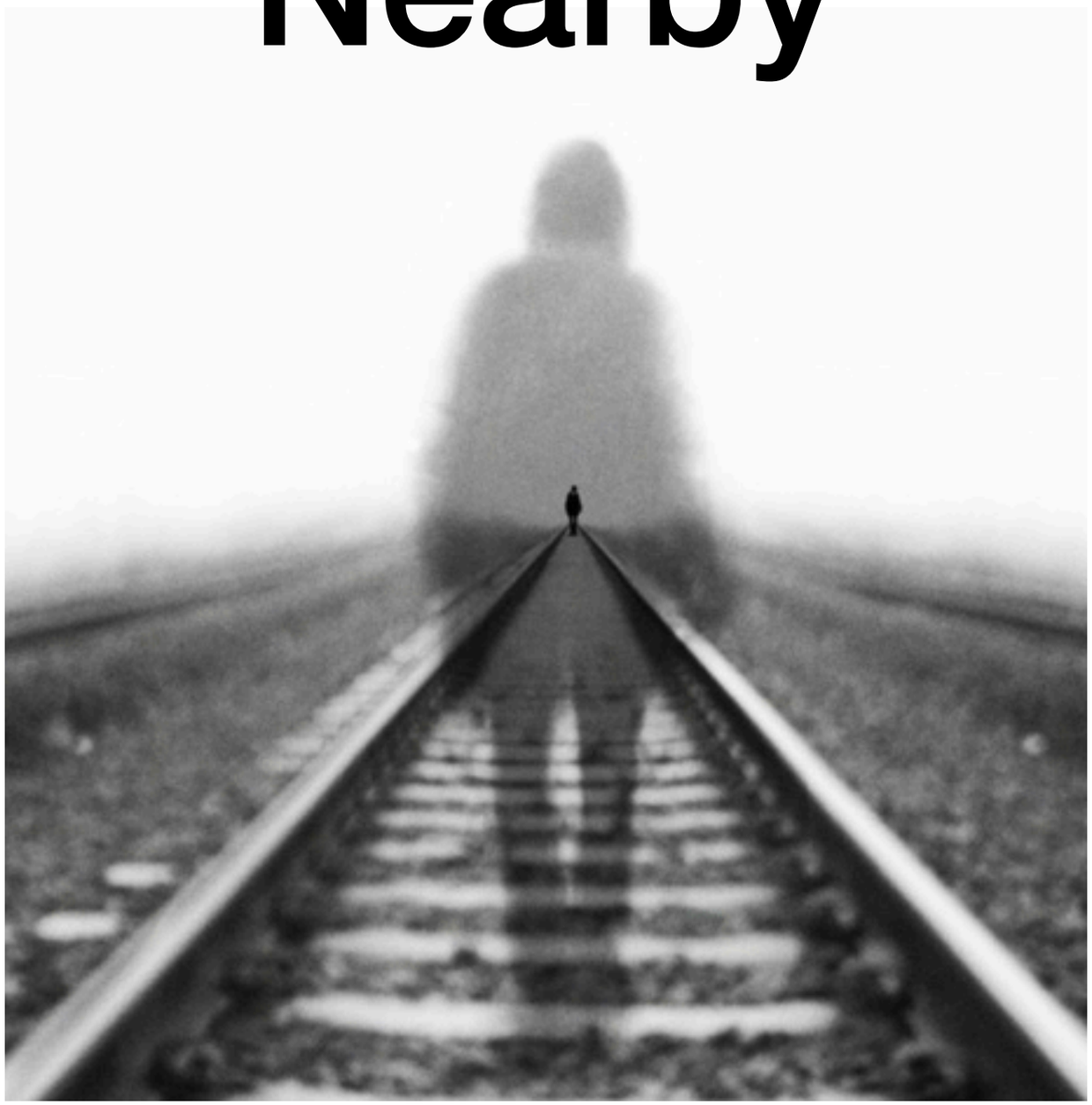
Lecture #8
Nearby

Android Things 2019

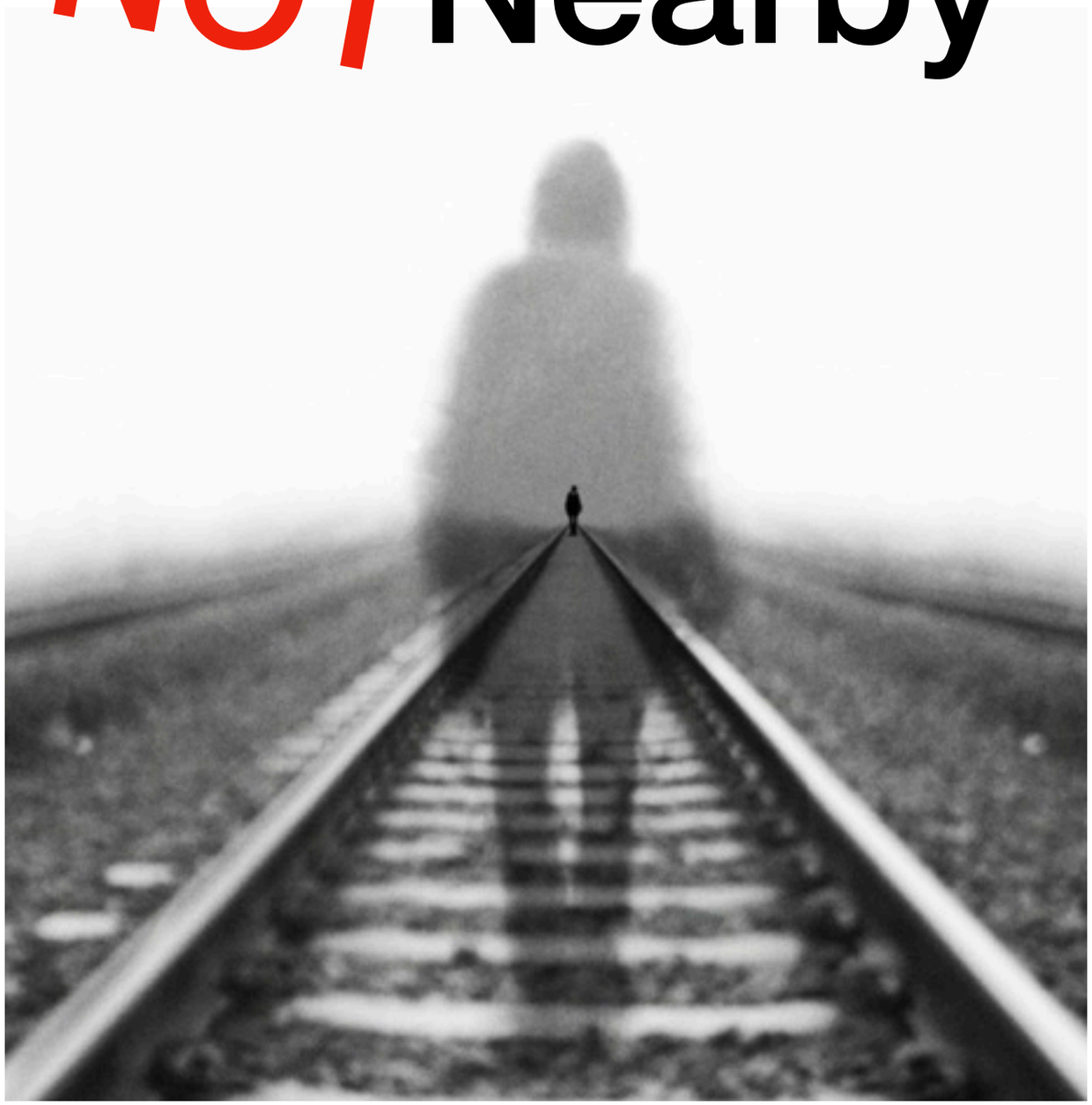
May 9th

May 9th
Nearby



May 9th

NOT Nearby



Nearby Messages API

