

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

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

The UI: use a calendar view

```
<?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 spokenText”)

```
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

```
27
28 public class MainActivity extends AppCompatActivity {
29
30     CalendarView calendarView;
31     private static final int REQUEST_PHONE_CALL = 1;
32     protected static final int RESULT_SPEECH = 1;
33
34     private ImageButton btnSpeak;
35     private TextView txtText;
36
37     @Override
38     protected void onCreate(Bundle savedInstanceState) {
39         super.onCreate(savedInstanceState);
40         setContentView(R.layout.activity_main);
41
42         txtText = (TextView) findViewById(R.id.txtText);
43
44         btnSpeak = (ImageButton) findViewById(R.id.btnSpeak);
45
46         btnSpeak.setOnClickListener(new View.OnClickListener() {
47
48             @Override
49             public void onClick(View v) {
50
51                 Intent intent = new Intent(
52                     RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
53
54                 intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
55                               value: "en-US");
56
57                 try {
58                     startActivityForResult(intent, RESULT_SPEECH);
59                     txtText.setText("");
60                 } catch (ActivityNotFoundException a) {
61                     Toast t = Toast.makeText(getApplicationContext(),
62                                     text: "Opps! Your device doesn't support Speech to Text",
63                                     Toast.LENGTH_SHORT);
64                     t.show();
65                 }
66             }
67         });
68     }
69 }

```

Oncreate (1)

```
68
69     if (ContextCompat.checkSelfPermission(context: MainActivity.this, Manifest.permission.CALL_PHONE) != PackageManager.PERMISSION_GRANTED) {
70         ActivityCompat.requestPermissions(activity: MainActivity.this, new String[]{Manifest.permission.CALL_PHONE}, REQUEST_PHONE_CALL);
71     }
72
73     calendarView = findViewById(R.id.calendarView);
74     if (calendarView != null) {
75         calendarView.setOnDateChangeListener(new CalendarView.OnDateChangeListener() {
76             @Override
77             public void onSelectedDayChange(@NotNull CalendarView view, int year, int month, int dayOfMonth) {
78                 // Note that months are indexed from 0. So, 0 means January, 1 means february, 2 means march etc.
79                 String msg = "Selected date is " + dayOfMonth + "/" + (month + 1) + "/" + year;
80                 Toast.makeText(MainActivity.this, msg, Toast.LENGTH_SHORT).show();
81             }
82         });
83     }
84     displaySpeechRecognizer();
85
86 }
87
88 }
89
90
91

```

Oncreate (2)

Main Activity

```
94
95     private static final int SPEECH_REQUEST_CODE = 0;
96
97     // Create an intent that can start the Speech Recognizer activity
98     private void displaySpeechRecognizer() {
99
100
101        try{
102            Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
103            intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
104                            RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
105            intent.putExtra(RecognizerIntent.EXTRA_PROMPT, "Speech recognition demo");
106            startActivityForResult(intent, VOICE_RECOGNITION_REQUEST_CODE);
107
108            Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
109            intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
110                            RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
111
112            // This starts the activity and populates the intent with the speech text.
113            startActivityForResult(intent, SPEECH_REQUEST_CODE);
114        }
115        catch(ActivityNotFoundException e)
116        {
117
118            String appPackageName = "com.google.android.googlequicksearchbox";
119            try {
120                startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse("market://details?id=" + appPackageName)));
121            } catch (android.content.ActivityNotFoundException anfe) {
122                startActivity(new Intent(Intent.ACTION_VIEW, Uri.parse("https://play.google.com/store/apps/details?id=" + appPackageName)));
123            }
124
125            Intent browserIntent = new Intent(Intent.ACTION_VIEW, Uri.parse("https://market.android.com/details?id=APP_PACKAGE_NAME"));
126            startActivity(browserIntent);
127
128        }
129
130    }
131
132 }
```

A status bar at the bottom right of the screenshot displays a message: "Project update recommended" with a note that "Android Gradle Plugin can be upgraded".

Main Activity

```
153     // This callback is invoked when the Speech Recognizer returns.  
154     // This is where you process the intent and extract the speech text from the intent.  
155     @RequiresApi(api = Build.VERSION_CODES.O)  
156     @Override  
157     protected void onActivityResult(int requestCode, int resultCode,  
158                                     Intent data) {  
159  
160         super.onActivityResult(requestCode, resultCode, data);  
161         switch (requestCode){  
162             case RESULT_SPEECH:{  
163                 if (resultCode == RESULT_OK && null != data) {  
164  
165                     ArrayList<String> text = data  
166                         .getStringArrayListExtra(RecognizerIntent.EXTRA_RESULTS);  
167  
168                     txtText.setText(text.get(0));  
169                     if (text.get(0).equals("today")){  
170  
171                         long unixTime = System.currentTimeMillis();  
172                         calendarView.setDate(unixTime);  
173                     }  
174  
175                     if (text.get(0).equals("tomorrow")){  
176  
177                         long unixTime = System.currentTimeMillis();  
178                         calendarView.setDate(unixTime+86400000);  
179                     }  
180                     if (text.get(0).equals("day after tomorrow")){  
181  
182                         long unixTime = System.currentTimeMillis();  
183                         calendarView.setDate(unixTime+172800000);  
184                     }  
185                     if (text.get(0).equals("call emergency")){  
186                         StringBuilder sb=new StringBuilder();  
187                         for (int i=1;i<text.size();i++){  
188                             sb.append(text.get(i));  
189                         }  
190  
191                         Intent callIntent = new Intent(Intent.ACTION_CALL,Uri.parse("tel:"+R.string.emergency_number));  
192                         startActivity(callIntent);  
193                     }  
194                 }  
195             }  
196         }  
197     }  
198 }
```

```
174     Toast.makeText(context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();  
175 }  
176  
177 if (text.get(0).equals("take note")){  
178  
179     StringBuilder sb=new StringBuilder();  
180     for (int i=1;i<text.size();i++){  
181         sb.append(text.get(i));  
182     }  
183  
184     Toast.makeText(context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();  
185 }  
186 }  
187 }  
188 break;  
189 }  
190 }  
191 }  
192 }  
193 }  
194 }  
195 }  
196 }
```

Activity_main.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <LinearLayout
3      xmlns:android="http://schemas.android.com/apk/res/android"
4      android:layout_width="match_parent"
5      android:layout_height="match_parent"
6      android:gravity="center"
7      android:orientation="vertical">
8      <ImageButton
9          android:id="@+id/btnSpeak"
10         android:layout_width="fill_parent"
11         android:layout_height="wrap_content"
12         android:layout_margin="10dp"
13         android:layout_marginRight="10dp"
14         android:layout_marginTop="10dp"
15         android:contentDescription="Speak Now"
16         android:src="@android:drawable/ic_btn_speak_now" />
17
18      <TextView
19          android:id="@+id/txtText"
20          android:layout_width="wrap_content"
21          android:layout_height="wrap_content"
22          android:layout_marginLeft="10dp"
23          android:layout_marginRight="10dp"
24          android:layout_marginTop="10dp"
25          android:textAppearance="?android:attr/textAppearanceLarge" />
26
27      <CalendarView
28          android:id="@+id/calendarView"
29          android:layout_width="match_parent"
30          android:layout_height="wrap_content"
31          android:layout_marginBottom="50dp"
32          android:layout_marginLeft="50dp"
33          android:layout_marginRight="50dp"/>
34  </LinearLayout>
```



◀ 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.