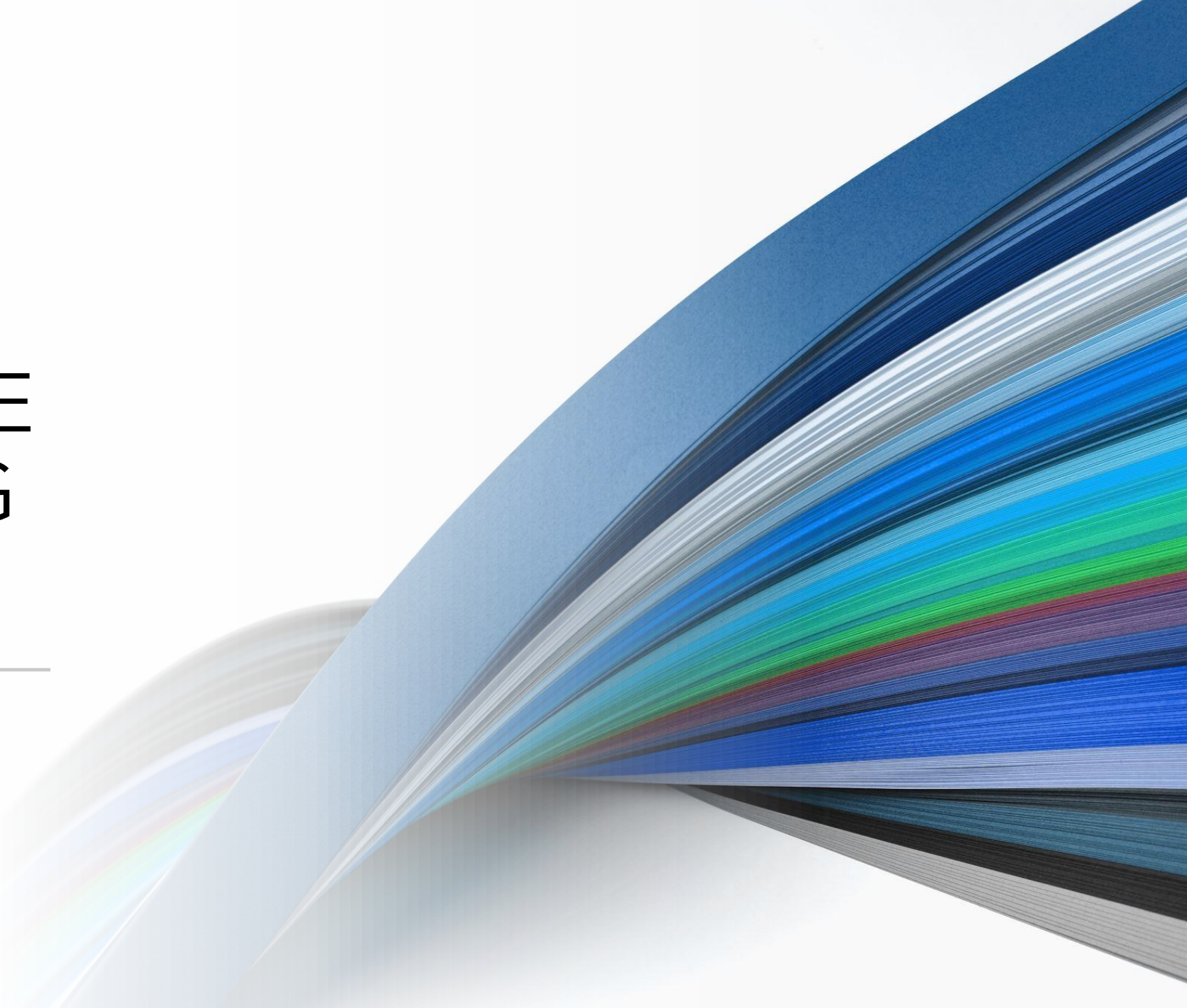# GAS LEAKAGE MONITORING SYSTEM

DISASTER RESILIENCY

Team GoBig Or GoHome

Agrippina Mwangi

Margaret Odero

Tanya Akumu

Wuyeh Jobe

Jonathan Rukundo

Background

- Rwanda has issued a directive that all citizens will use natural gas for residential and industrial applications. The efforts are to move away from the use of charcoal, coal, and firewood.