- A Publish-Subscribe API.

Nearby Messages API

Nearby Messages API

- Bluetooth.

Nearby Messages API

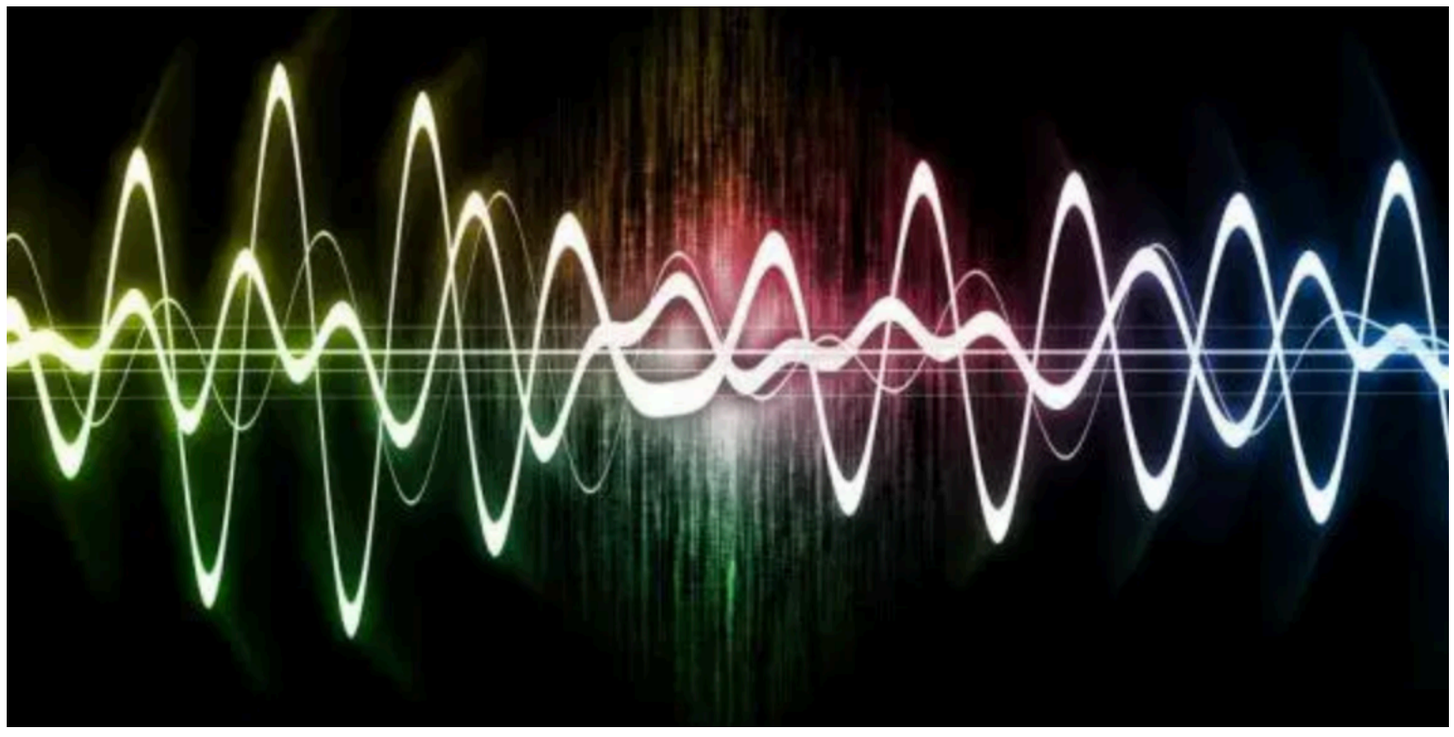
- Bluetooth.
- Bluetooth Low Energy.

