



**TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE
FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY**

Assignment

BAIT 2123 Internet of Things

2020/2021

Student's Name (Student ID): Lim Chia Chung (20WMR08877)

Student's Name (Student ID): Lim Ming Jun (20WMR08879)

Student's Name (Student ID): Leong Yit Wee (20WMR08876)

Student's Name (Student ID): Lim Yih Feng (20WMR08880)

Programme : RDS2

Tutorial Group : 3

Date of Submission : 10 April 2021

Prepared By



Lim Chia Chung



Lim Ming Jun



Leong Yit Wee

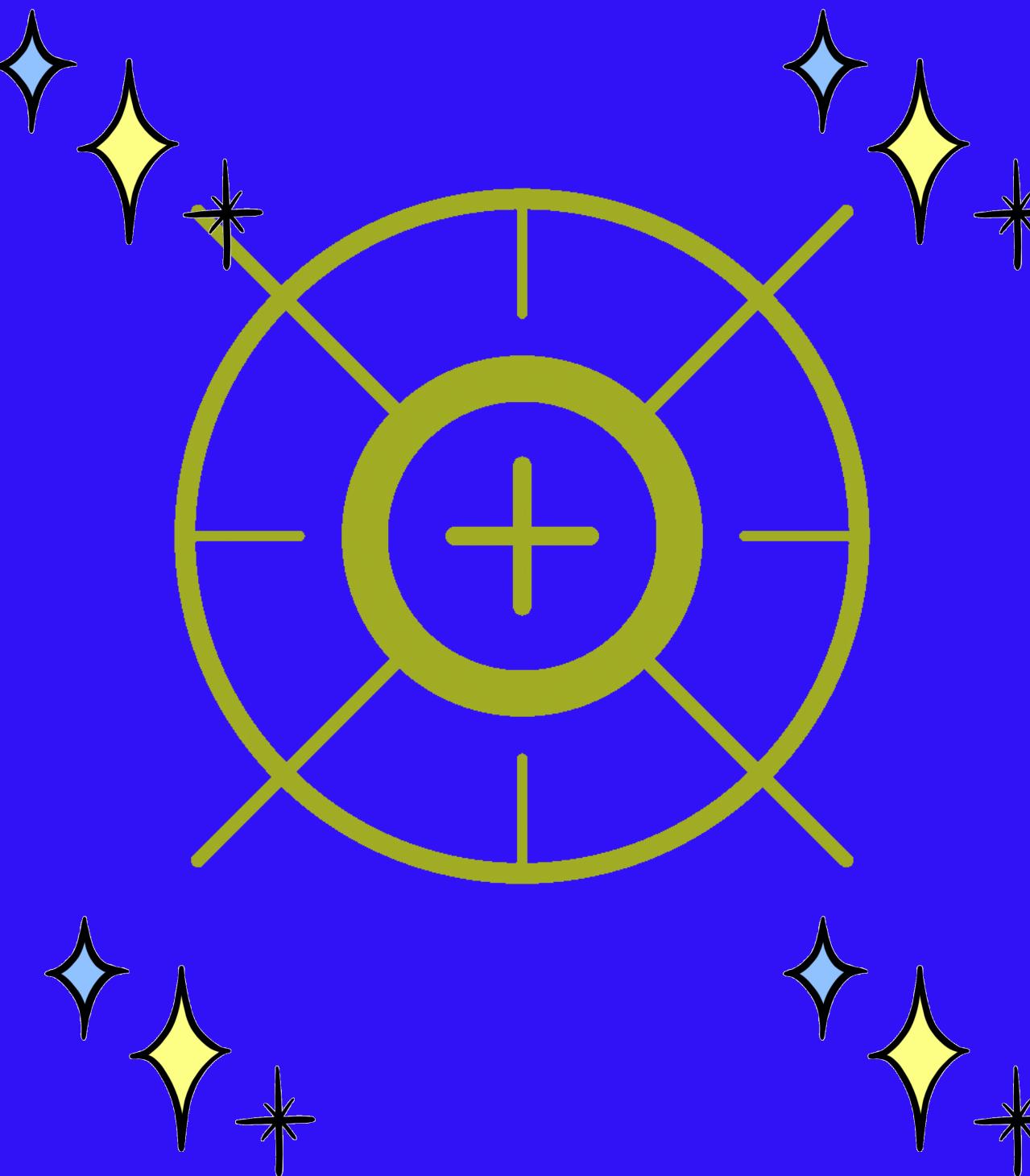


Lim Yih Feng

The Smart City

Exciting innovations that can change the world

OBJECTIVE



No.1 Efficiency of Services

To optimize the use of public resources and provide a high-level of citizen services.

No.2 Sustainability

To grow & develop the city with strong consideration to environmental impact.

No.3 Mobility

To make it easy for citizens, workers and visitors to move around in the city.

No.4 Safety & Security

To improve public safety & security in every-day life and being best possibly prepared for emergencies and disasters.

BUSINESS VALUES



No.1

**More Effective, Data-
Driven Decision-Making**

No.2

**Enhance Citizen and
Government Engagement**

No.3 Improve Transportation

No.4 Improved Infrastructure

No.5 Safer Communities

BUSINESS VALUES



TARGETED USER



No.1 Government

No.2 Real Estate Developer

No.3 Business Man & Merchant

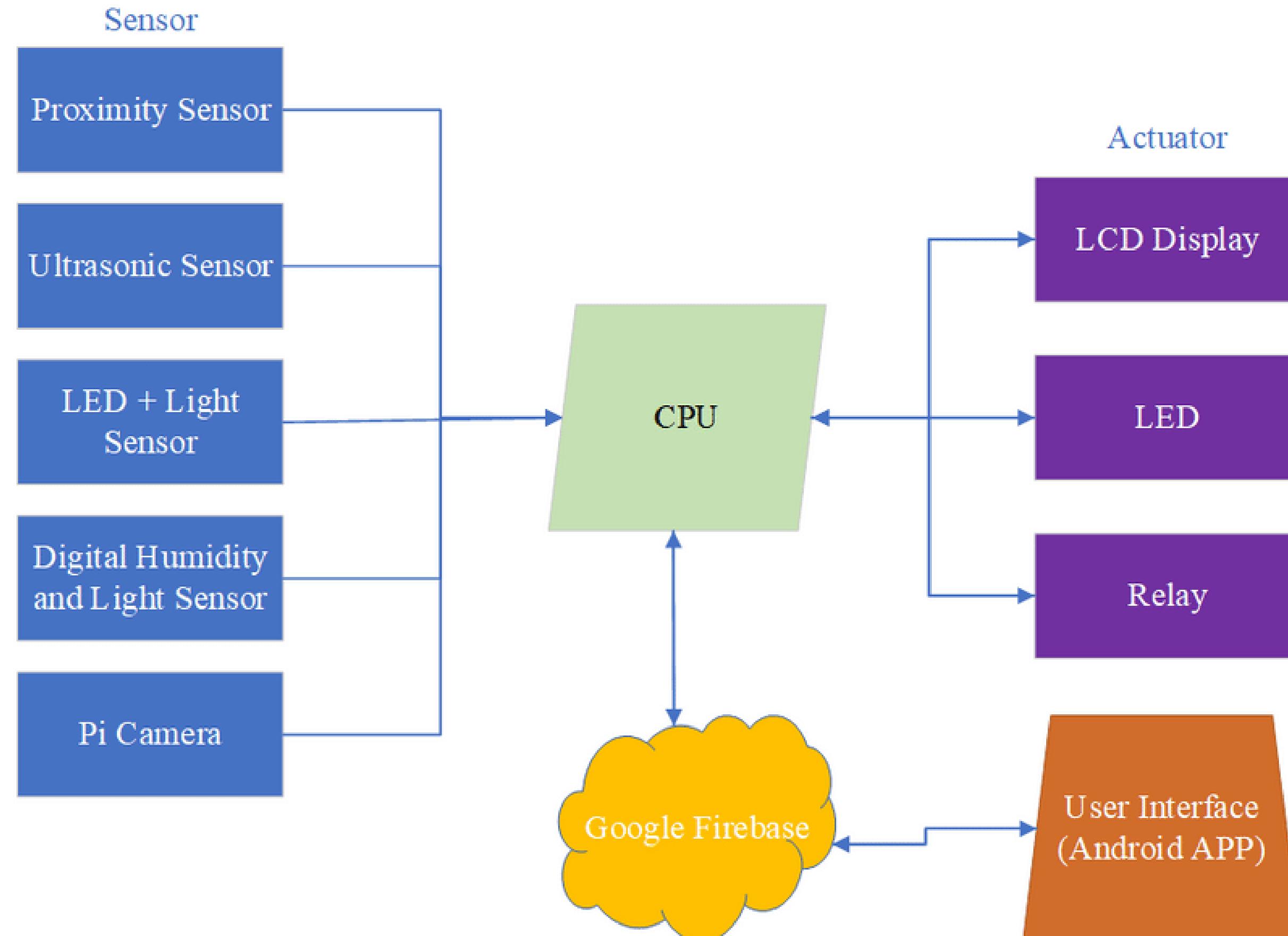
Does everyone need your system? Why?

Yes, Smart City is designed for optimum usage of space and resources along with optimum and efficient distribution of benefits.

