



Cat Feeder With Speech Command -AIoT Course-

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To build system circuit.

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Train our model with collected data and deploy on device.

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Demo for the whole project.



Introduction

Necessary device in The 4.0 Industrial Revolution:




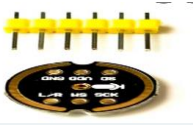
- Time saving
- Efficiency
- Convenience







Components Datails



Hardware Components

Arduino Uno R3	
Node-MCU ESP32S	
Servo RC MG996G	
Microphone INMP441	

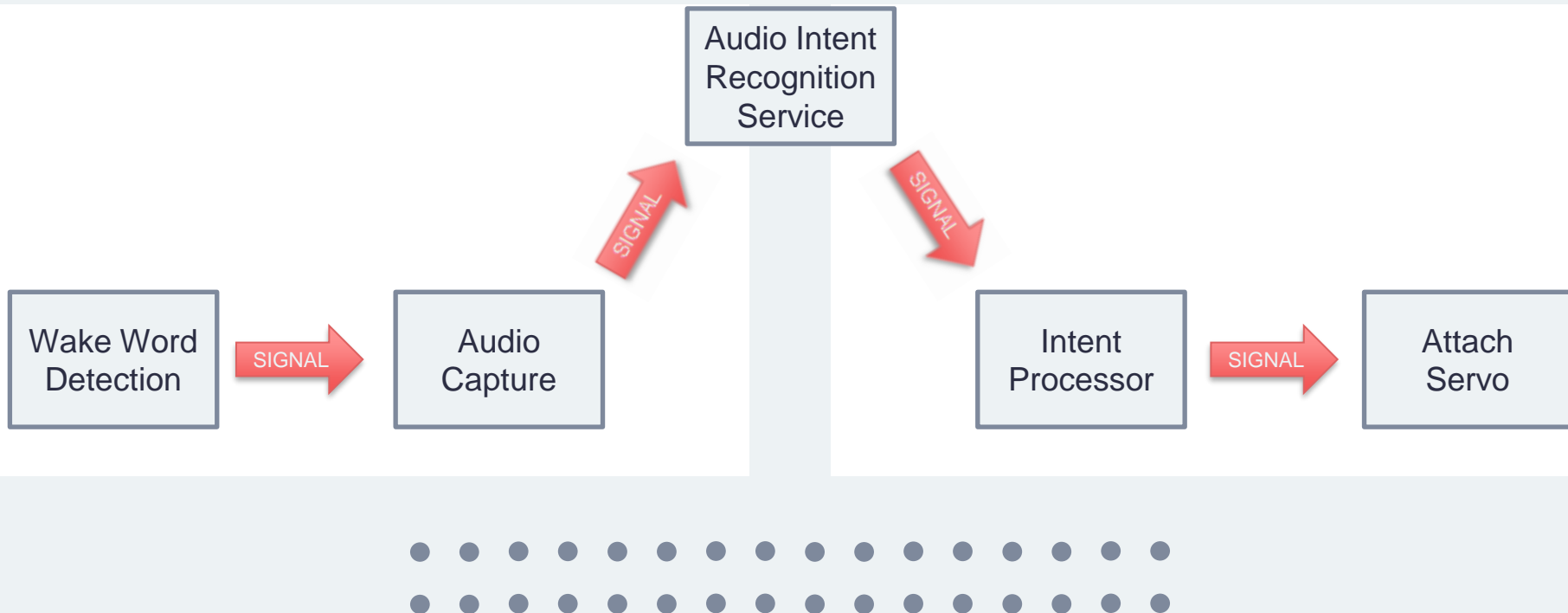
Software Components and Platform

Visual Studio Code	
Arduino IDE	
Jupyter Notebook	
Tensorflow Lite	



How Does It Work?

xx



How Does It Work?