Nearby Messages API

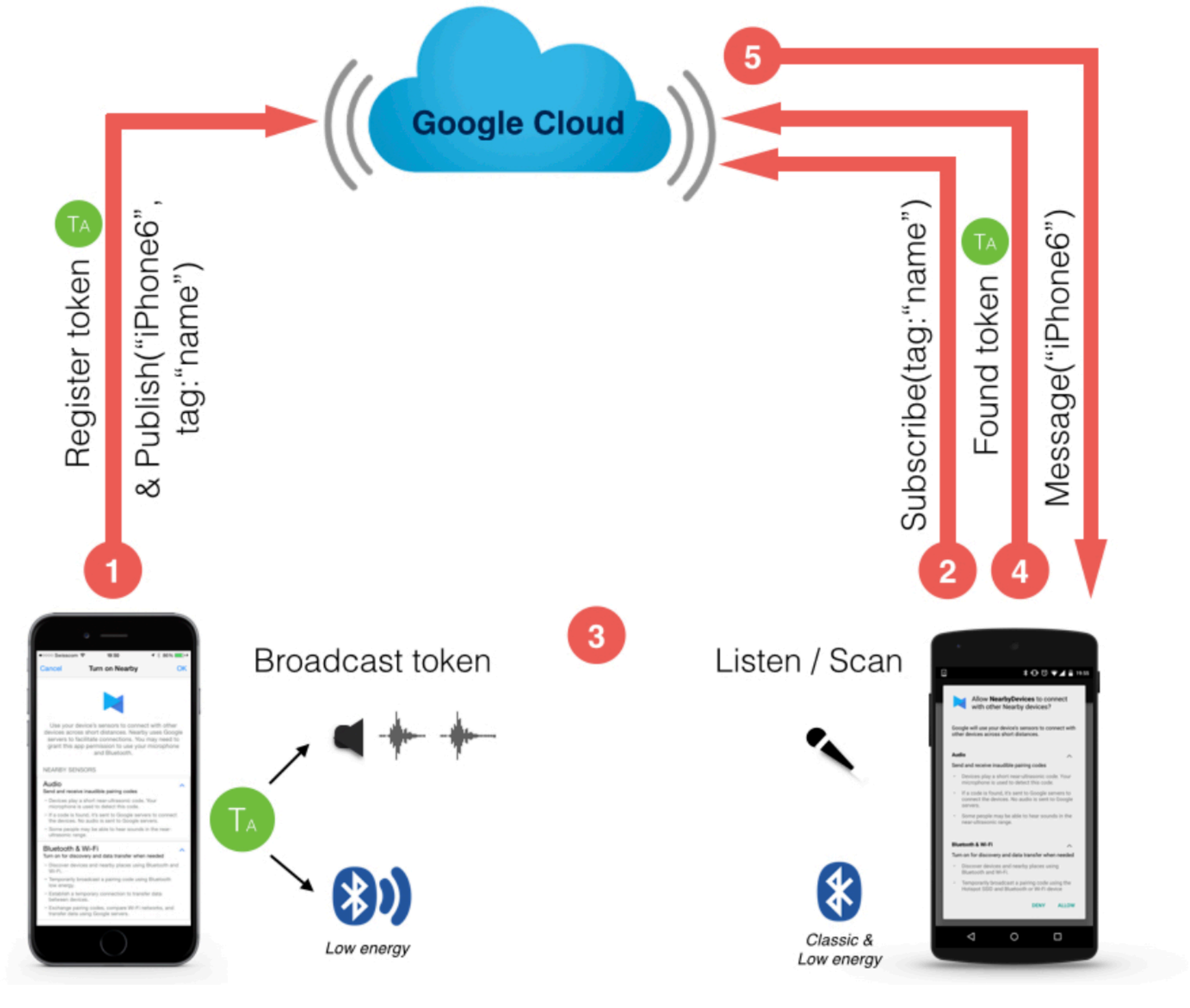
- Bluetooth.
- Bluetooth Low Energy.
- Wi-Fi.

Nearby Messages API

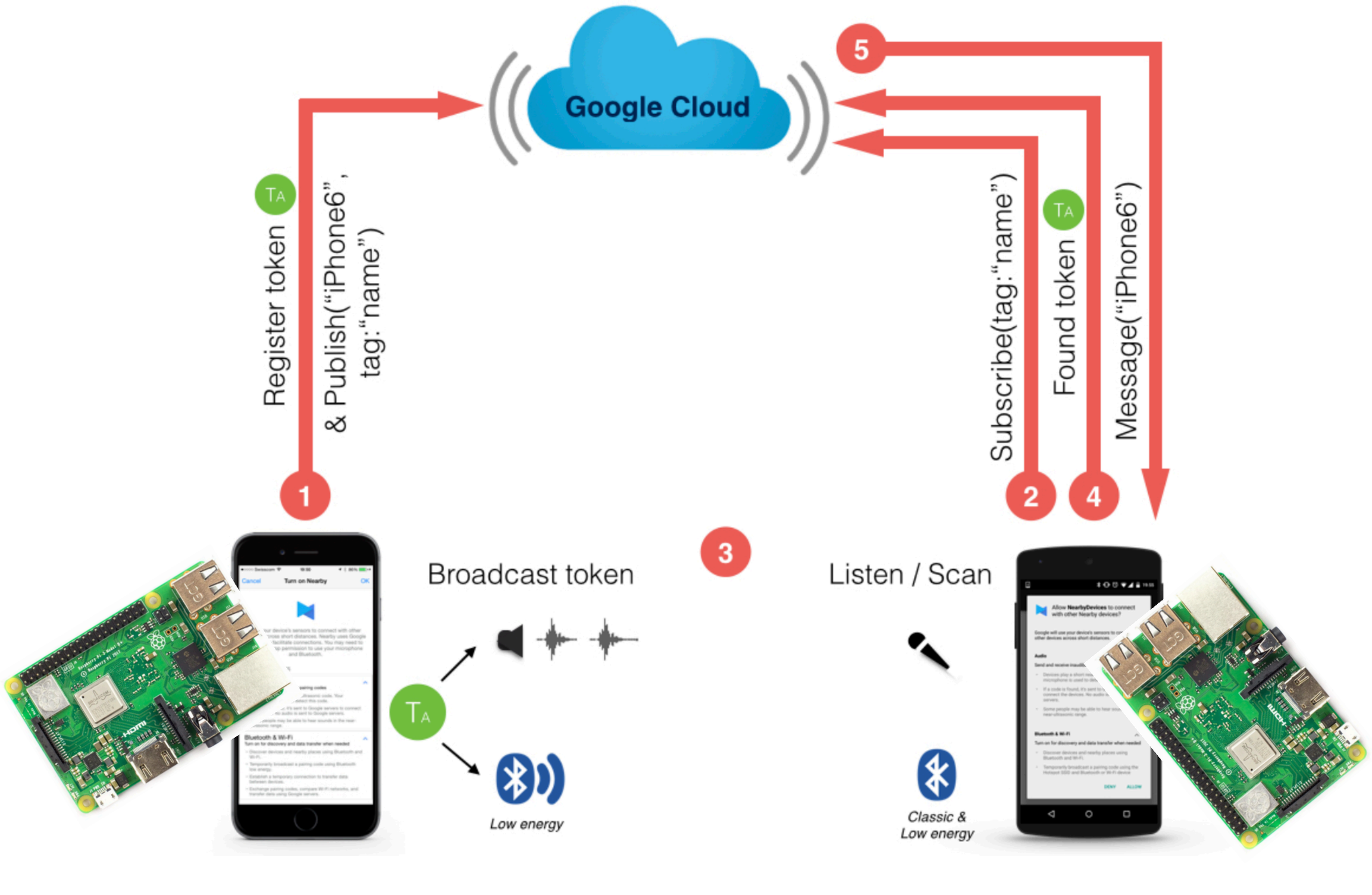
- Bluetooth.
- Bluetooth Low Energy.
- Wi-Fi.
- Near-ultrasonic audio.