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SYSTEM ARCHITECTURE

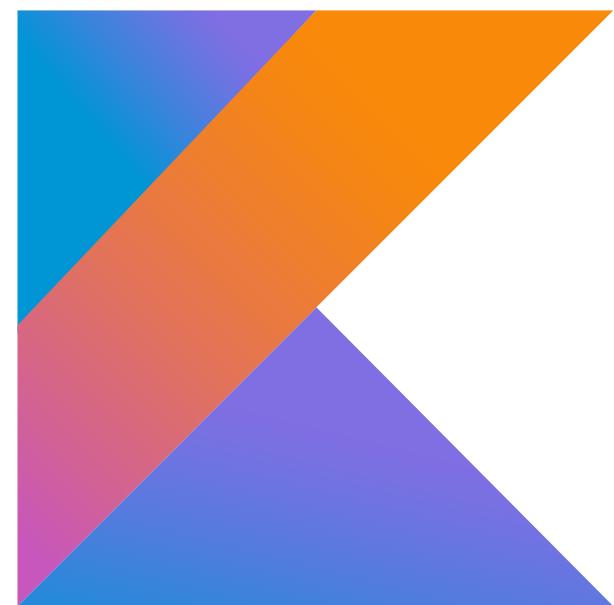


TECHNOOGY INVOLVED

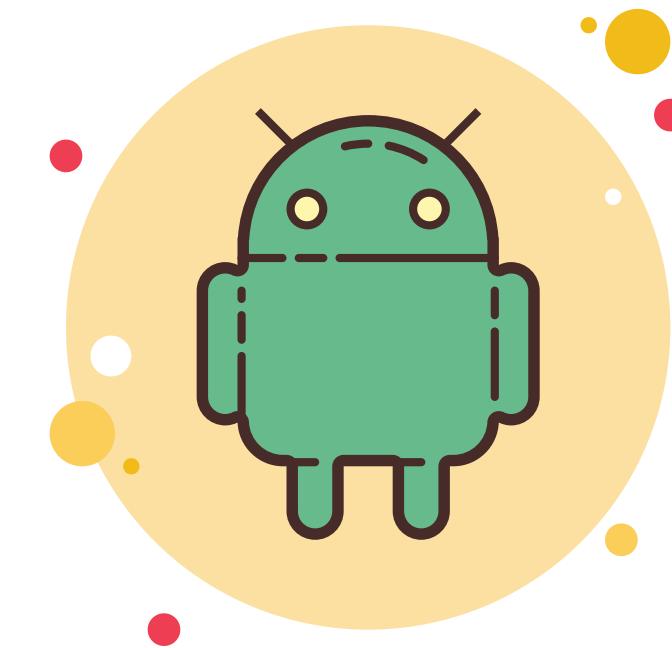
Kotlin, Android Studio



Android Studio



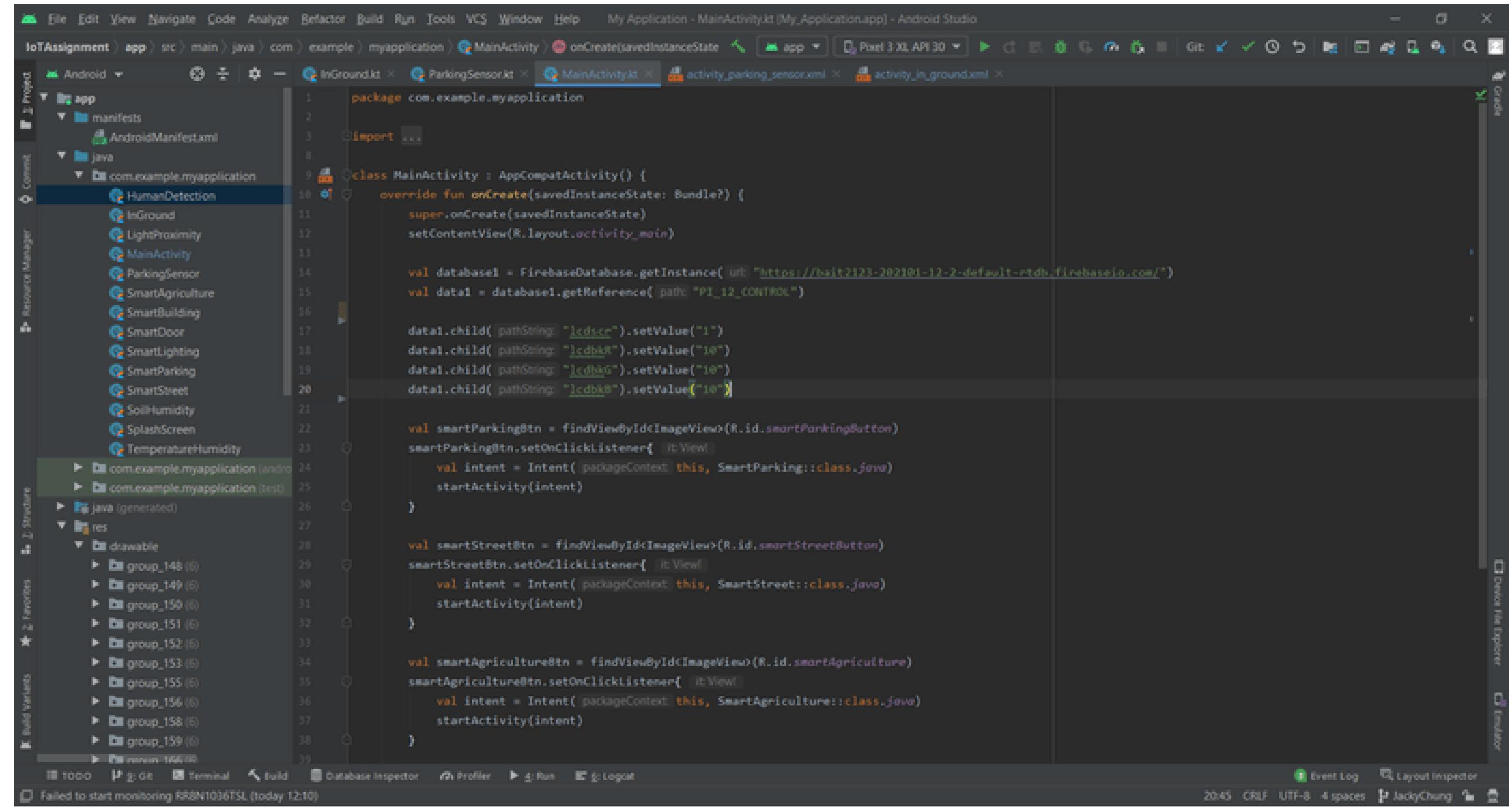
Kotlin language



Android App

TECHNOOGY INVOLVED

Kotlin, Android Studio



The screenshot shows the Android Studio interface with the Kotlin file `MainActivity.kt` open. The code implements a `HumanDetection` class that extends `AppCompatActivity`. It overrides the `onCreate` method to set the content view and initialize a Firebase database reference to a path named "PI_12_CONTROL". The code then sets values for four database nodes: "lcdscr", "lcdbkR", "lcdbkG", and "lcdbkB". It also handles click events for three buttons: "smartParkingBtn", "smartStreetBtn", and "smartAgricultureBtn", each starting an activity for its respective feature.

```
package com.example.myapplication

import android.os.Bundle
import androidx.appcompat.app.AppCompatActivity
import com.google.firebase.database.DatabaseReference
import com.google.firebase.database.FirebaseDatabase
import kotlinx.android.synthetic.main.activity_main.*

class HumanDetection : AppCompatActivity() {
    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        val database = FirebaseDatabase.getInstance("https://baite2123-202101-12-2-default.firebaseio.com/")
        val dataRef = database.getReference("PI_12_CONTROL")

        dataRef.child("lcdscr").setValue("1")
        dataRef.child("lcdbkR").setValue("10")
        dataRef.child("lcdbkG").setValue("10")
        dataRef.child("lcdbkB").setValue("10")

        val smartParkingBtn = findViewById<ImageView>(R.id.smartParkingButton)
        smartParkingBtn.setOnClickListener {
            val intent = Intent(packageContext, SmartParking::class.java)
            startActivity(intent)
        }

        val smartStreetBtn = findViewById<ImageView>(R.id.smartStreetButton)
        smartStreetBtn.setOnClickListener {
            val intent = Intent(packageContext, SmartStreet::class.java)
            startActivity(intent)
        }

        val smartAgricultureBtn = findViewById<ImageView>(R.id.smartAgriculture)
        smartAgricultureBtn.setOnClickListener {
            val intent = Intent(packageContext, SmartAgriculture::class.java)
            startActivity(intent)
        }
    }
}
```

TECHNOOGY INVOLVED

Realtime Database, Firebase



Firebase

BAIT2123-202101-12-2

Realtime Database

Data Rules Backups Usage

https://bait2123-202101-12-2-default.firebaseio.com/

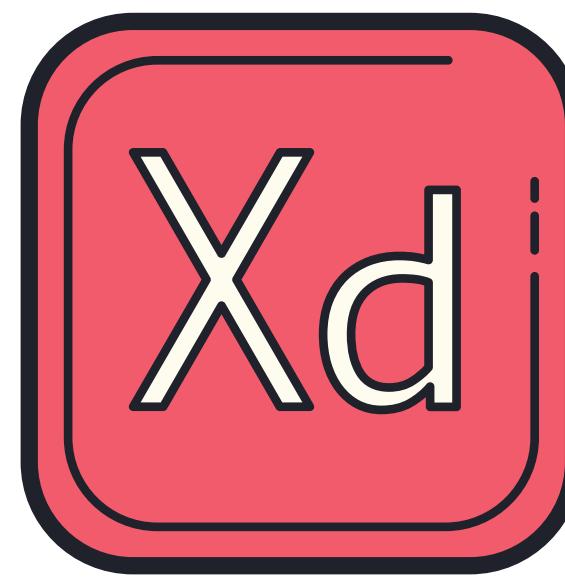
Read-only and non-realtime mode activated in the data viewer to improve browser performance
Select a key with fewer records to edit or view in realtime

- bait2123-202101-12-2-default-rtdb
 - PI_12_20210331
 - PI_12_20210401
 - PL_12_CONTROL
 - buzzer: "0"
 - camera: "0"
 - lcdbkB: "50"
 - lcdbkG: "5"
 - lcdbkR: "5"
 - lcdscr: "1"
 - lcdtxt: "=App is Running="
 - ledtgt: "0"
 - master: "1"

Database location: United States (us-central1)

