

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 Android 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("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)));
        }
    }
}
```



# 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

```
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, "en-US");
55
56                 try {
57                     startActivityForResult(intent, RESULT_SPEECH);
58                     txtText.setText("");
59                 } catch (ActivityNotFoundException a) {
60                     Toast t = Toast.makeText(getApplicationContext(),
61                         text: "Oops! Your device doesn't support Speech to Text",
62                         Toast.LENGTH_SHORT);
63                     t.show();
64                 }
65             }
66         });
67     }
68 }
```

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
74     calendarView = findViewById(R.id.calendarView);
75     if (calendarView != null) {
76         calendarView.setOnDateChangeListener(new CalendarView.OnDateChangeListener() {
77
78             @Override
79             public void onSelectedDayChange(@NonNull CalendarView view, int year, int month, int dayOfMonth) {
80                 // Note that months are indexed from 0. So, 0 means January, 1 means february, 2 means march etc.
81                 String msg = "Selected date is " + dayOfMonth + "/" + (month + 1) + "/" + year;
82                 Toast.makeText(MainActivity.this, msg, Toast.LENGTH_SHORT).show();
83             }
84         });
85
86         displaySpeechRecognizer();
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
102         try{
103             // Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
104             // intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
105             //                 RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
106             // intent.putExtra(RecognizerIntent.EXTRA_PROMPT, "Speech recognition demo");
107             // startActivityForResult(intent, VOICE_RECOGNITION_REQUEST_CODE);
108
109             Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
110             intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
111                             RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
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
```

Project update recommended  
Android Gradle Plugin can be upgraded

# Main Activity

```
133 // This callback is invoked when the Speech Recognizer returns.
134 // This is where you process the intent and extract the speech text from the intent.
135 @RequiresApi(api = Build.VERSION_CODES.O)
136 @Override
137 protected void onActivityResult(int requestCode, int resultCode,
138     Intent data) {
139
140     super.onActivityResult(requestCode, resultCode, data);
141     switch (requestCode){
142         case RESULT_SPEECH:{
143             if (resultCode == RESULT_OK && null != data) {
144
145                 ArrayList<String> text = data
146                     .getStringArrayListExtra(RecognizerIntent.EXTRA_RESULTS);
147
148                 txtText.setText(text.get(0));
149                 if (text.get(0).equals("today")){
150
151                     long unixTime = System.currentTimeMillis();
152                     calendarView.setDate(unixTime);
153                 }
154
155                 if (text.get(0).equals("tomorrow")){
156
157                     long unixTime = System.currentTimeMillis();
158                     calendarView.setDate(unixTime+86400000);
159                 }
160
161                 if (text.get(0).equals("day after tomorrow")){
162
163                     long unixTime = System.currentTimeMillis();
164                     calendarView.setDate(unixTime+172800000);
165                 }
166                 if (text.get(0).equals("call emergency")){
167                     StringBuilder sb=new StringBuilder();
168                     for (int i=1;i<text.size();i++){
169                         sb.append(text.get(i));
170                     }
171
172                     Intent callIntent = new Intent(Intent.ACTION_CALL,Uri.parse("tel:"+R.string.emergency_number));
173                     startActivity(callIntent);
174                 }
175             }
176         }
177     }
178 }
```

```
174 Toast.makeText( context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();
175 }
176
177
178 if (text.get(0).equals("take note")){
179
180     StringBuilder sb=new StringBuilder();
181     for (int i=1;i<text.size();i++){
182         sb.append(text.get(i));
183     }
184
185     Toast.makeText( context: MainActivity.this, sb.toString(), Toast.LENGTH_SHORT).show();
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>
```



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.