Nearby Messages API



Nearby Messages API



Configuration

```
apply plugin: 'android'
...
dependencies {
  compile 'com.google.android.gms:play-services-nearby:16.0.0'
}
```

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```
apply plugin: 'android'
...

dependencies {
  compile 'com.google.android.gms:play-services-nearby:16.0.0'
}
```

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.google.sample.app" >
    <application ...>
        <meta-data
            android:name="com.google.android.nearby.messages.API_KEY"
            android:value="API_KEY" />
        <uses-library android:name="com.google.android.things" />
        <activity>
        ...
        </activity>
    </application>
</manifest>
```

Publish and Subscribe

```
@Override
public void onCreate(Bundle savedInstanceState) {
  super.onCreate(savedInstanceState);
  ...
  mMessageListener = new MessageListener() {
    @Override
    public void onFound(Message message) {
      Log.d(TAG, "Found message: " + new String(message.getContent()));
    }
    @Override
    public void onLost(Message message) {
      Log.d(TAG, "Lost sight of message: " + new String(message.getContent()));
    }
  }

  mMessage = new Message("Hello World".getBytes());
}

@Override
public void onStart() {
  super.onStart();
  ...
  Nearby.getMessagesClient(this).publish(mMessage);
  Nearby.getMessagesClient(this).subscribe(mMessageListener);
```

```
  ...
  mMessageListener = new MessageListener() {
    @Override
    public void onFound(Message message) {
      Log.d(TAG, "Found message: " + new String(message.getContent()));
    }

    @Override
    public void onLost(Message message) {
      Log.d(TAG, "Lost sight of message: " + new String(message.getContent()));
    }
  }

  mMessage = new Message("Hello World".getBytes());
}
```

```
@Override
public void onStart() {
  super.onStart();
  ...
  Nearby.getMessagesClient(this).publish(mMessage);
  Nearby.getMessagesClient(this).subscribe(mMessageListener);
}

@Override
public void onStop() {
  Nearby.getMessagesClient(this).unpublish(mMessage);
  Nearby.getMessagesClient(this).unsubscribe(mMessageListener);
  ...
  super.onStop();
}
```

Handling User Consent

```
if (ContextCompat.checkSelfPermission(this,
    Manifest.permission.ACCESS_FINE_LOCATION)
        == PackageManager.PERMISSION_GRANTED) {
    mMessagesClient = Nearby.getMessagesClient(this,
       new MessagesOptions.Builder()
     .setPermissions(NearbyPermissions.BLE)
     .build());
}
```

Get Beacon Messages


```
public void onCreate(Bundle savedInstanceState) {
  super.onCreate(savedInstanceState);
  ...
  mMessageListener = new MessageListener() {
    @Override
    public void onFound(Message message) {
      Log.d(TAG, "Found message: " + new String(message.getContent()));
    }

    @Override
    public void onLost(Message message) {
      Log.d(TAG, "Lost sight of message: " + new String(message.getContent()));
    }
  }
}

// Subscribe to receive messages.
private void subscribe() {
  Log.i(TAG, "Subscribing.");
  SubscribeOptions options = new SubscribeOptions.Builder()
    .setStrategy(Strategy.BLE_ONLY)
    .build();
  Nearby.getMessagesClient(this).subscribe(mMessageListener, options);
}
```

Get Beacon Messages

Subscribe in the background

```
// Subscribe to messages in the background.
private void backgroundSubscribe() {
    Log.i(TAG, "Subscribing for background updates.");
    SubscribeOptions options = new SubscribeOptions.Builder()
            .setStrategy(Strategy.BLE_ONLY)
            .build();
    Nearby.getMessagesClient(this).subscribe(getPendingIntent(), options);
}

private PendingIntent getPendingIntent() {
    return PendingIntent.getBroadcast(this, 0, new Intent(this,
        BeaconMessageReceiver.class), PendingIntent.FLAG_UPDATE_CURRENT);
}
```