TECHNOOGY INVOLVED

Adobe XD



Adobe XD

A screenshot of a mobile application interface titled 'Smart City Home Screen'. The screen features several icons and sections: at the top left is a red kiosk-like device with a barrier; below it is a blue kiosk-like device with a barrier; to the right are five small icons labeled 'Intruder Detection', 'Soil Humidity', 'Temperature & Humidity', 'Parking sensor', and 'In-ground sensor'; below these are two larger cards: 'The Smart City' (with icons for buildings and a camera) and 'Smart Building System' (with icons for CCTV, Smart Door, Smart Parking, Smart Street, Smart Building, and Smart Agriculture); at the bottom are three more icons: a car with a checkmark, a car with a star, a shield with a checkmark, and a person in a balaclava.

iPhone 12, 12 Pro – 1

Google Pixel 3XL – 1

Intruder Detection

Soil Humidity

Temperature & Humidity

Parking sensor

In-ground sensor

Smart City Home Screen

Smart Building System

CCTV

Smart Door

Smart Parking

Smart Street

Smart Building

Smart Agriculture

The Smart City

Smart Agriculture

Smart City System



Smart Parking



Smart Street



Smart Agriculture



Smart Building

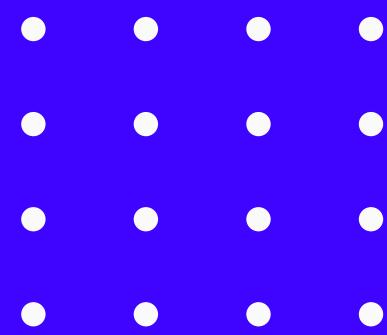
Homepage



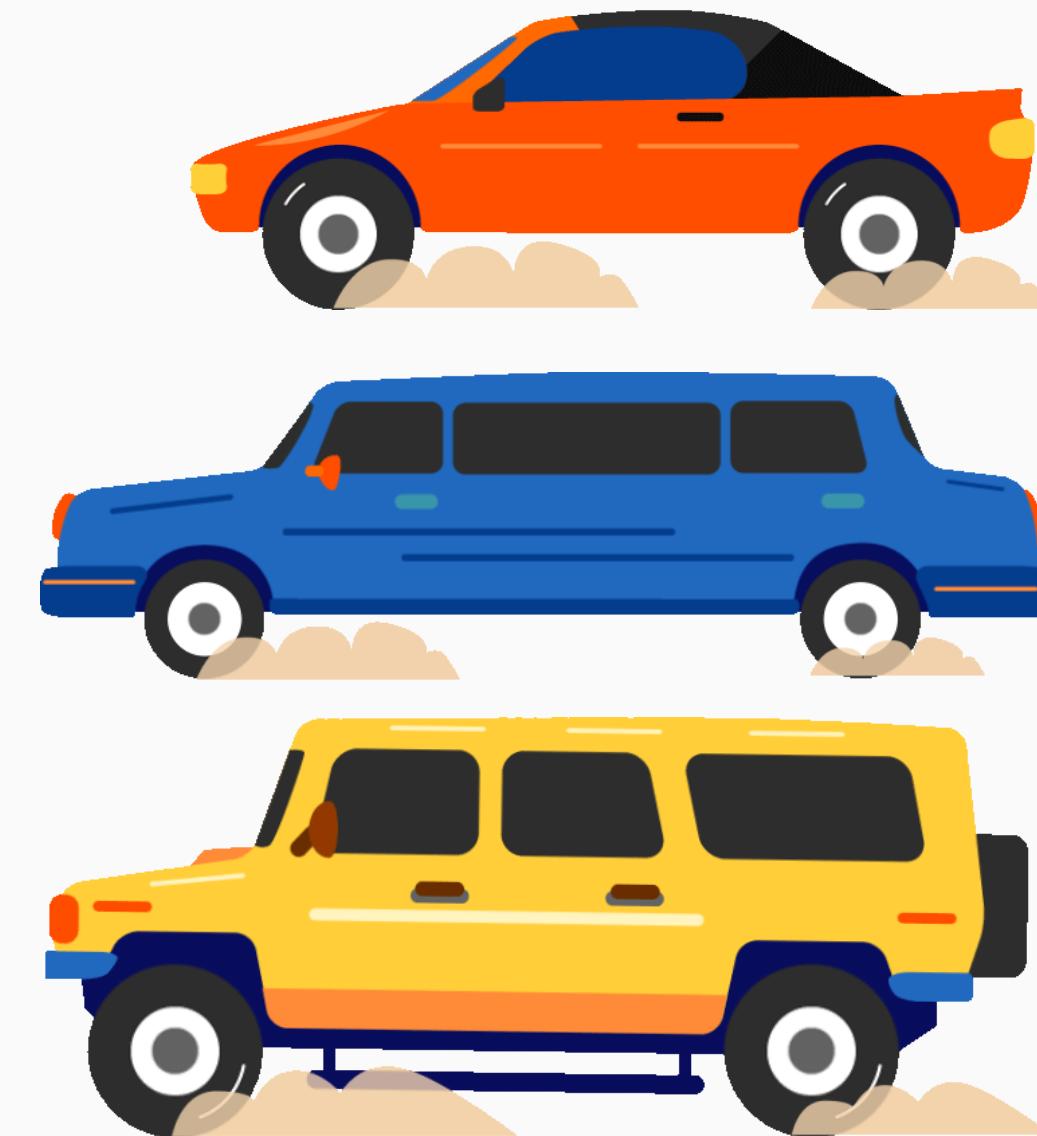
Smart Parking

Smart Parking system uses sensors, cameras, GPS and payment data to determine the car and where available parking space.





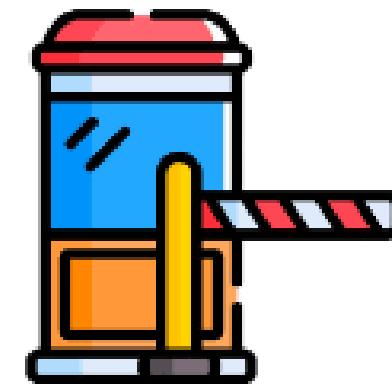
IN-GROUND SENSOR



The Smart City

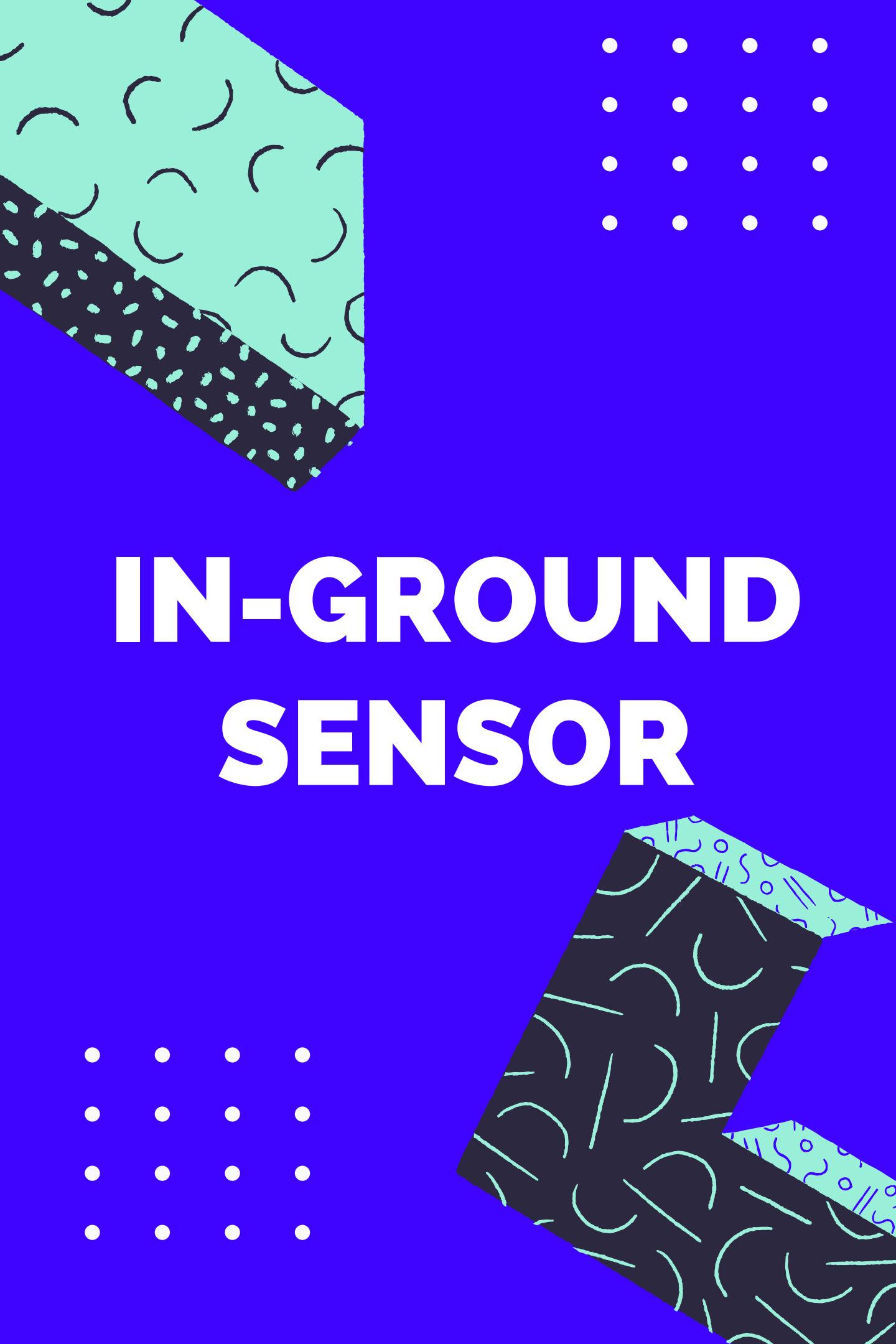


In-ground sensor



Barrier gate is closed

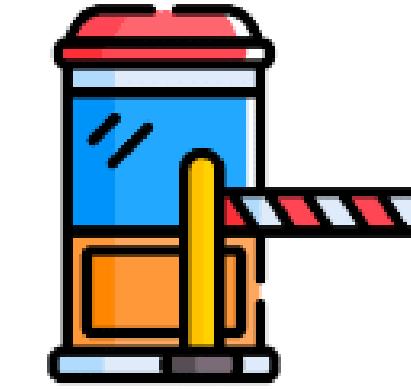
IN-GROUND SENSOR



The Smart City

In-ground sensor

Sensor(cm): 10.0
No Car Detected



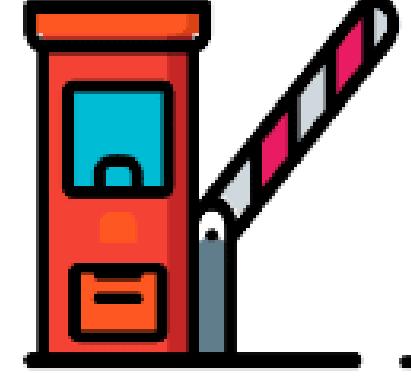
Barrier gate is closed

This panel shows the initial state of the system. A blue circle contains the text "Sensor(cm): 10.0" and "No Car Detected". Below the circle is an icon of a barrier gate that is currently closed. The text "Barrier gate is closed" is displayed at the bottom.

