



# Power Termination, Diversion, and Notification Using "COSMIC" Team Cosmic

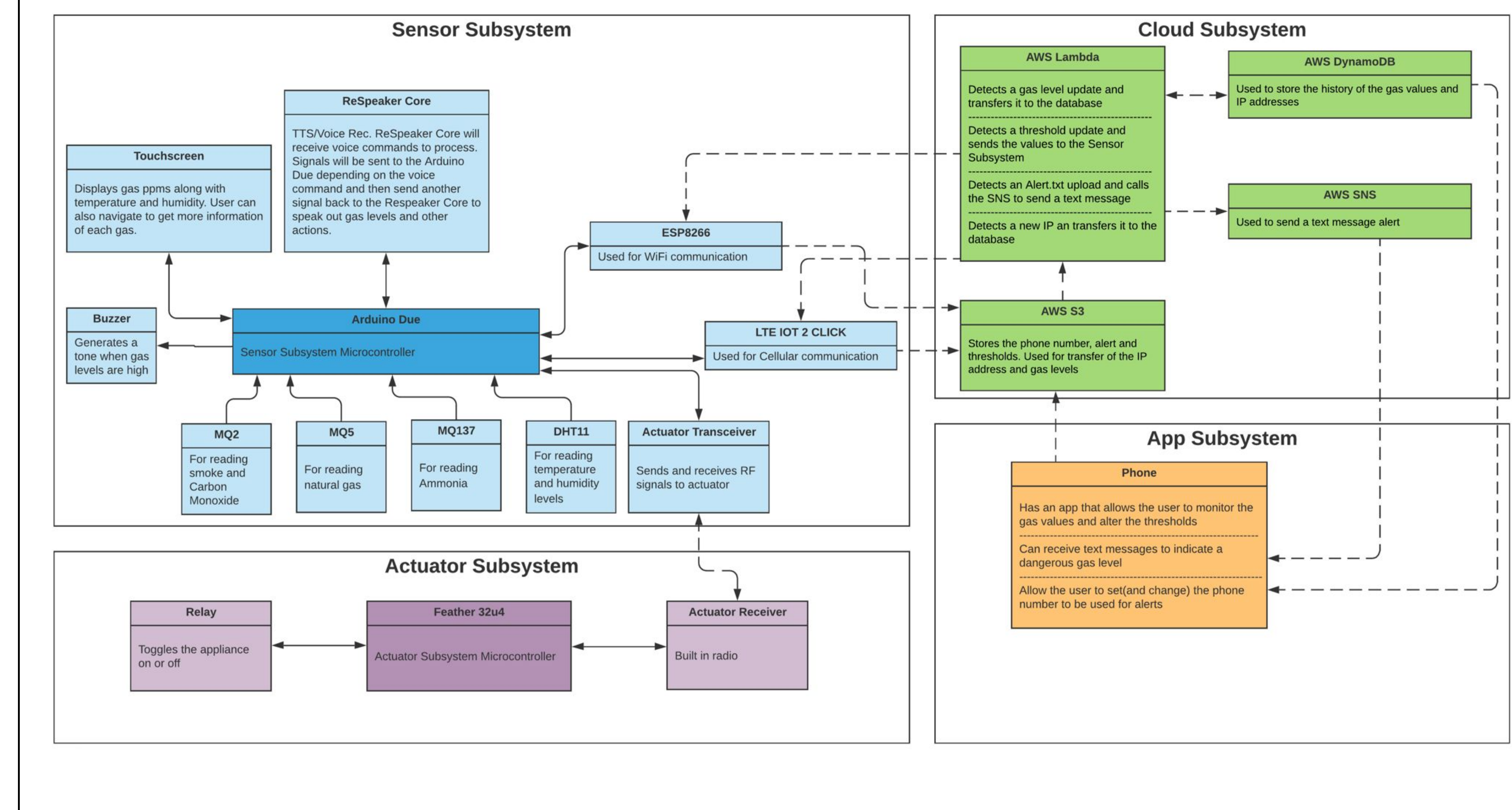


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## BACKGROUND AND OBJECTIVE

- COSMIC stands for **C**arbon **M**onoxide – **S**moke – **I**nterrupting – **C**ircuit.
- The goal of this project is to create a system that can take care of high levels of toxic gas before it becomes life threatening to the user.
- Every year, 3,275 people die from smoke inhalation and another 500 die from carbon monoxide poisoning.
- Project works with IoT systems to send gas concentrations levels and alerts to homeowners of hazardous gasses in their homes.
- Homeowners can monitor their gas levels on the touchscreen of the sensor subsystem or on their mobile devices.
- The COSMIC gas detector will be able to detect toxic gases at low concentrations and be able to turn on ventilation systems before the concentrations become life-threatening

## SYSTEM DIAGRAM



## IMPLEMENTATION

- Cloud Subsystem
  - AWS S3, DynamoDB, SNS, Lambda
- Sensor Subsystem
  - Arduino Due
  - ESP8266 for WiFi Connection
  - LTE IoT 2 Click for Cellular Connection
  - Touchscreen
  - Voice Recognition Module
  - MQ Sensors
  - RF Transceiver to control actuator
- Actuator Subsystem
  - Adafruit Feather 32u4 with RF 433 Mhz Transceiver
  - Two relays to control the appliance
- App Subsystem
  - Xamarin.Forms

## PROPOSED SOLUTION

- The system will automatically perform tasks to lessen the risk of harm when the gas levels are over the specified threshold; such as cut power to an appliance, open a vent, or turn a fan on.
- Notify homeowners by way of a buzzer and a text message.
- There may be situations where the house does not have any WiFi connection, and so the sensor subsystem has a cellular module to fall back on as a back-up
- Have voice recognition for homeowners to get gas concentration levels outputted using text-to-speech.

## RESULTS

### Thresholds Page of Mobile App

Edit Thresholds Page		
	Current	New
Carbon Monoxide Threshold:	50 ppm	50 ppm
Smoke Threshold:	50 ppm	50 ppm
Ammonia Threshold:	50 ppm	50 ppm
Natural Gas Threshold:	50 ppm	50 ppm

- EDIT CARBON MONOXIDE THRESHOLD
- EDIT SMOKE THRESHOLD
- EDIT AMMONIA THRESHOLD
- EDIT NATURAL GAS THRESHOLD
- SEND NEW THRESHOLDS
- GO BACK



- The sensor subsystem has 4 sensors for reading temperature, humidity, smoke, Carbon Monoxide, Natural Gas, and Ammonia.
- Upon detection of toxic gasses, the sensor subsystem successfully sends a text message to the user's phone, and toggles the appliance connected to the relay.
- The app allows users to view current and previous sensor data, and adjust the thresholds at which the user is notified and actuators toggled.

## SUMMARY

- Overall the Cosmic System was a success.
- The Cosmic System successfully reads gas levels, activates actuators, alerts the user, and stores the data in the cloud.
- As a team, we learned hard skills such as PCB design, app design, and wireless connectivity.
- We went through the entire engineering design process, from requirements to component design and integration, into a fully working system.
- In the future, higher quality components can be used.

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