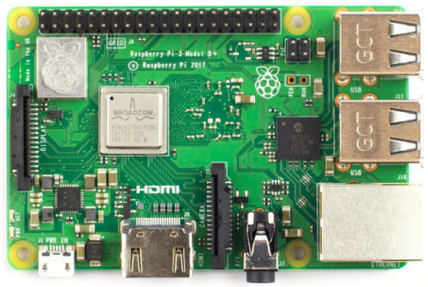
Get Beacon Messages

Subscribe in the background

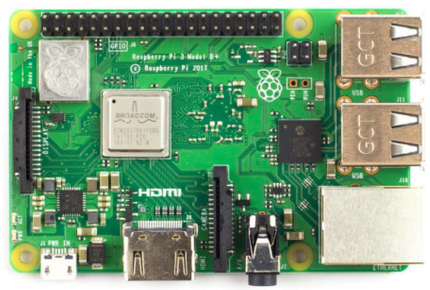
```
@Override
public void onReceive(Context context, Intent intent) {
  Nearby.getMessagesClient(context).handleIntent(intent, new MessageListener() {
    @Override
    public void onFound(Message message) {
      Log.i(TAG, "Found message via PendingIntent: " + message);
    }

    @Override
    public void onLost(Message message) {
      Log.i(TAG, "Lost message via PendingIntent: " + message);
    }
  });
}
```