-System Operation-

xx

Wake Word Detection



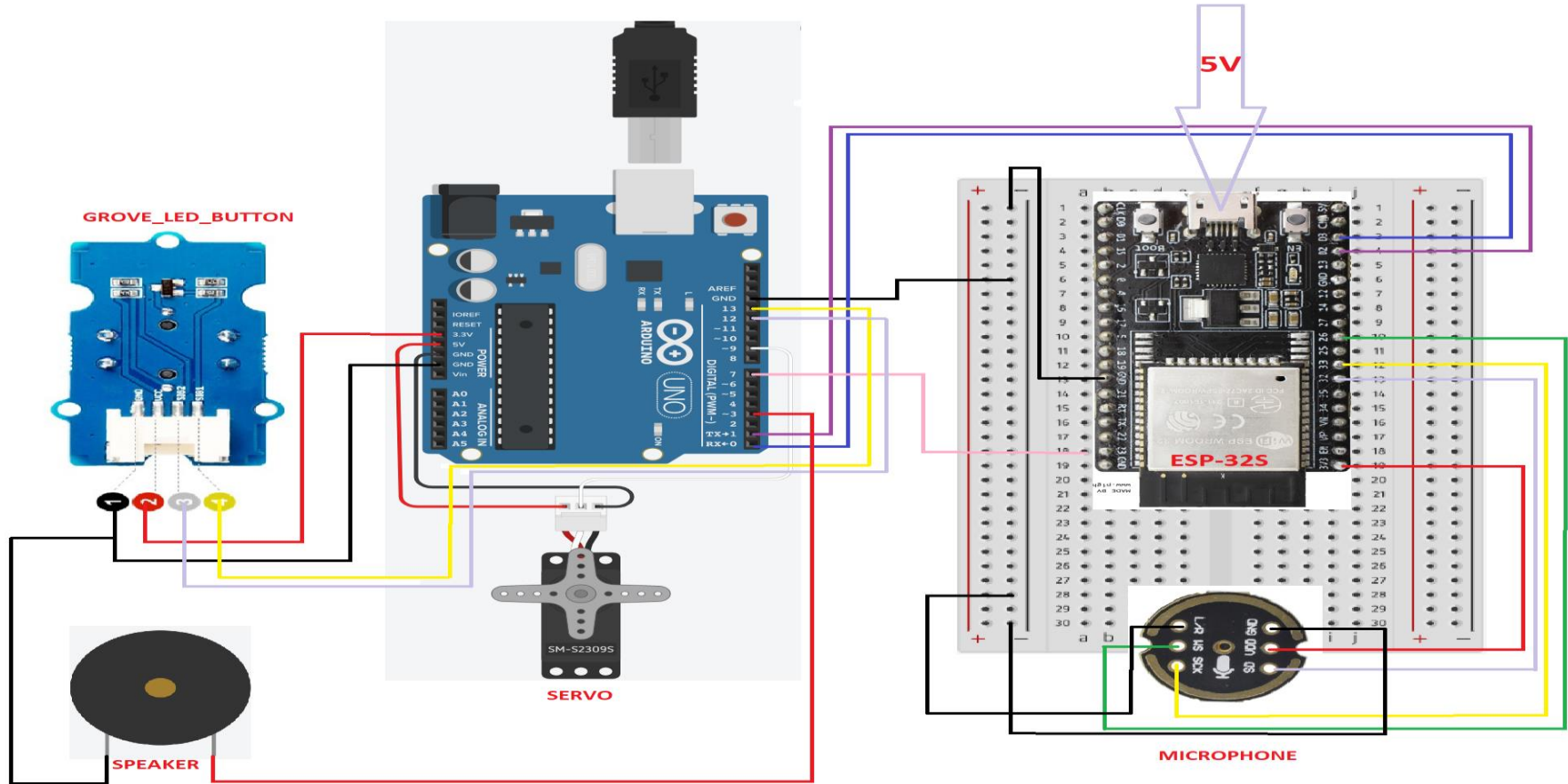
Intent Processor



Intent Excutor



Circuit and Wiring



Learning Model

-Data Prepagation-

Speech Commands Dataset

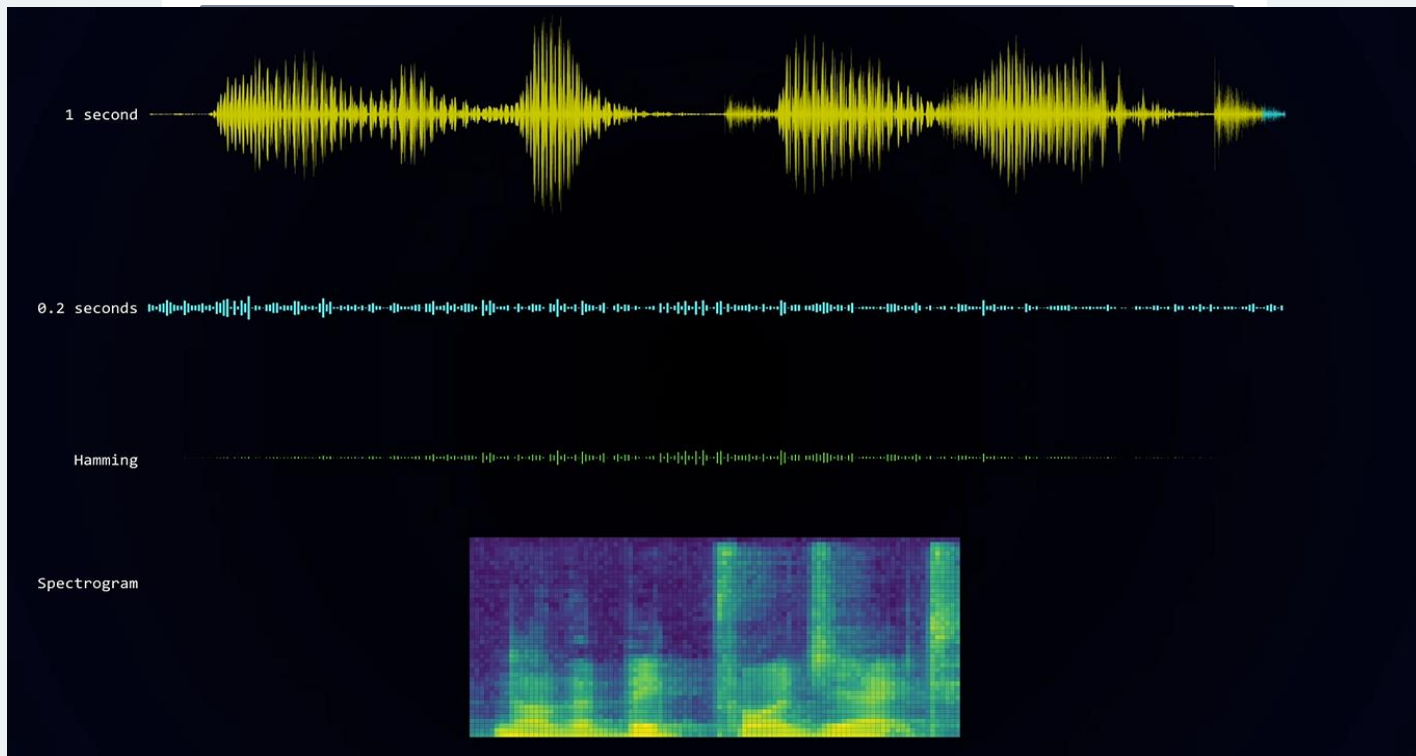
zero	4053
one	3891
two	3881
three	3728
four	3729
five	4053
six	3861
seven	3999
eight	3788
nine	3935

bed	2015
bird	2065
cat	2032
dog	2129
happy	2055
house	2114
marvin	2101
sheila	2023
visual	1593
wow	2124
learn	1576

up	3724
down	3918
left	3802
right	3779
forward	1558
backward	1665
stop	3873
go	3881
off	3746
on	3846
no	3942
yes	4045
tree	1760
follow	1580

Total Samples - 105890

Learning Model -Feature Extraction-



Learning Model

-Architecture & Hyper parameters-

Model: "sequential"

Layer (type)	Output Shape	Param #
conv_layer1 (Conv2D)	(None, 99, 43, 4)	40
max_pooling1 (MaxPooling2D)	(None, 49, 21, 4)	0
conv_layer2 (Conv2D)	(None, 49, 21, 4)	148
max_pooling2 (MaxPooling2D)	(None, 24, 10, 4)	0
flatten (Flatten)	(None, 960)	0
dropout (Dropout)	(None, 960)	0
hidden_layer1 (Dense)	(None, 40)	38440
output (Dense)	(None, 1)	41