- The first step would be to educate the citizens on safety measures while operating LPG appliances in residential units, garages, service stations, hotels, and manufacturing industries.
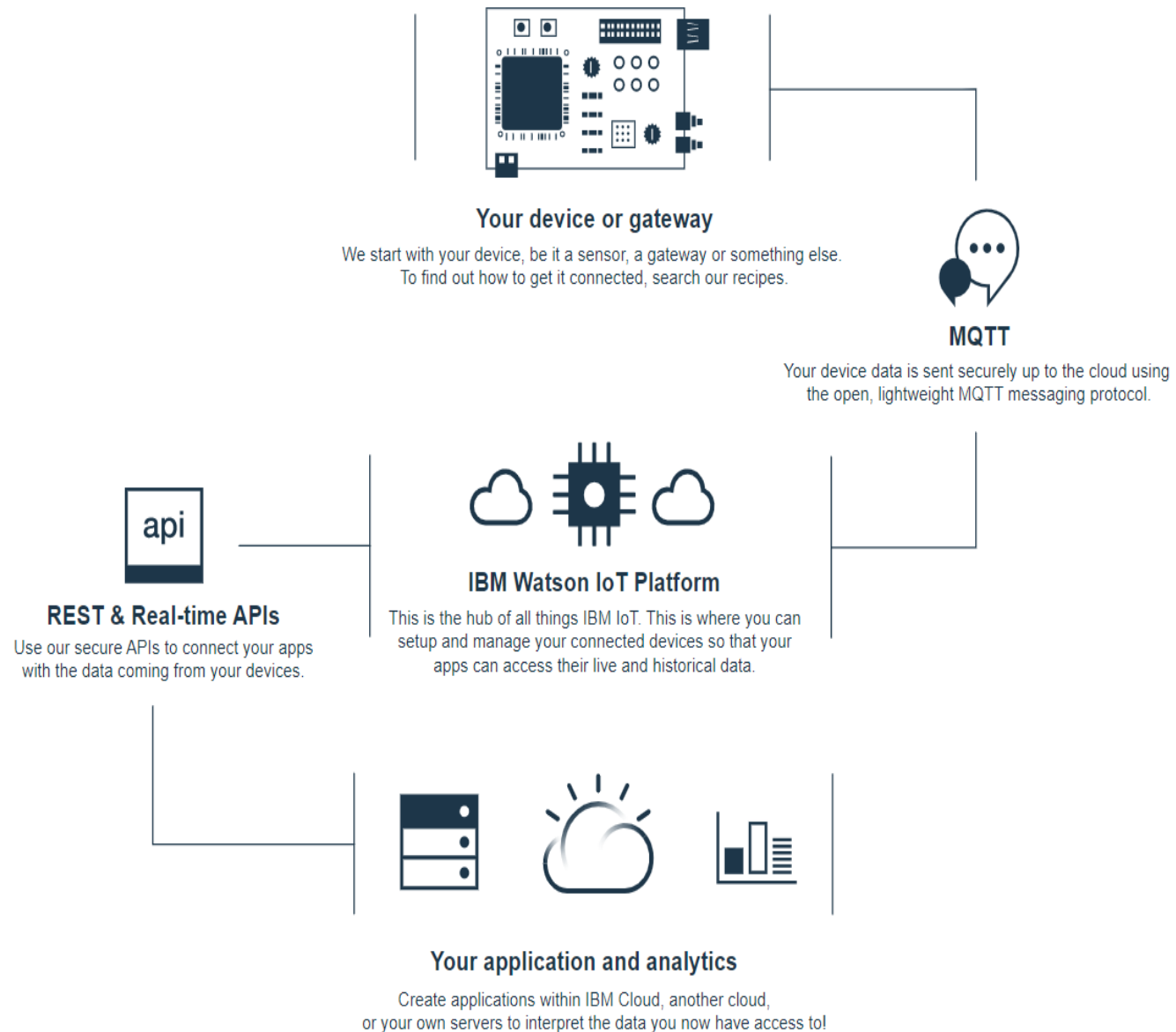
Problem statement

- Fire and explosion are the most important and most unfortunate events that threatens human life in public buildings and industrial complexes.

- The Liquid petroleum gas (LPG) has been involved in major fires and explosions with historical survey indicating that of 22.52% of the road accidents were as a result of a tanker explosions.

Proposed solution

- Use a gas leakage sensor (MQ6 – propane, butane, LPG) to detect a gas leakage and upload the data to a cloud resource for analytics and real-time warning. The system should trigger an alert to the system owner.

- Further, the system triggers the control unit to turn off the gas unit (large scale) or send an SMS alert to the home-owner (residential use).

Roadmap

Your device or gateway

We start with your device, be it a sensor, a gateway or something else.
To find out how to get it connected, search our recipes.

MQTT

Your device data is sent securely up to the cloud using
the open, lightweight MQTT messaging protocol.

api

REST & Real-time APIs

Use our secure APIs to connect your apps
with the data coming from your devices.