https://developers.google.com/nearby/messages/android/get-beacon-messages

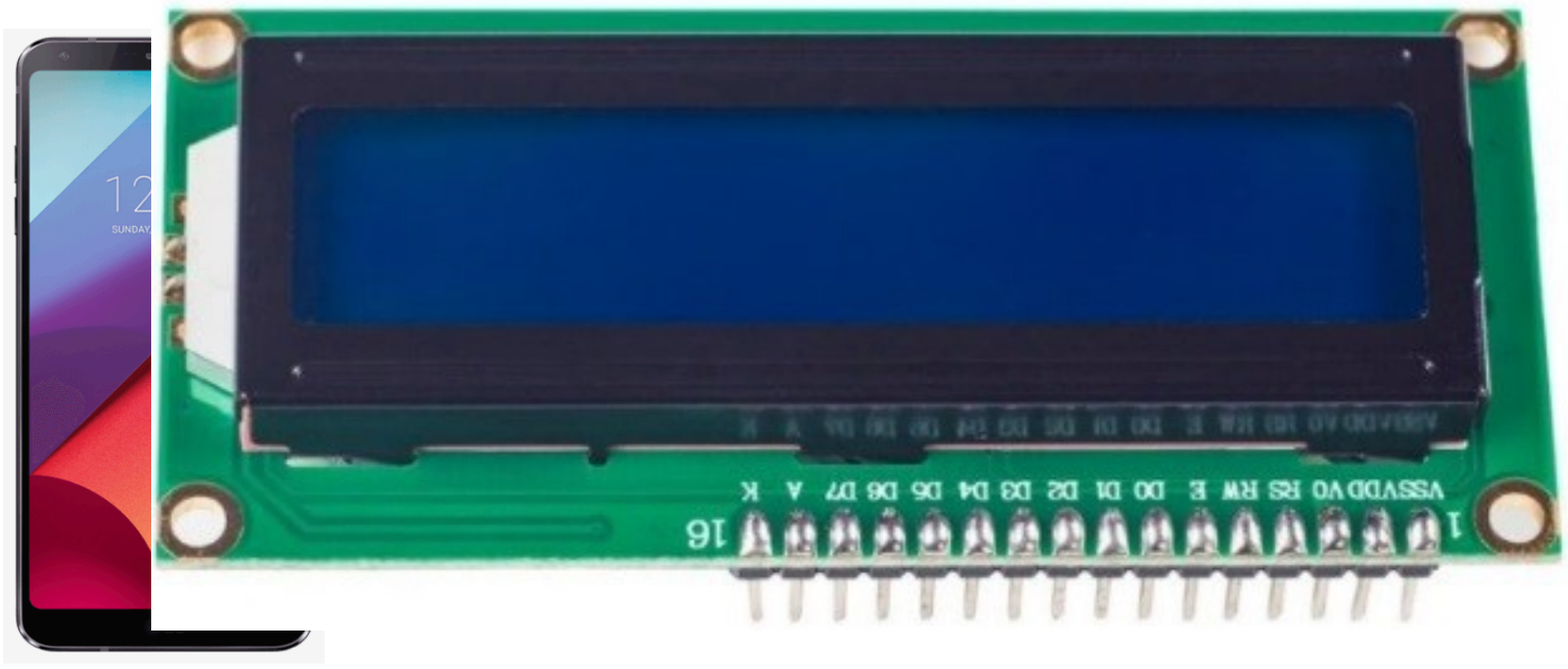
Android Things Nearby Connection



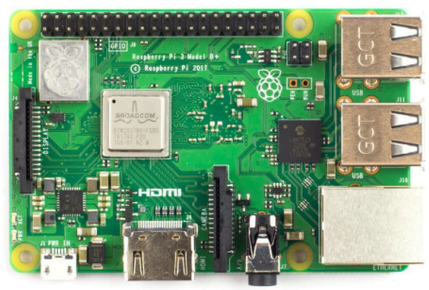
Android Things Nearby Connection



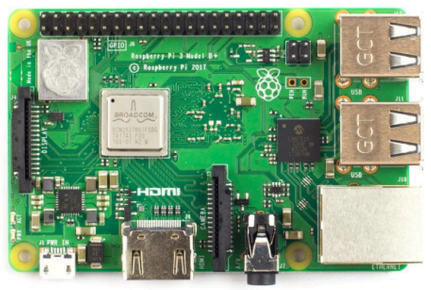
Android Things Nearby Connection



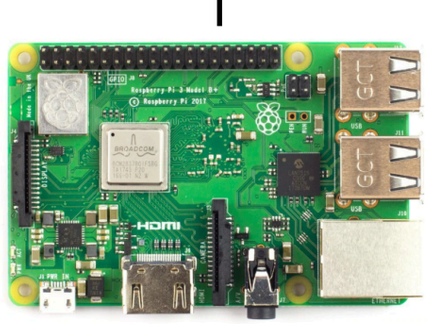
Android Things Nearby Connection



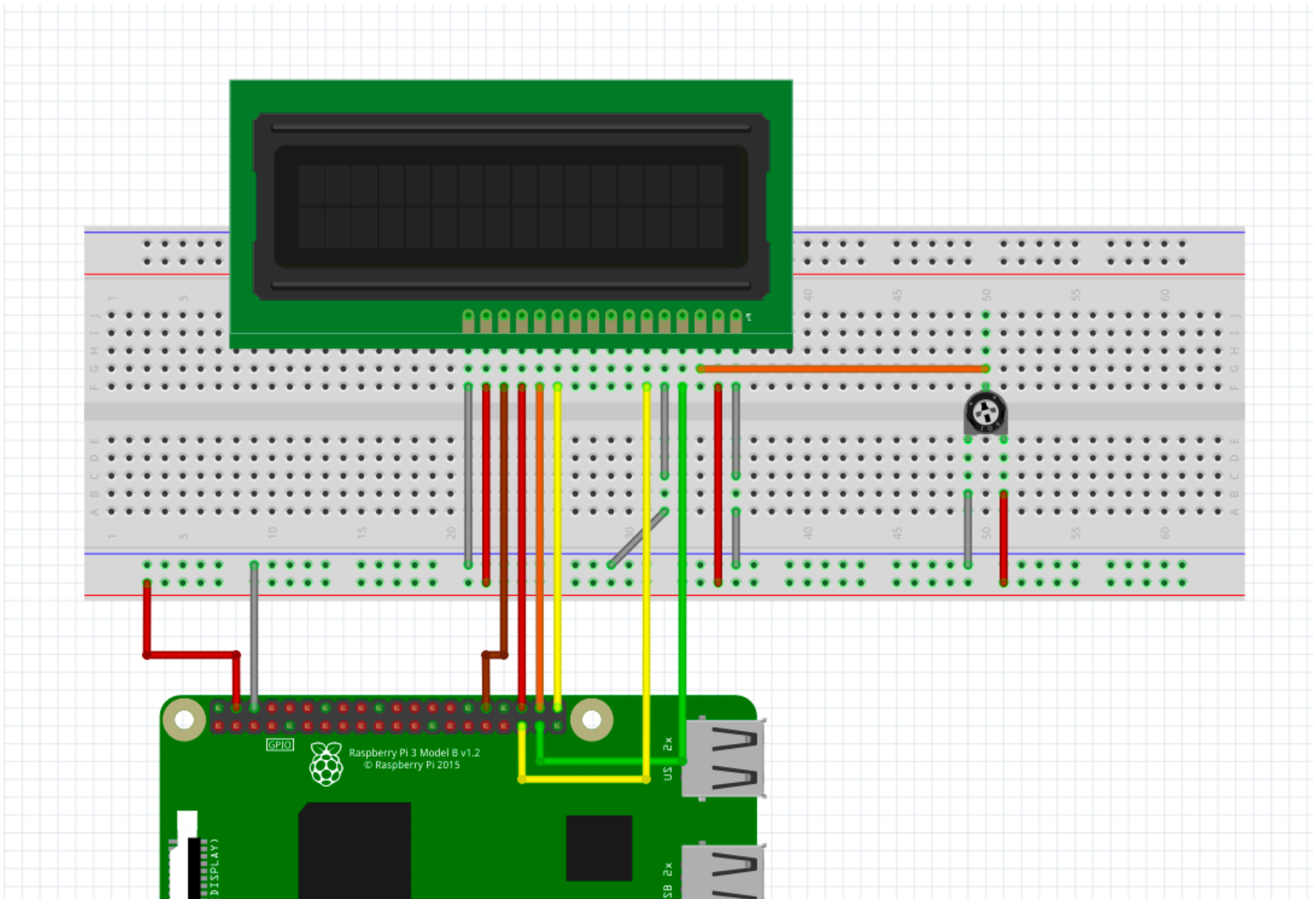
Android Things Nearby Connection



Android Things Nearby Connection



Schema


GPIO
Raspberry Pi 3 Model B v1.2
© Raspberry Pi 2015
USB 2x
USB 2x
DISPLAY)

Advertise

```
val advertisingOptions =
AdvertisingOptions.Builder().setStrategy(Strategy.P2P_STAR).build()
client = Nearby.getConnectionsClient(ctx)
client.startAdvertising("AndroidThings",
    SERVICE_ID,
    connectionLifeCycleCB,
    advertisingOptions)
    .addOnSuccessListener { logi("OnSuccess...") }
    .addOnFailureListener { e -> loge("OnFailure: ", e) }
```

Discover

```
Nearby.getConnectionsClient(ctx)
        .startDiscovery(SERVICE_ID,
            endpointDiscoveryCB,
            discoveryOptions)
        .addOnSuccessListener {
          logi("OnSuccess...")
          listener.startDiscovering()
        }
        .addOnFailureListener { e ->
          loge("OnFailure", e)
        }
```