The Smart City

In-ground sensor

Sensor(cm): 3.75
Car Detected



Barrier gate is opened
10.0 slots available

This panel shows the system after a car has been detected. The blue circle now displays "Sensor(cm): 3.75" and "Car Detected". Below the circle is an icon of a barrier gate that is now open. The text "Barrier gate is opened" and "10.0 slots available" is displayed at the bottom.



Parking Sensor



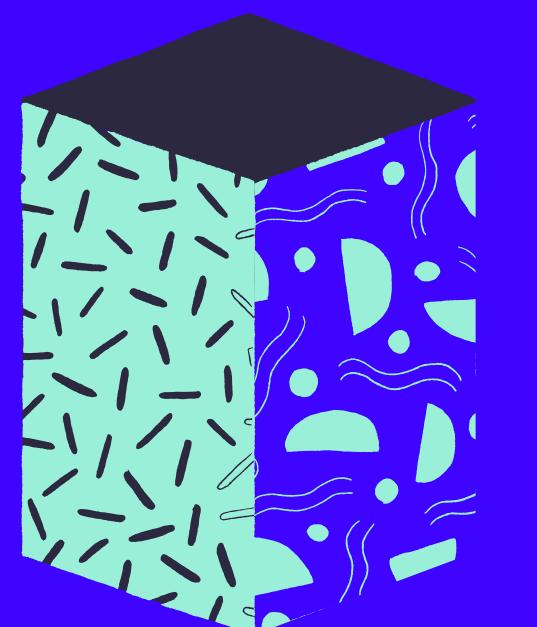
Slot is occupied



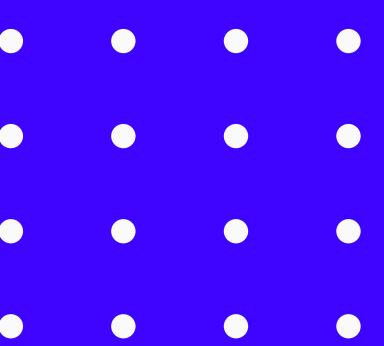
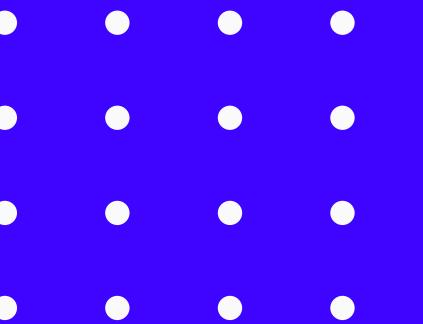
Parking Sensor



Slot is free now



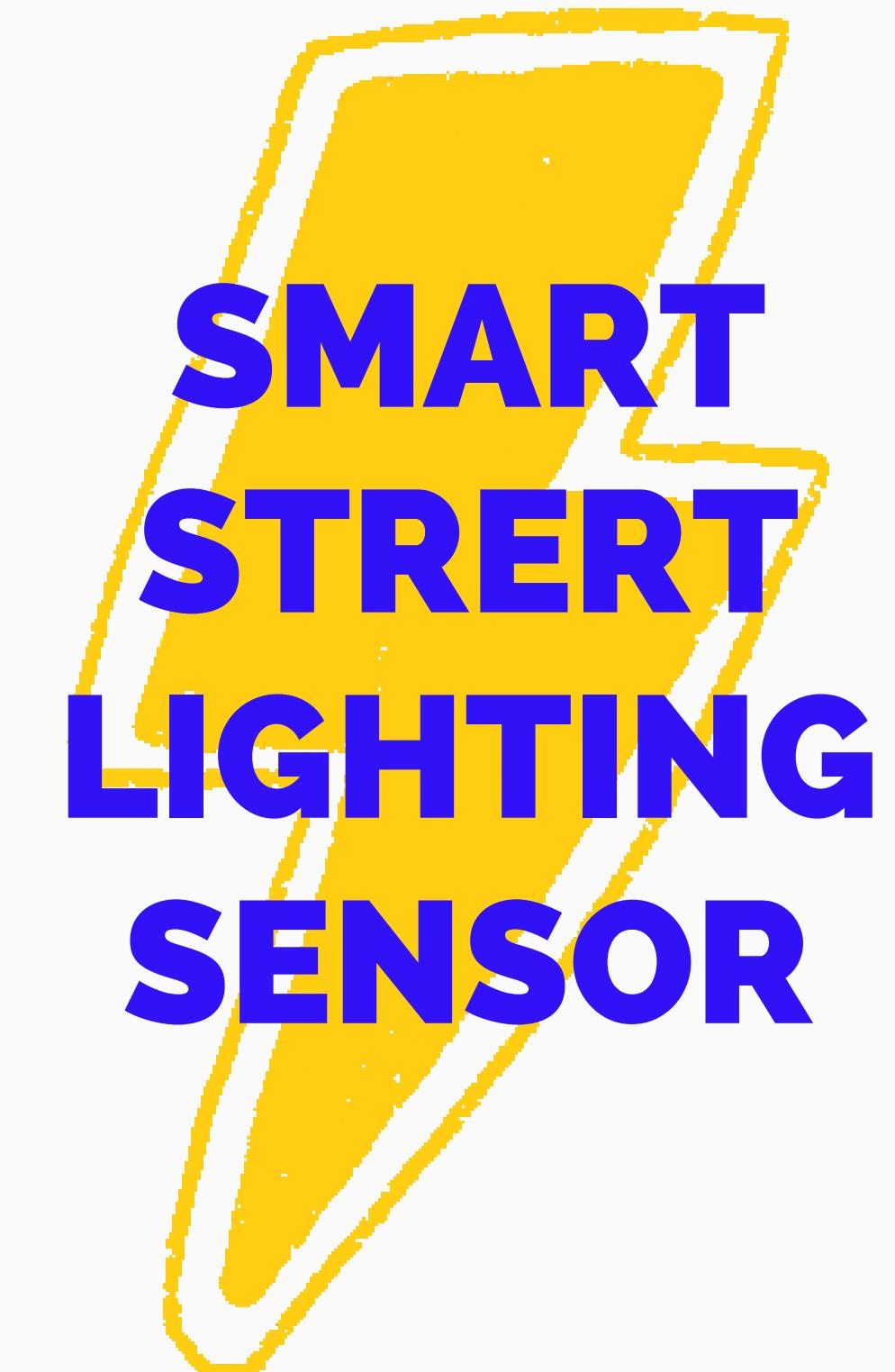
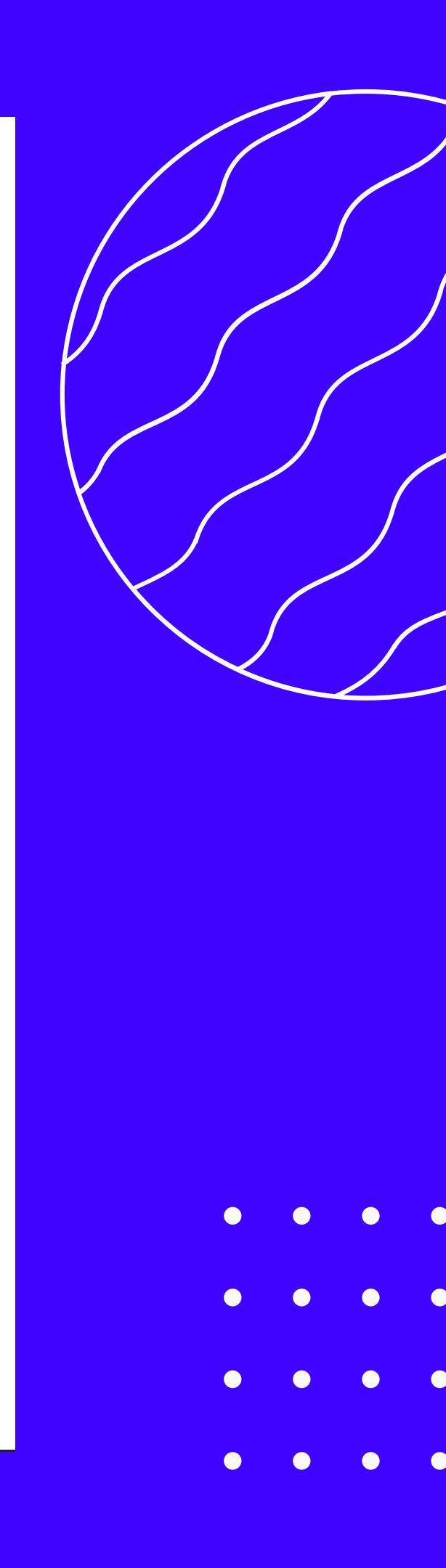
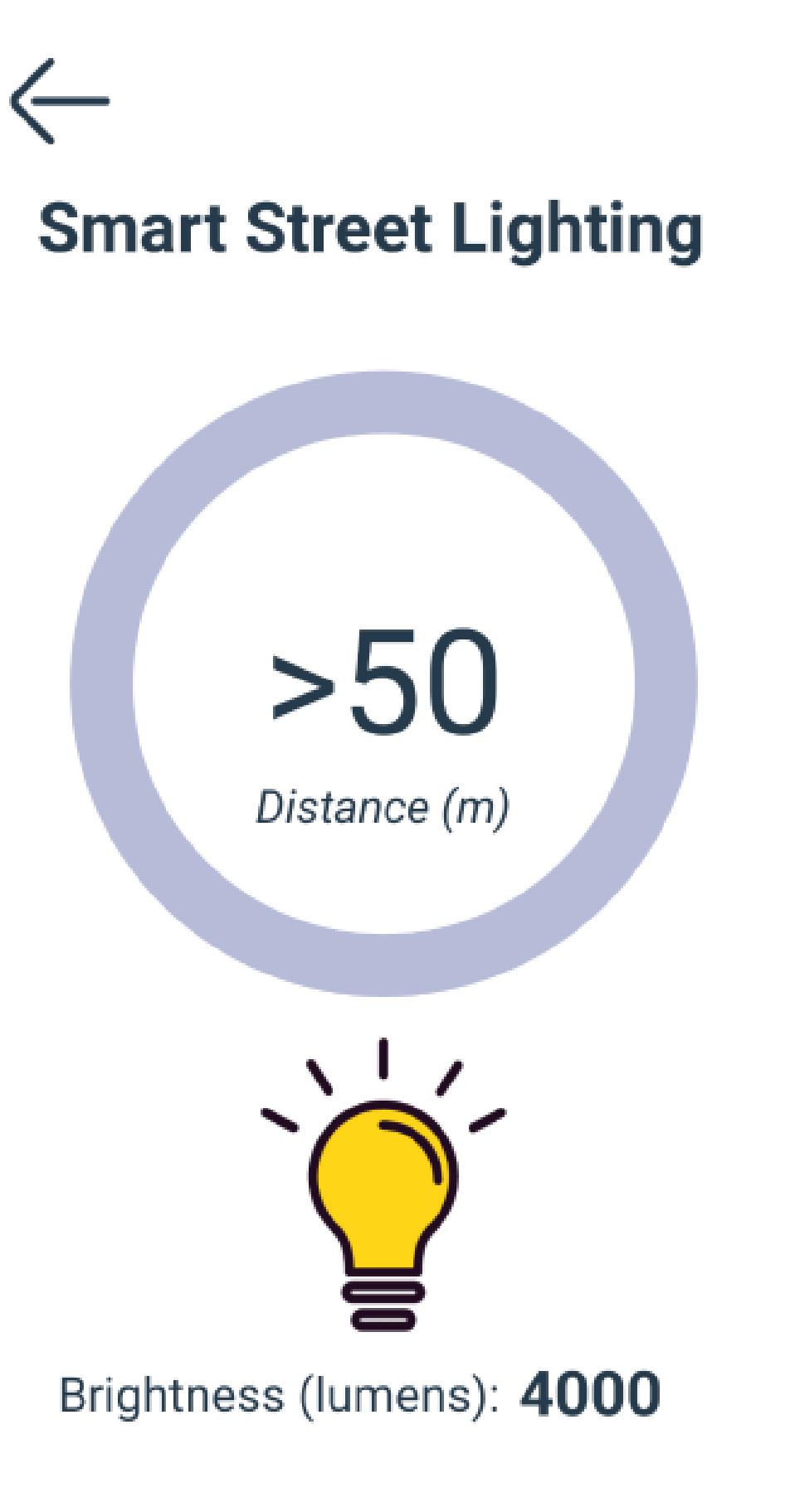
**PARKING
SENSOR**