IBM Watson IoT Platform

This is the hub of all things IBM IoT. This is where you can
setup and manage your connected devices so that your
apps can access their live and historical data.

Your application and analytics

Create applications within IBM Cloud, another cloud,
or your own servers to interpret the data you now have access to!

Gas Leakage Monitoring System

Weather detection unit (DHT sensor or Weather api.)

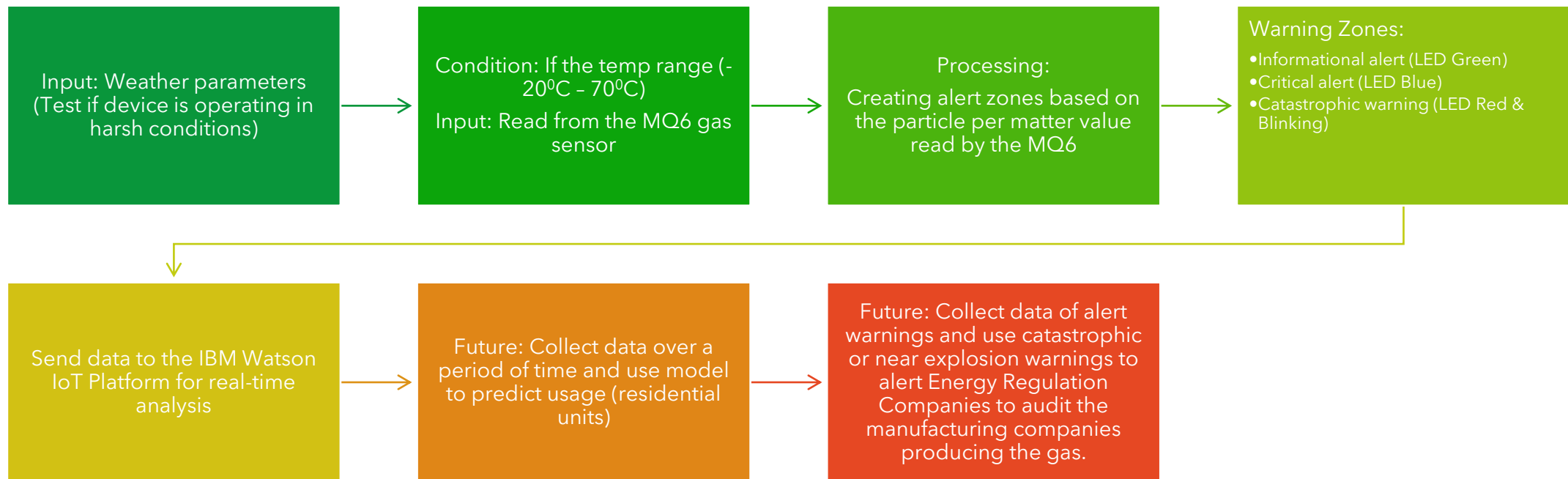MQ6 Gas leakage sensor (using particle per matter ratings)

ESP32 Microcontroller Unit

(processing & alert unit)

Use a GPS Location detector to alert the fire station unit in case of a catastrophy (E.g.) An explosion
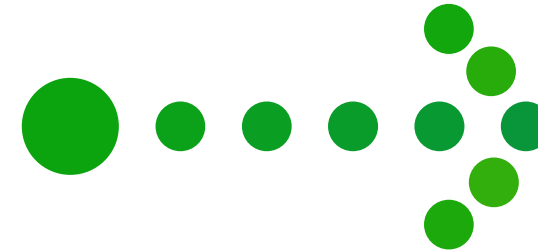
System Operating Principle

Input: Weather parameters (Test if device is operating in harsh conditions)

Condition: If the temp range (-20^{0}C – 70^{0}C)
Input: Read from the MQ6 gas sensor

Processing:
Creating alert zones based on the particle per matter value read by the MQ6

Warning Zones:
•Informational alert (LED Green)
•Critical alert (LED Blue)
•Catastrophic warning (LED Red & Blinking)

Send data to the IBM Watson IoT Platform for real-time analysis

Future: Collect data over a period of time and use model to predict usage (residential units)

Future: Collect data of alert warnings and use catastrophic or near explosion warnings to alert Energy Regulation Companies to audit the manufacturing companies producing the gas.

Resources

- IBM Watson IoT Platform

- ESP32 Microcontroller

- Weather Api or DHT sensor (remote rural applications)

- GPS coordinate system

- Gas leakage sensors & calibrators

- IBM Cloud Dashboard (Nodejs)