DEMO

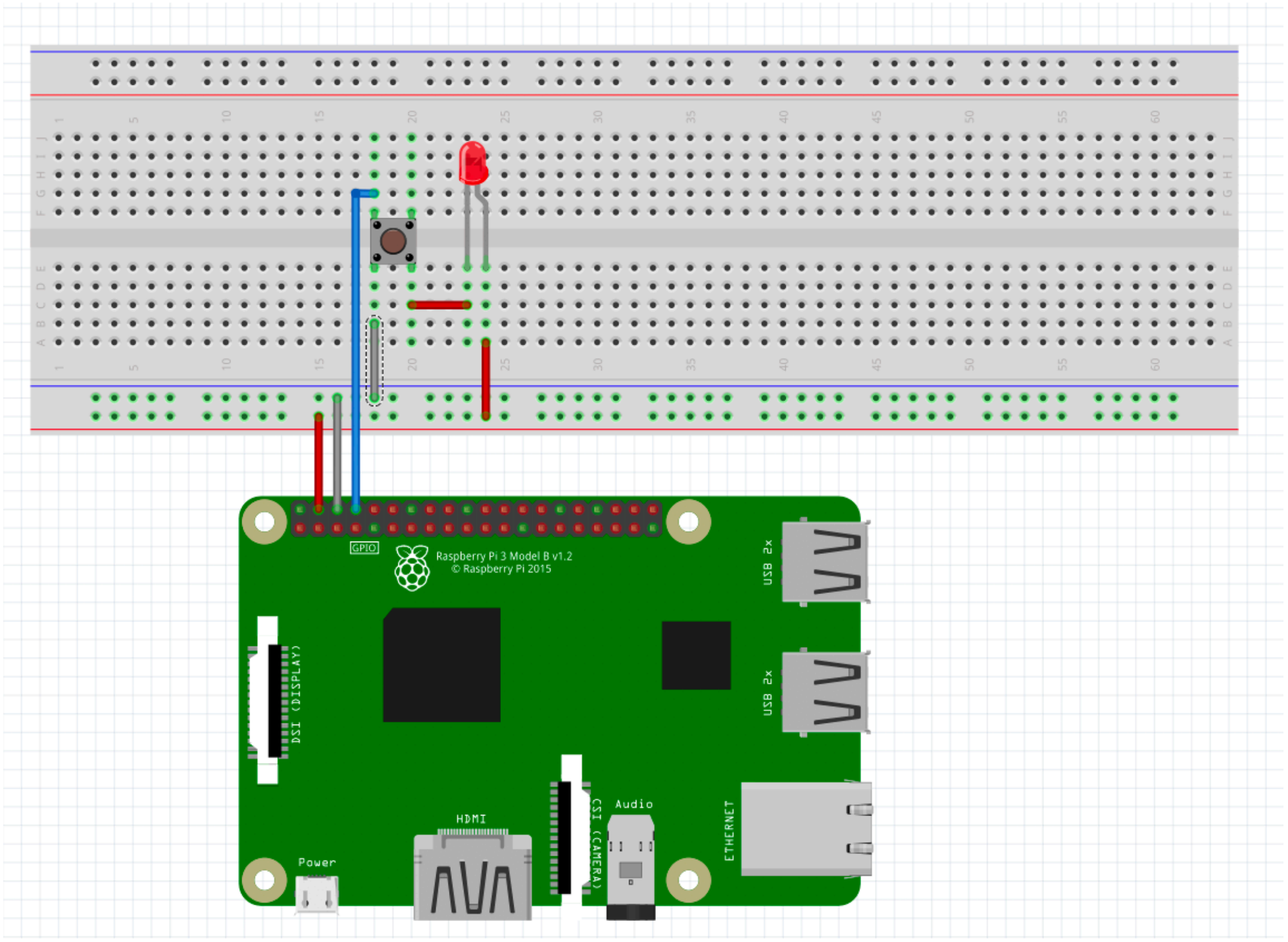
LCD Screen

```
implementation 'com.nilhcem.androidthings:driver-lcd1602:0.0.3'
```

```
val GPIO_LCD_RS = "BCM26"
val GPIO_LCD_EN = "BCM19"
val GPIO_LCD_D4 = "BCM21"
val GPIO_LCD_D5 = "BCM20"
val GPIO_LCD_D6 = "BCM16"
val GPIO_LCD_D7 = "BCM12"

mLcd = Lcd1602(GPIO_LCD_RS, GPIO_LCD_EN,
               GPIO_LCD_D4, GPIO_LCD_D5, GPIO_LCD_D6, GPIO_LCD_D7)
mLcd.clear()
mLcd.print(“Hello World!”)
```

https://github.com/Nilhcem/1602A-androidthings

Panic Button



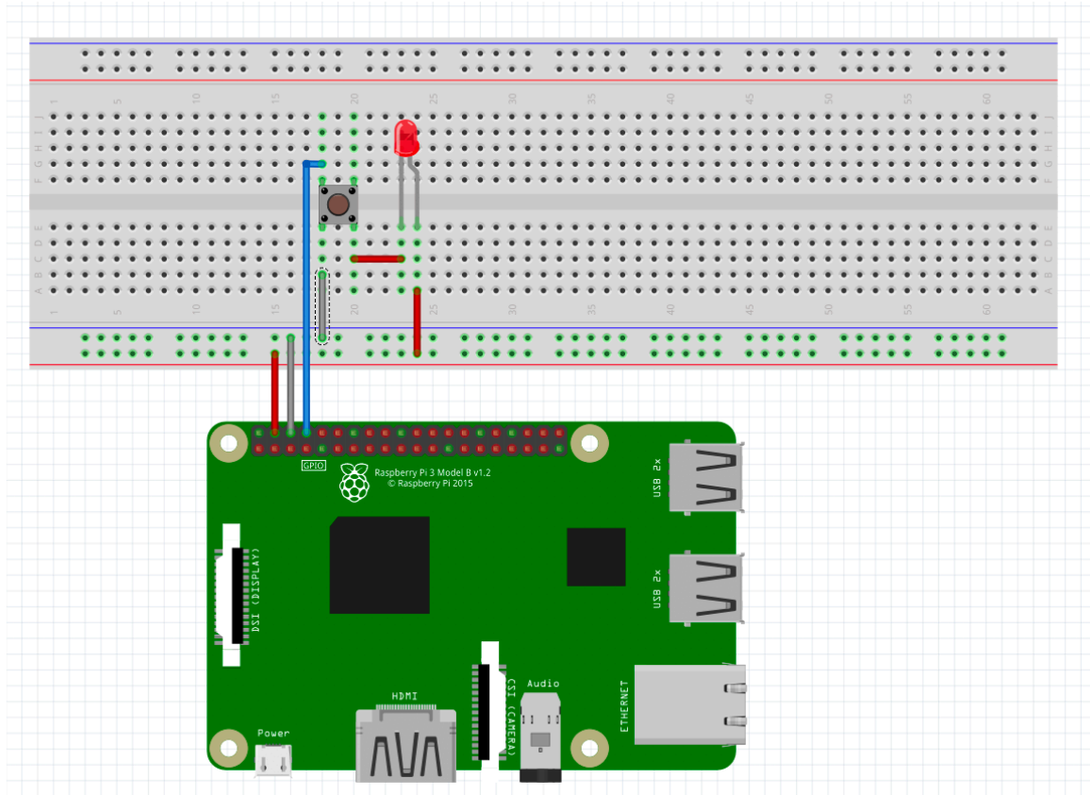
Panic Button

- When pressing the button more than 500ms send an SMS to a predefined number.