Smart Street

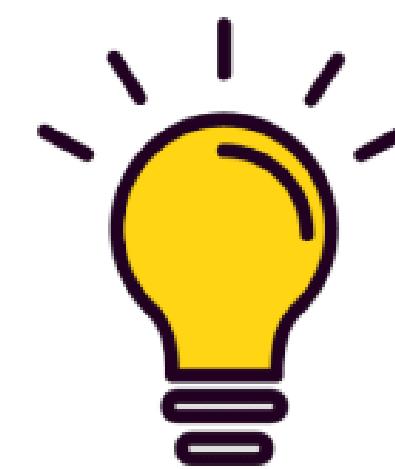
A *smart street* uses a variety of sensors and *Internet of Things* devices to collect a broad range of data that can help smart cities better manage traffic flow, parking, and public safety.







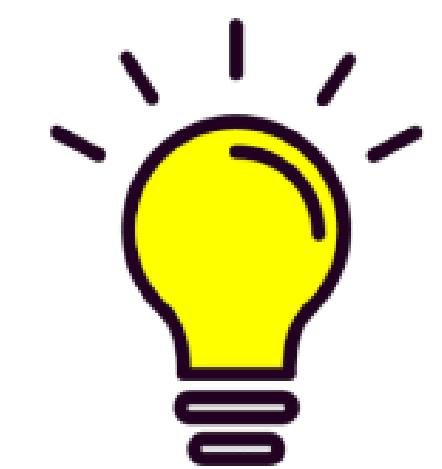
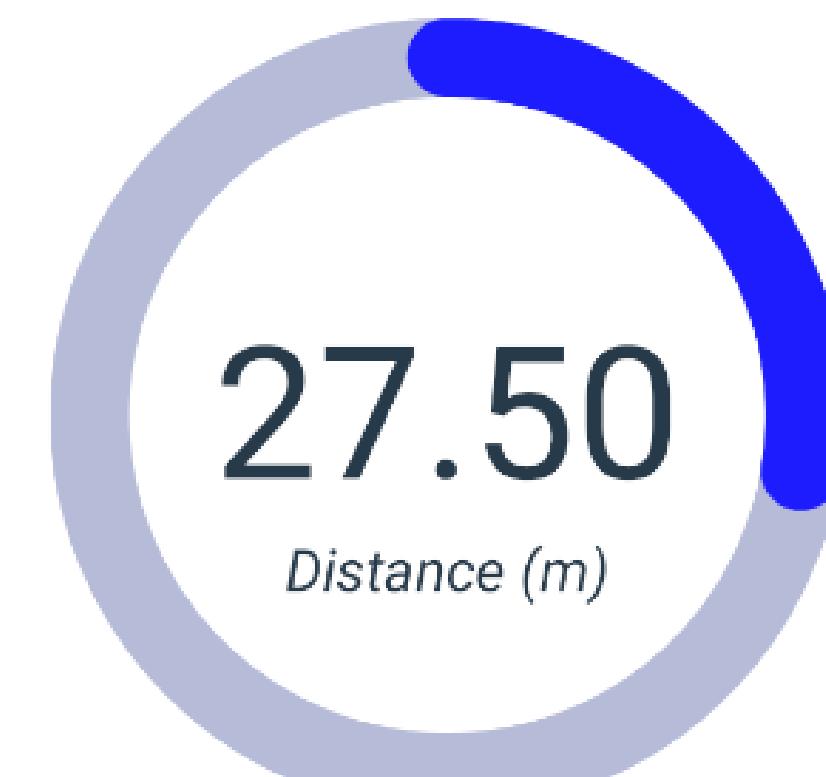
Smart Street Lighting



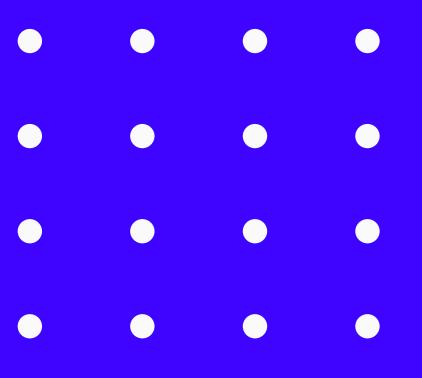
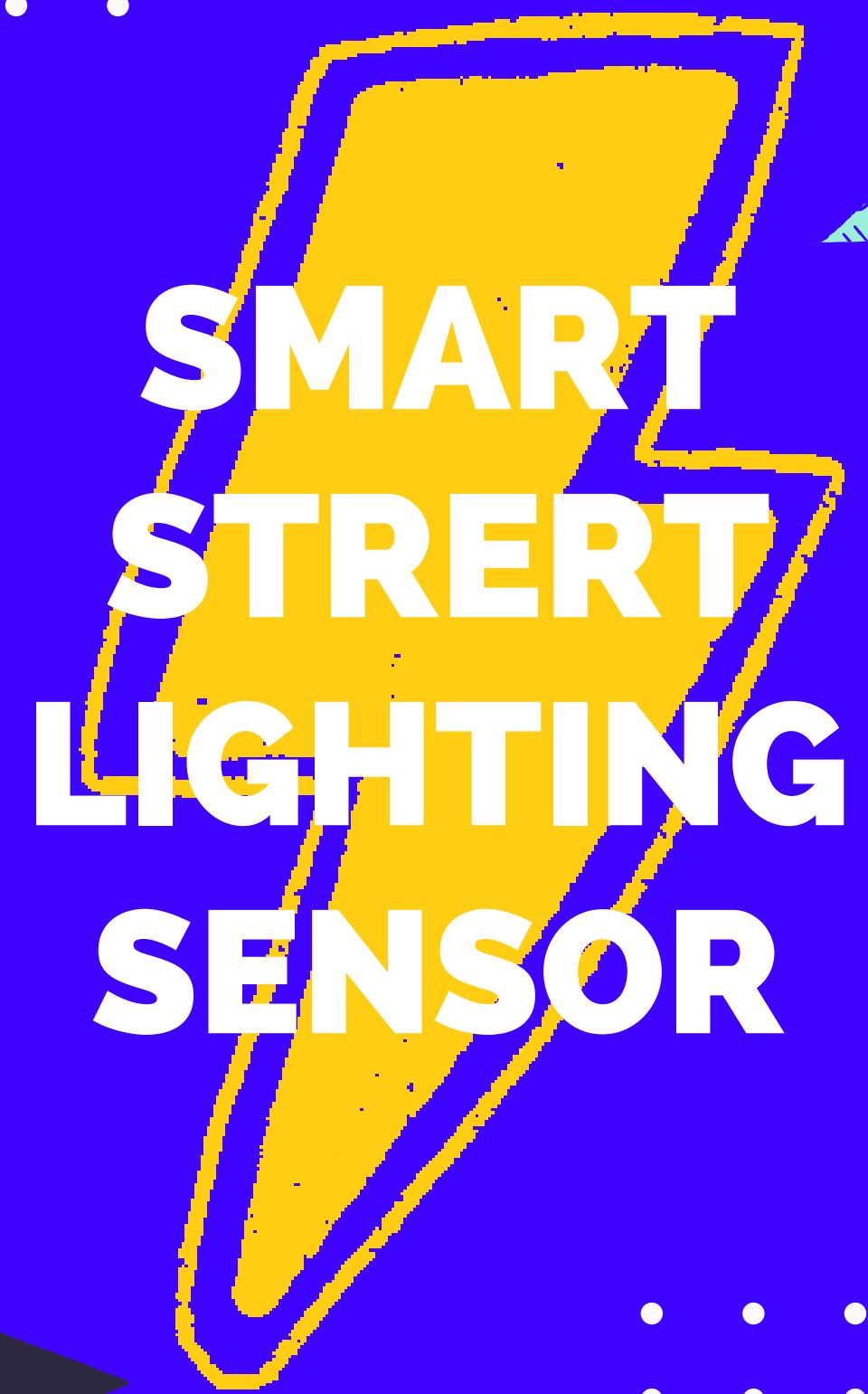
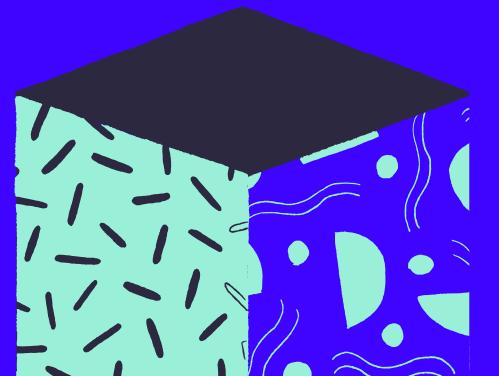
Brightness (lumens): **4000**



