After the user speaks ”today”, respond by pronouncing the complete date in audio
  - tips: use the TextToSpeech class.