- To send the sms we can use, either:

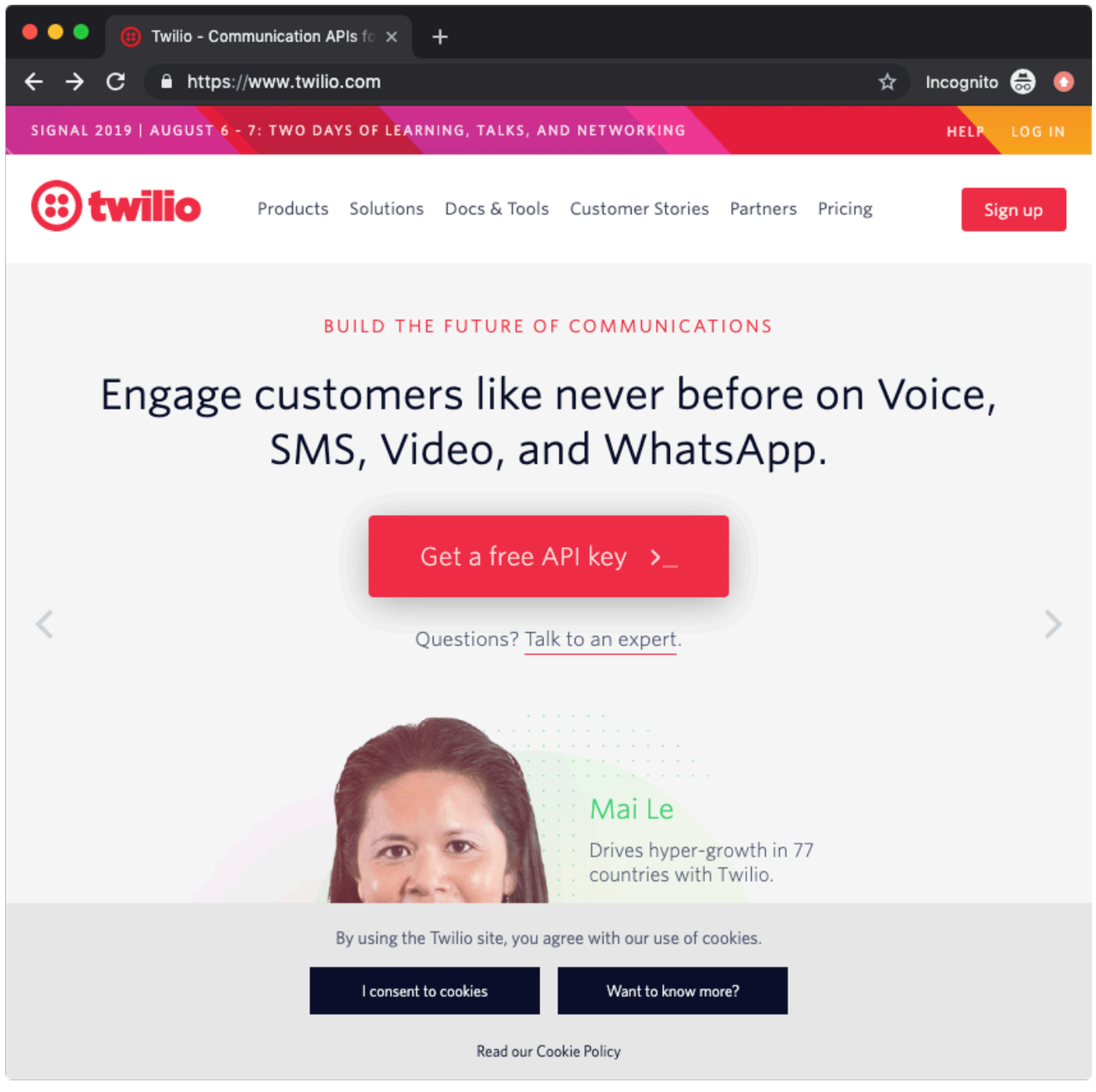
  - https://www.twilio.com

  - GSM Sim900A module.



www.twilio.com

- Create a trial account.
- You will get:
  - An API key.
  - A client id code.



Send a SMS Message

```
fun sms(body: String) {
    val formBody = FormBody.Builder()
        .add("From", ORIGIN_PHONE_NUMBER)
        .add("To", DEST_PHONE_NUMBER)
        .add("Body", body)
        .build()
    val builder = Request.Builder()
        .url(TWILLIO_MESSAGE_URL)
        .post(formBody)
    execute(builder)
}
```

Authenticate the Call

```
private fun execute(builder: Request.Builder) {
  val credential = Credentials.basic(TWILLIO_ACCOUNT_SID, TWILLIO_AUTH_TOKEN)
  val request = builder
      .addHeader("Authorization", credential)
      .build()
  httpClient.newCall(request)?.enqueue(object : Callback {
    @Throws(IOException::class)
    override fun onResponse(call: Call, response: Response) {
      if (response.isSuccessful) {
        logd("Twilio request succeed.")
      } else {
        logd("Twilio request failed. Make sure you have the correct configuration")
      }
    }
    override fun onFailure(call: Call, e: IOException) {
      logd("Twilio request failed.", e)
    }
  })
}
```

Make a Phone Call

```
fun call() {
  val url = "https://someurl.com"

  val formBody = FormBody.Builder()
    .add("From", ORIGIN_PHONE_NUMBER)
    .add("To", DEST_PHONE_NUMBER)
    .add("Url", url)
    .build()

  val builder = Request.Builder()
    .url(TWILLIO_CALL_URL)
    .post(formBody)

  execute(builder)
}
```

Lecture outcomes

- Nearby API.
- Send sms messages.
- Make phone calls.