Smart Street Lighting

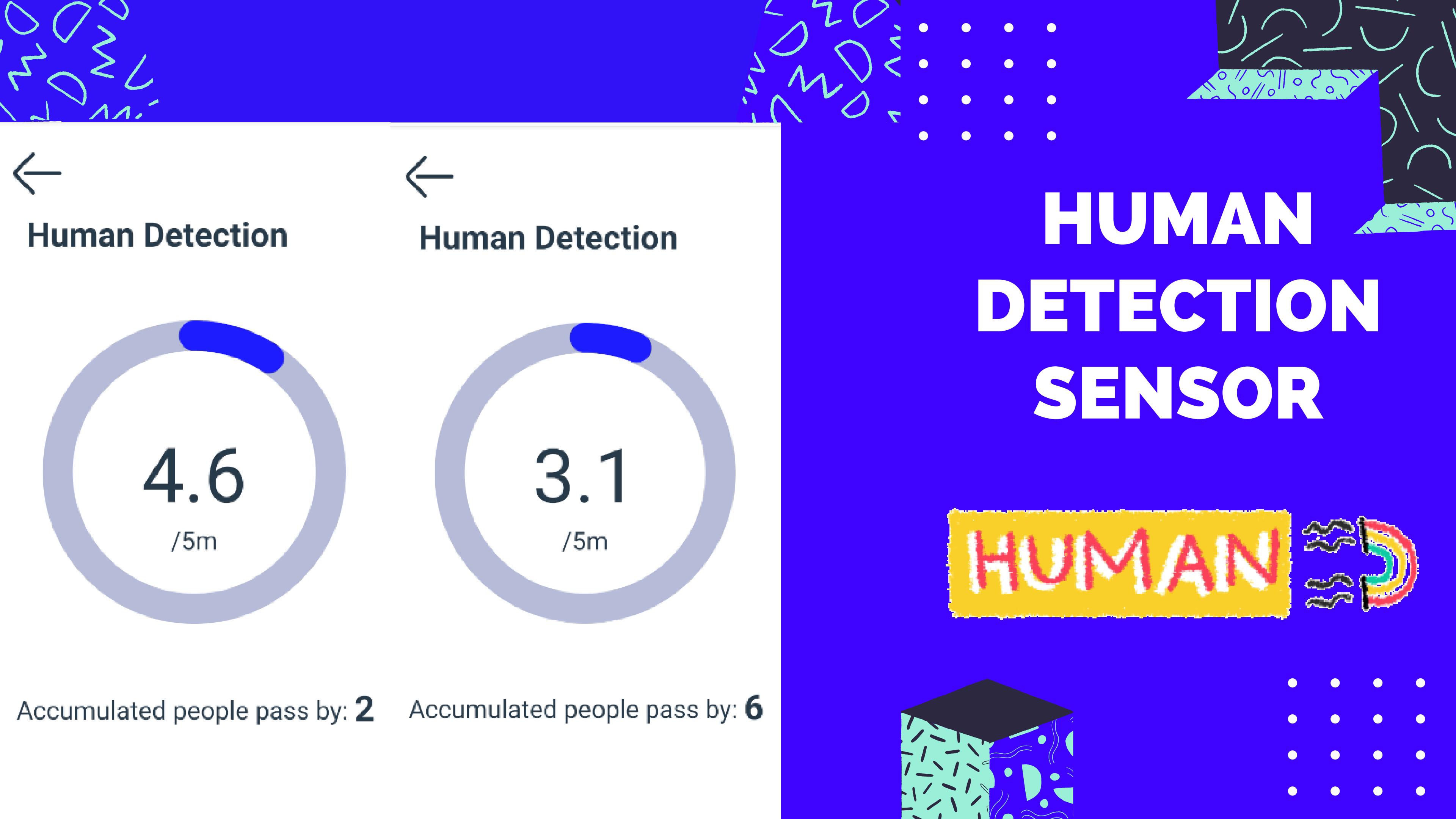


Brightness (lumens): **5000**



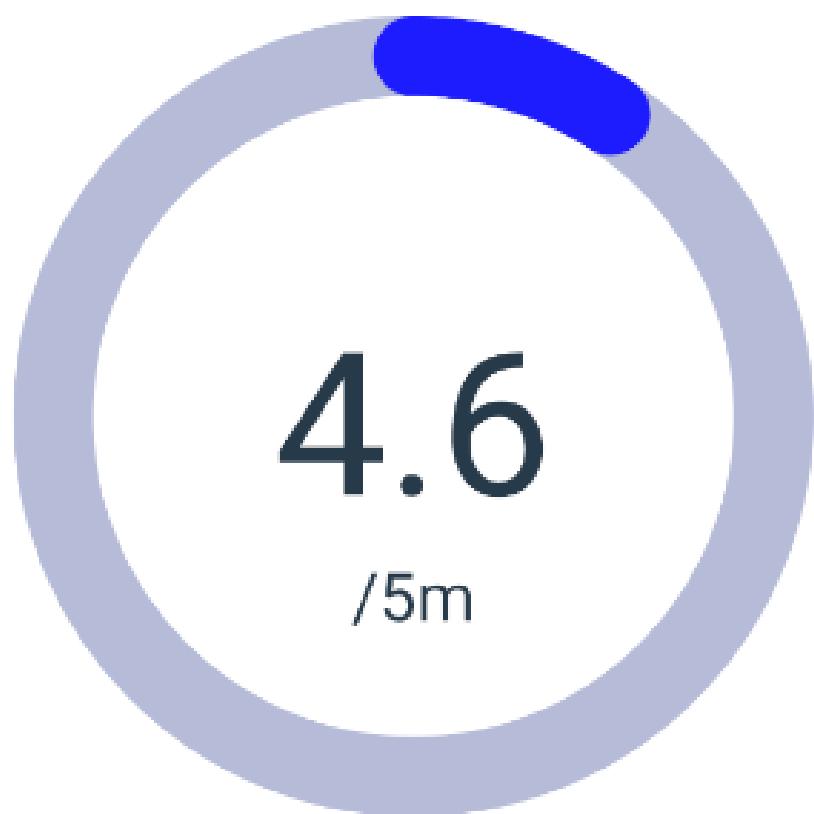
HUMAN DETECTION SENSOR





HUMAN DETECTION SENSOR

←
Human Detection

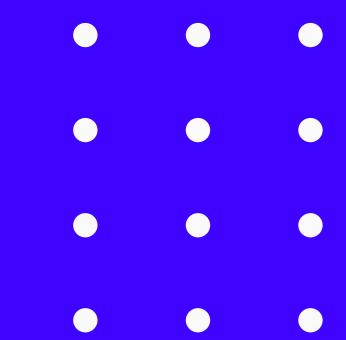


Accumulated people pass by: **2**

←
Human Detection



Accumulated people pass by: **6**



Smart Agriculture

Smart Farming or Smart Agriculture is an emerging concept that refers to managing farms using modern Information and Communication Technologies to increase the quantity and quality of products while optimizing the human labor required.



The Smart City



Intruder Detection



1.25

Distance (m)

Intruder Detected!!!

