How to get a safer and cozier kitchen by using AIoT

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What is it about?	What exactly is it?	What does it do?	How does It do	Summary and outlook

01 Introduction

Members

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Fig. 1, Fig. 2 Cooking in Chinese restaurants

Smart Kitchen Comfort Monitor

- *Real - time monitoring*:
  monitor environment around from sensors
- *Intelligent classification*:
  invoke machine learning model to classify the state of environment
- *Automatic Control*:
  automatically control the actuator by judging the state

02 Structure

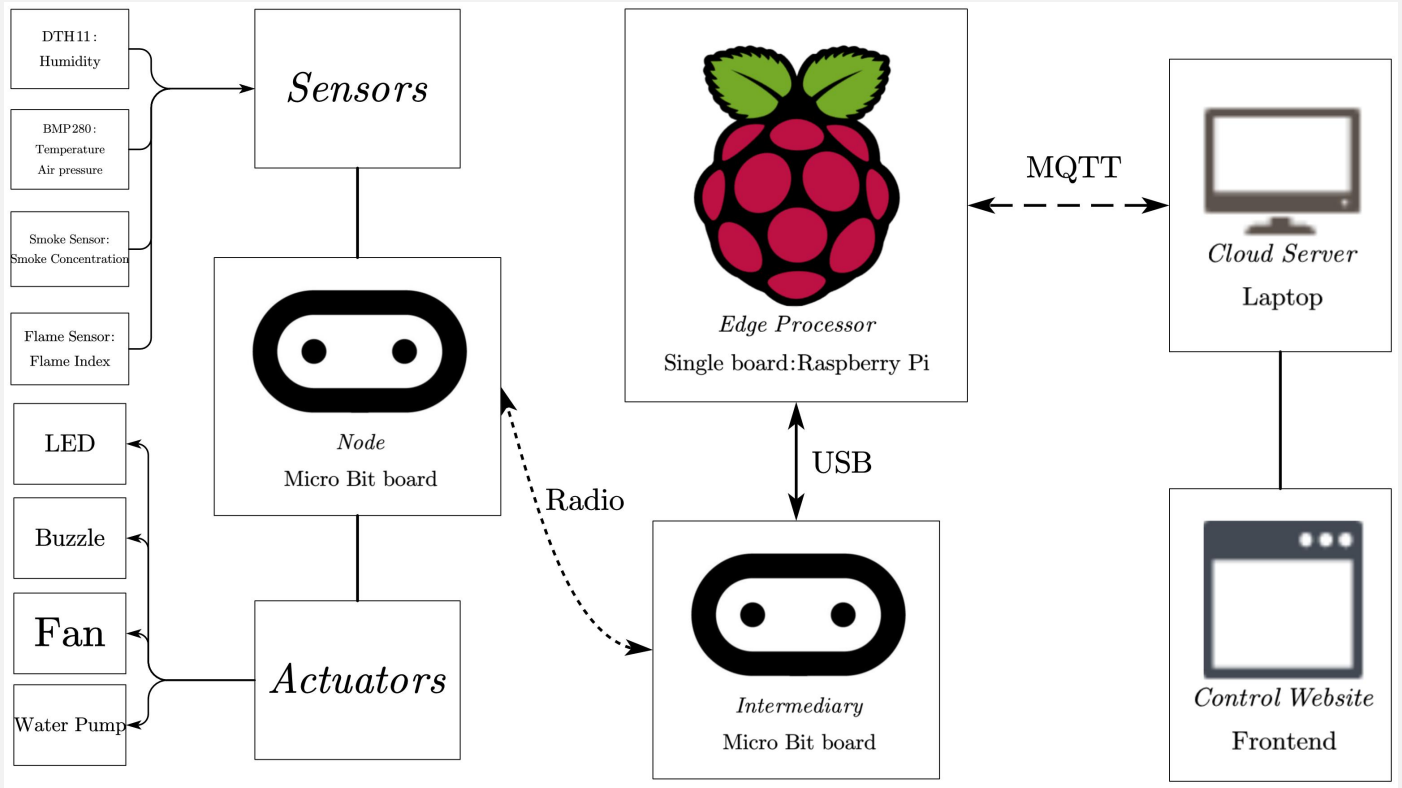


Fig. 3 Structure of devices

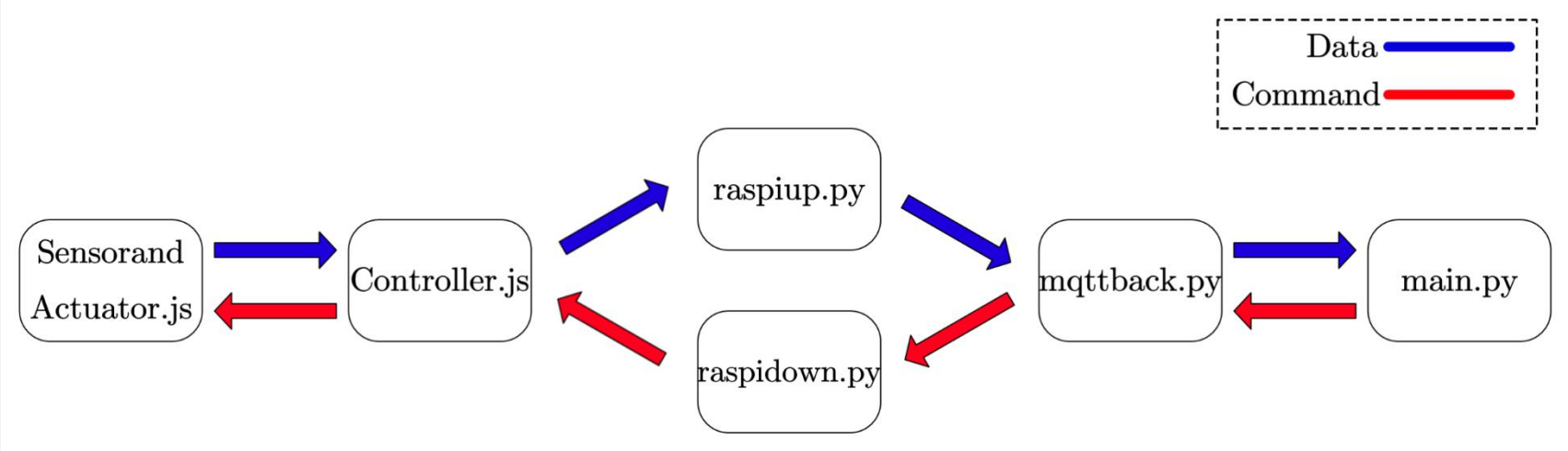


Fig. 4 Message flow controlled by scripts

03 Function

Smart Kitchen Comfort Monitor

Smart Kitchen

Environmental Parameters

Parameter	Data
Temperature	29.11
Pressure	99720.0
Humidity	56.0
Smoke	283.0
Flame	795.0
Assessment	Uncomfortable!

Control Options

Manual Mode

LED: ON | OFF Buzzer: ON | OFF Fan: ON | OFF Water Pump: ON | OFF

GET Real Time Information

Detect Mode

START | END

Manual Mode

Detect Mode

We define it into three categories:

Comfortable	Not operate all the actuators.
UnComfortable	Do something to improve the kitchen environment.
Dangerous	Take prompt actions to prevent fire, suffocation and other safety accidents.

Assessment	LED	Buzzer	Fan	Water Pump
Comfortable	OFF	OFF	OFF	OFF
Uncomfortable	ON	OFF	ON	OFF
Dangerous	ON	ON	ON	ON