Total params: 38,669

Trainable params: 38,669

Non-trainable params: 0

Learning Model

-Learning Hyper-Parameters-

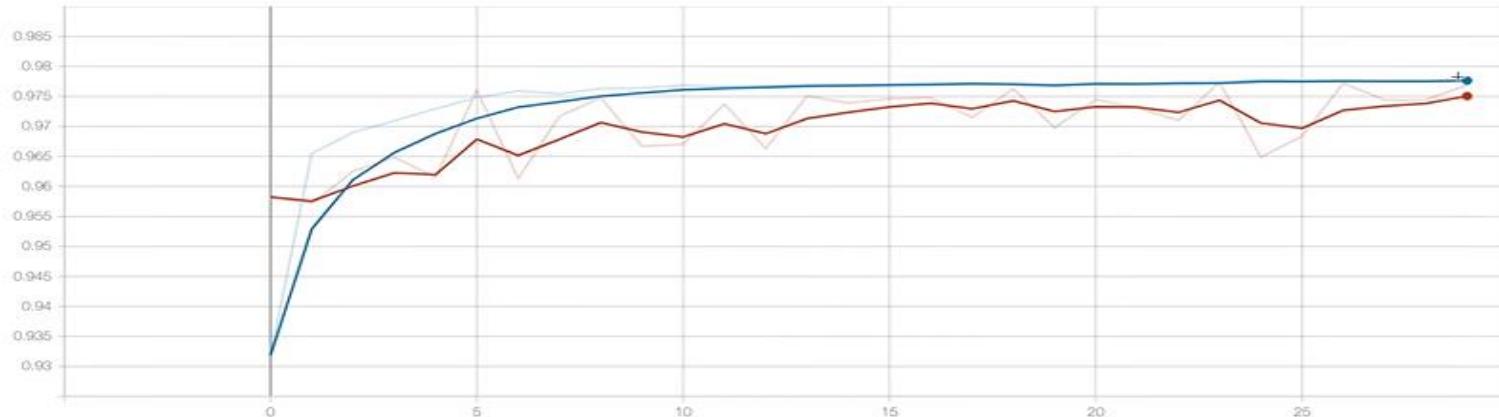
- Batch size: 30.
- Learning algorithm: Adam.
- Loss function: Binary cross entropy.

Learning Model - Validation -

Filter tags (regular expressions supported)

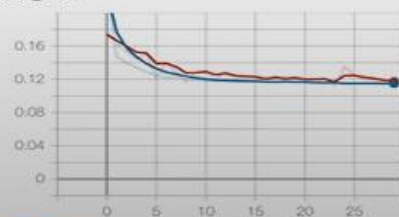
epoch_accuracy

epoch_accuracy



Name	Smoothed	Value	Step	Time	Relative
fit/20201001-223810/train	0.9776	0.9778	29	Thu Oct 1, 23:44:25	1h 3m 57s
fit/20201001-223810/validation	0.975	0.9769	29	Thu Oct 1, 23:44:25	1h 3m 57s

epoch_loss



Confusion Matrix

```
<tf.Tensor: shape=(2, 2), dtype=int32, numpy=
array([[13616,  427],
       [ 743, 11927]], dtype=int32)>
```

Wit.ai –Service-

Add a new utterance

Add a sample utterance and specify an intent. You can also highlight words or phrases in the utterance to annotate.

Utterance ⓘ

“ Turn on servo ”

267

Intent ⓘ

● Turn_off_and_on

☐

Out of Scope ⓘ

Entity

Role

Resolved value

Confidence

device

device

servo

80%

×

Trait

Value

Confidence

wit/on_off

on

98%

×

+ Add Trait

Wit.ai - Request and Response-

wit.ai

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```
const {Wit} = require('node-wit');

const client = new Wit({accessToken: 'TOKEN'});

client.message('Turn on the lights').then(({entities, intents, traits}) => {

  console.log(intents);

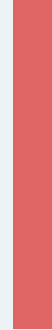
  console.log(entities);

  console.log(traits);

});
```

```
{
  "text": "Turn on the lights"
  "intents": [
    {
      "id": "508388063374132"
      "name": "lights"
      "confidence": 0.9951
    }
  ]
  "entities": {
  }
  "traits": {
    "wit$on_off": [
      {
        "id": "535a80f0-6922-4680-b678-0576f248cdcc"
        "value": "on"
        "confidence": 0.9852
      }
    ]
  }
}
```

Demo



Resources

References

- atomic14, “Github” - DIY Alexa <https://github.com/atomic14/diy-alexa>.
- A.Ulitin, “huckster.io” – DIY Arduino Cat Feeder <https://www.hackster.io/momwillbeproud/diy-arduino-cat-feeder-1c4c7f>.

Thanks

Do you have any questions?
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