The Smart City



Intruder Detection



5.625

Distance (m)

Farm is safe



Intruder Detection



The Smart City



Soil Humidity



Soil Humidity (%):

2.13

Watering Plants

The Smart City



Soil Humidity

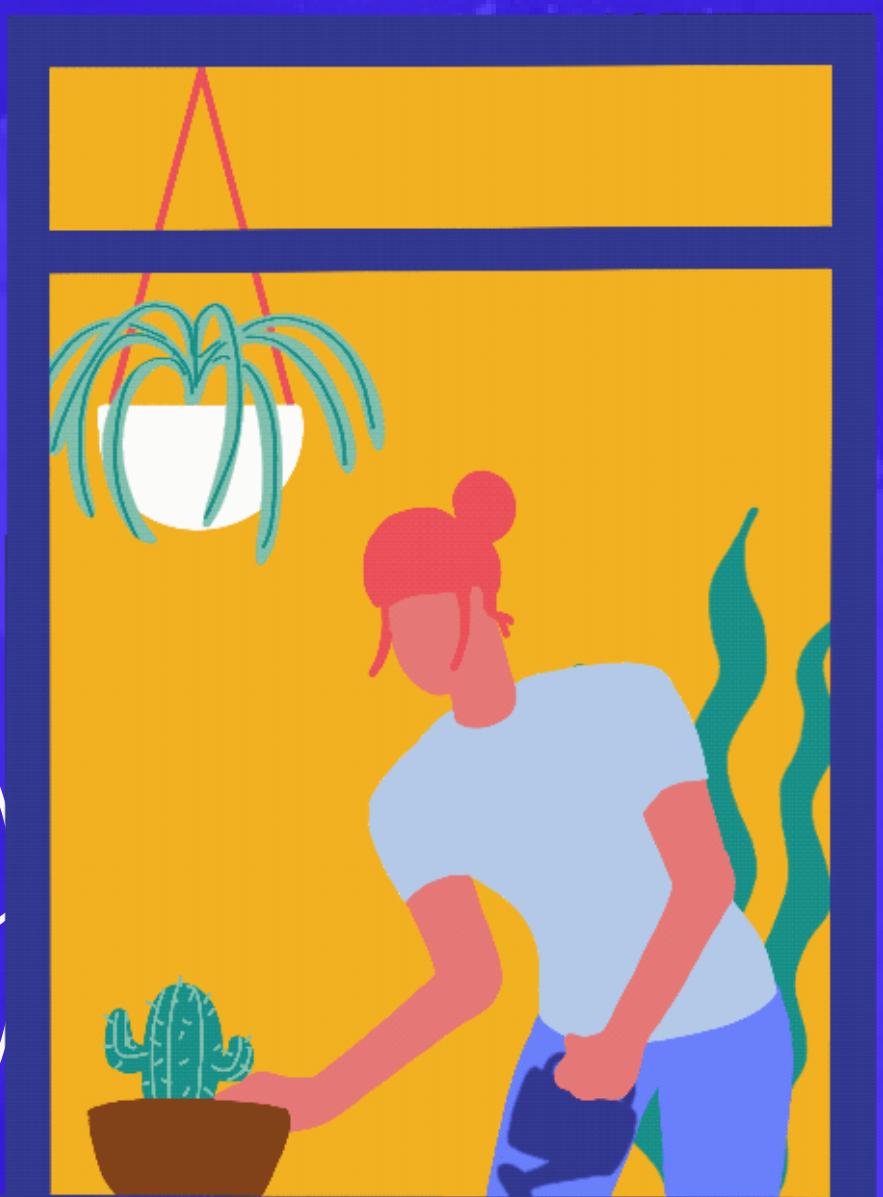
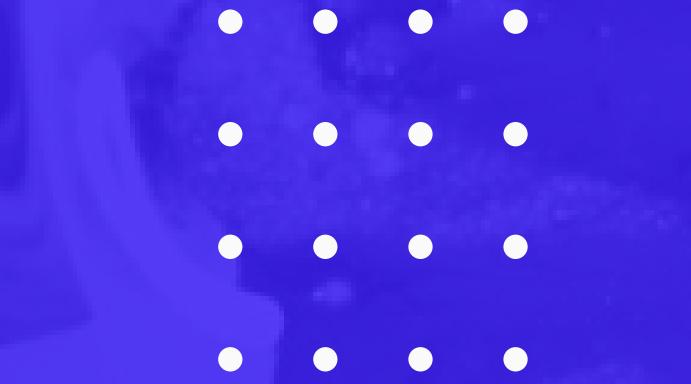


Soil Humidity (%):

73.75

Plant is healthy

Soil Humidity

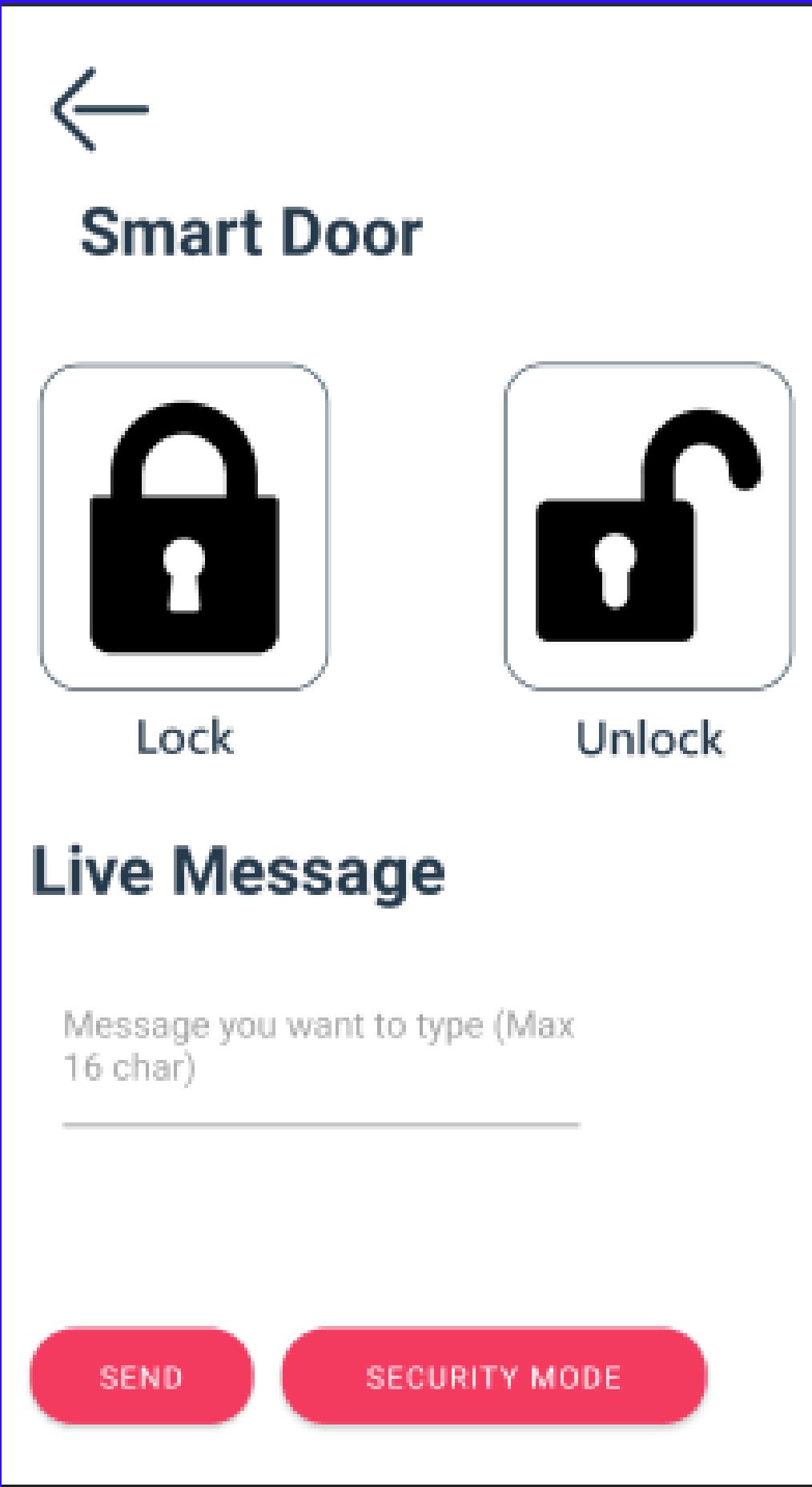
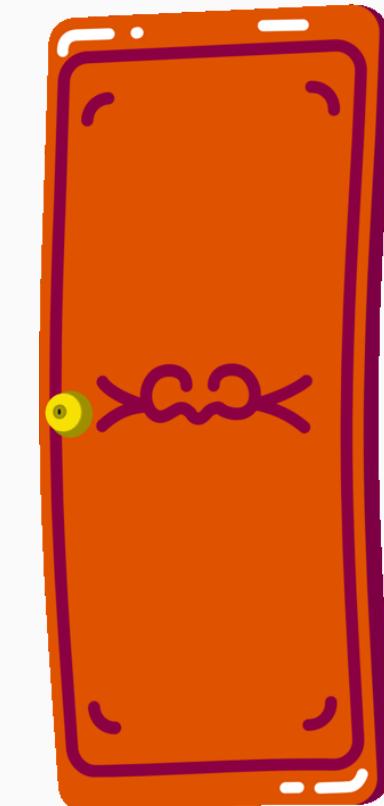