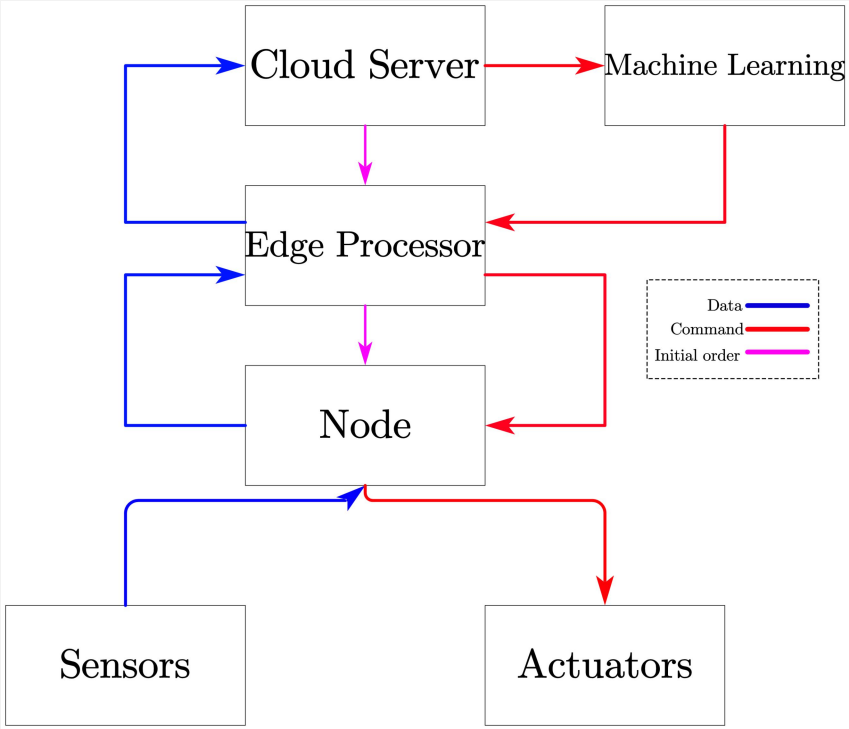


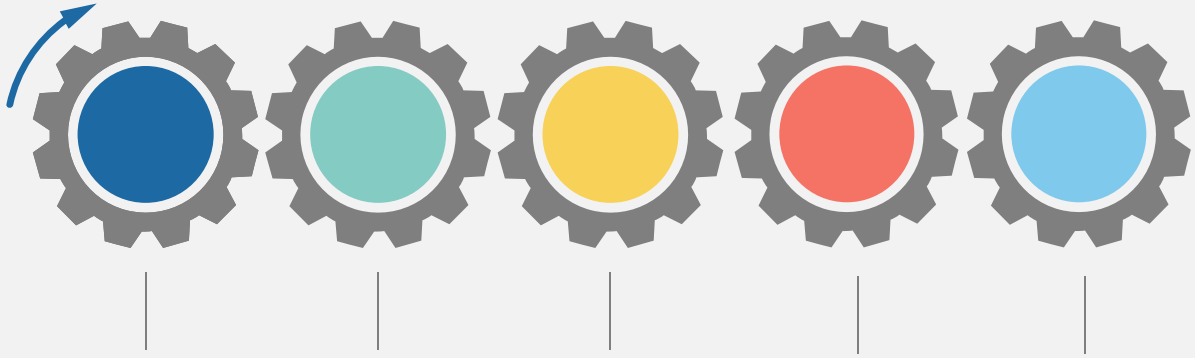
Fig. 5 Flow chart of the Detect process

04 Experiment

The Composition of Our Data Set:

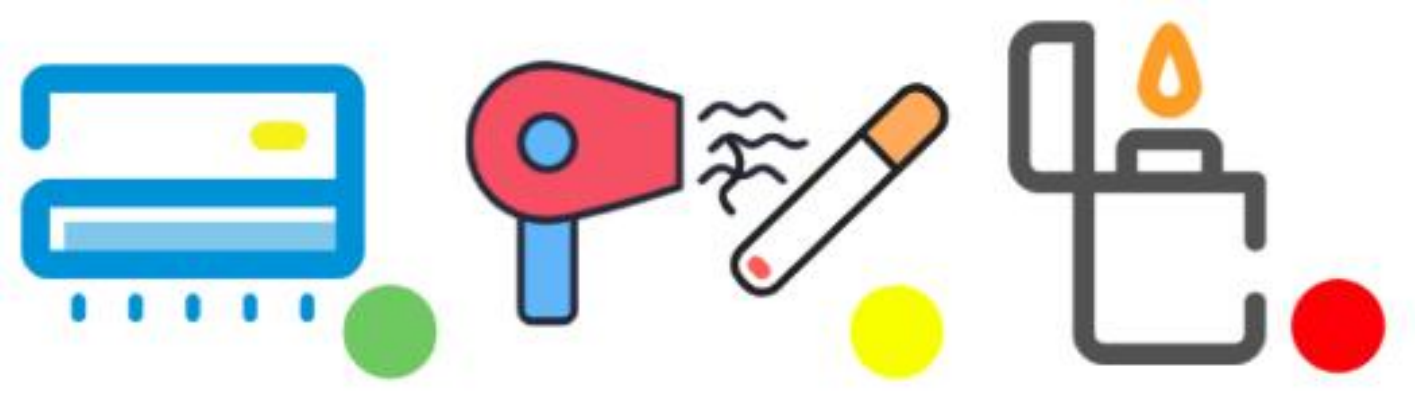
Sample original data(String)
“11.T:29.18;P:100887;H:66;S:717;F:943”

split()



Temperature Humidity Air Pressure Flame Index Smoke Concentration

How we collect data for our training:



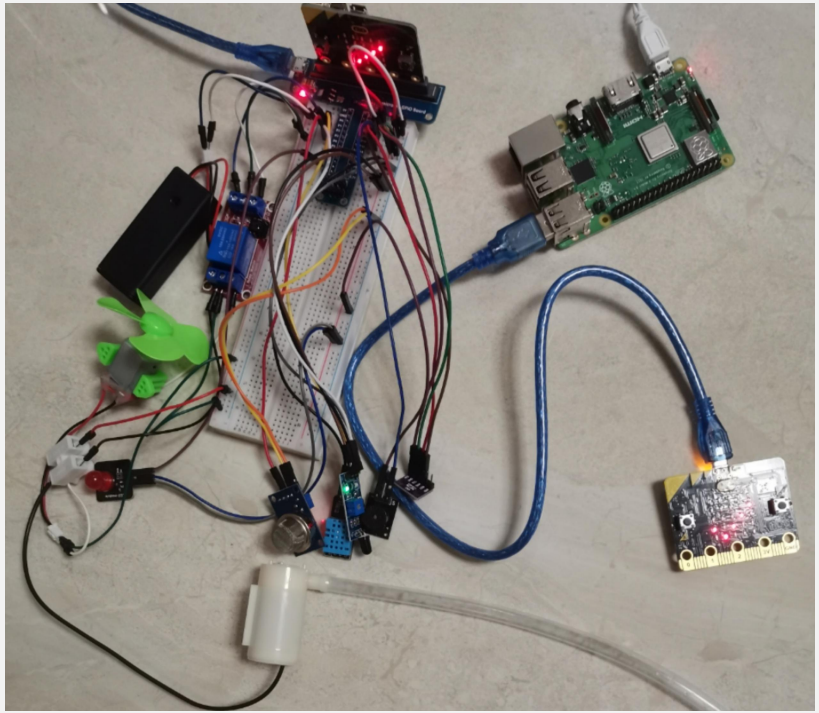


Fig. 6 The equipment and electrical conditions involved

Machine Learning Model

Step 1: KMeans Cluster: split data into 3 categories;
Step 2: Adding label, label each cluster from daily experiences;
Step 3: We use Random Forest to classify labeled data;
Step 4: Model Assessment:
1.Silhouette score of Cluster: 0.564;
2.Accuracy of Classification: 98.61% on train set; 97.22% on test set.

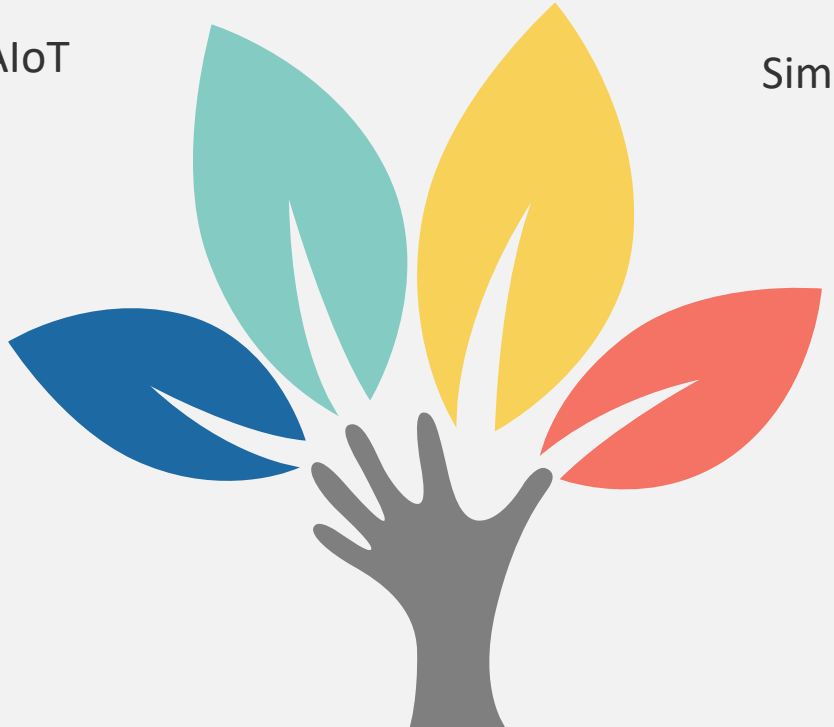
Conclusion

AIoT

Simple

Commercial Value

Not reliable



Technology makes the world a better place.

-Shoshana Zuboff

Thank you

Reference

[1] Liu Xuhua. Study on risk analysis and preventive measures of kitchen fire in catering industry [D]. South China University of Technology, 2013.

[2] Juliqin. Study on evaluation of Students' achievement based on random forest algorithm [D] . Anhui University of Technology, 2017.

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