Smart Building

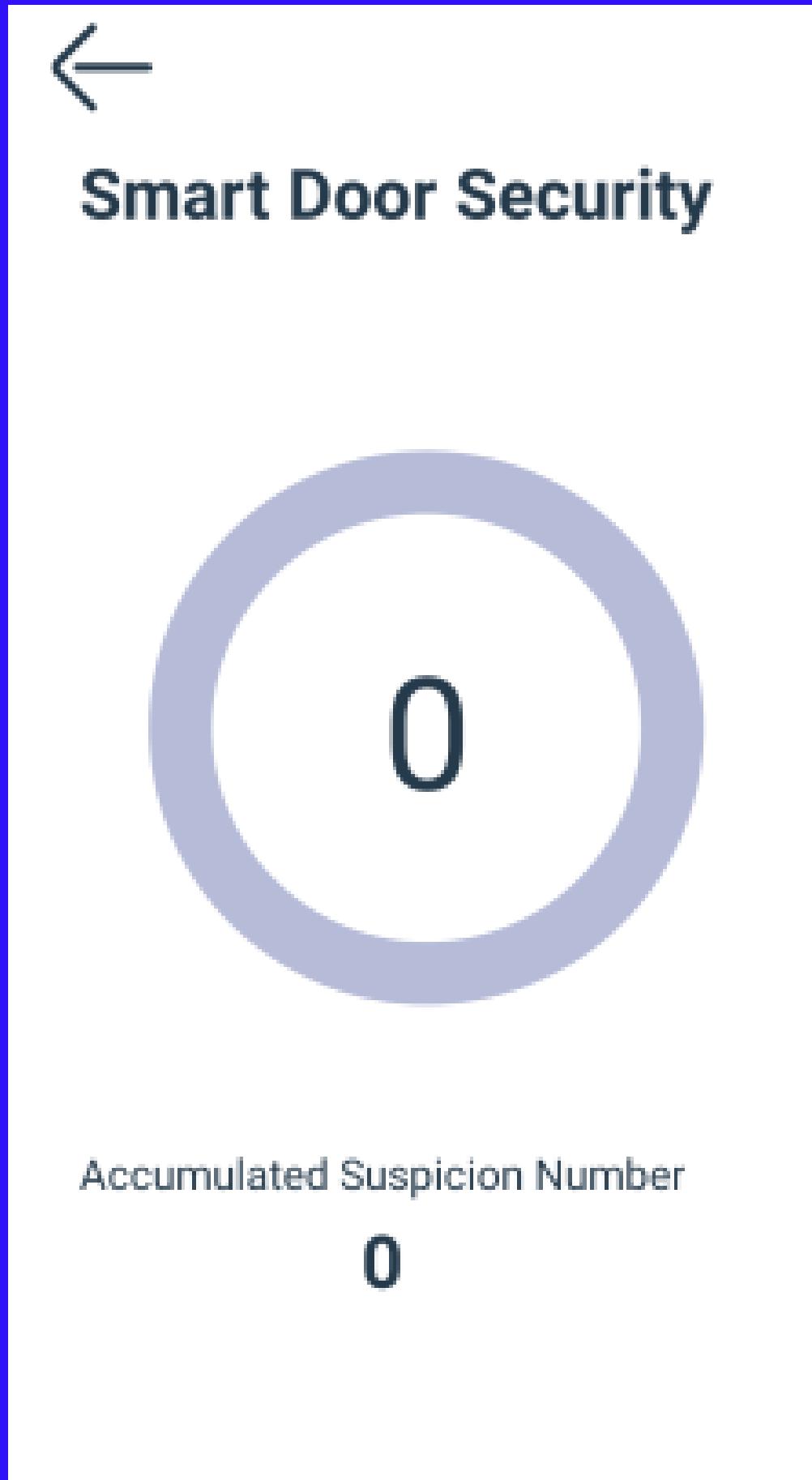
A smart building is any structure that uses automated processes to automatically control the building's operations including heating, ventilation, air conditioning, lighting, security, and other systems.



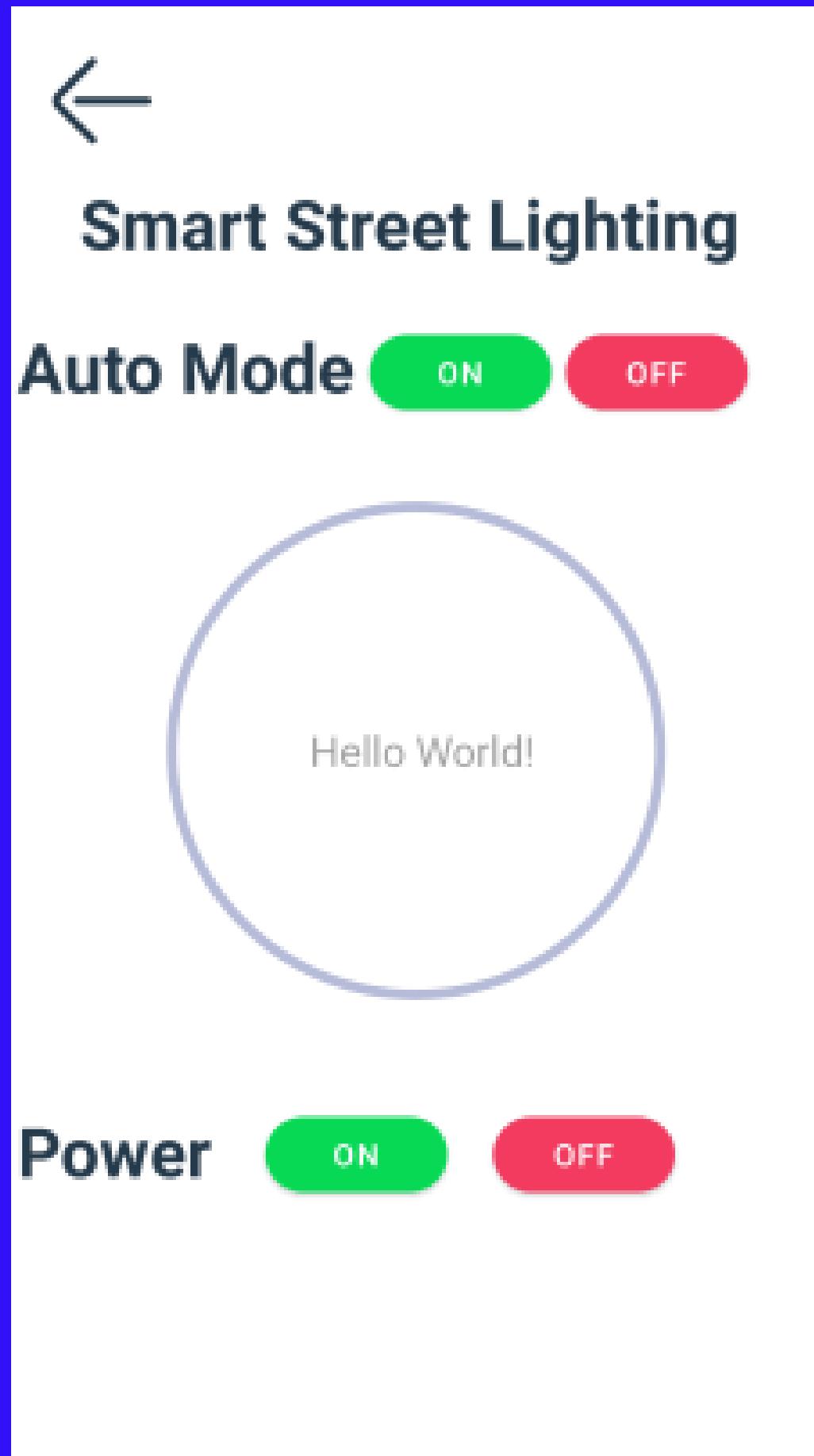
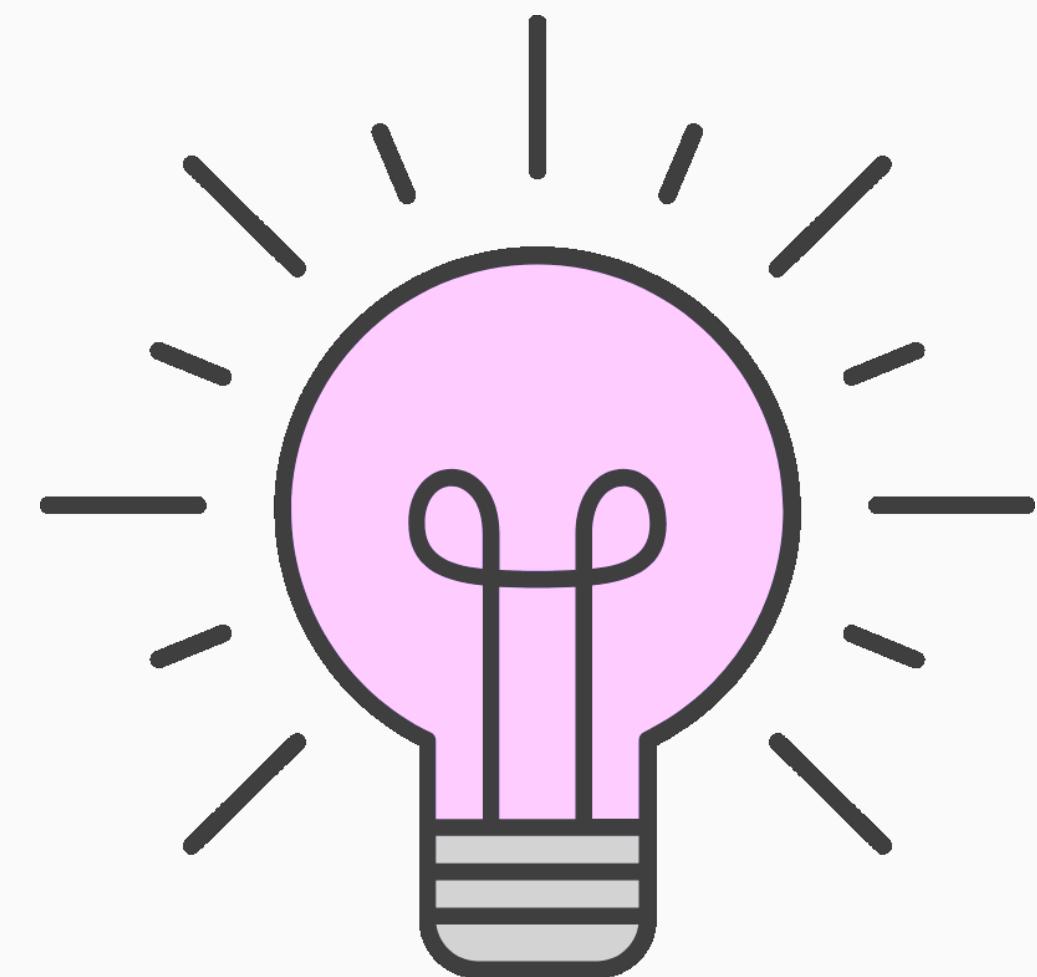
SMART DOOR SENSOR



SMART DOOR SECURITY SENSOR



SMART LIGHTING SENSOR





Lesson That We Learned

- How to connect to firebase.
- Use software to control hardware.
- Build App with limited hardware.

THANK
YOU!!



E N D

AWESOME

