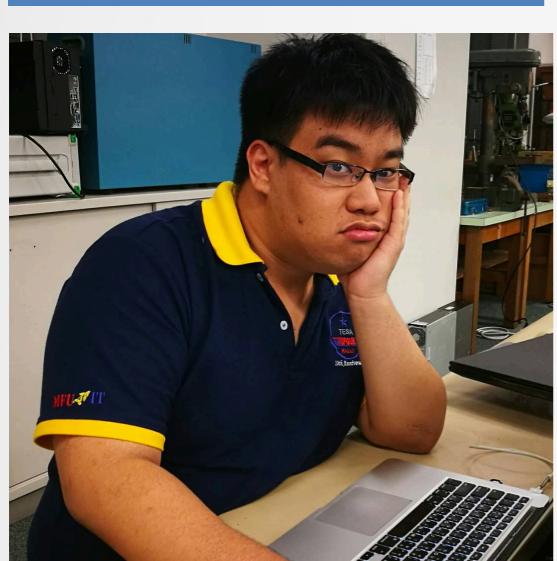


Reading Assistant For The Blind

Final Presentation

Our Team

Good afternoon...



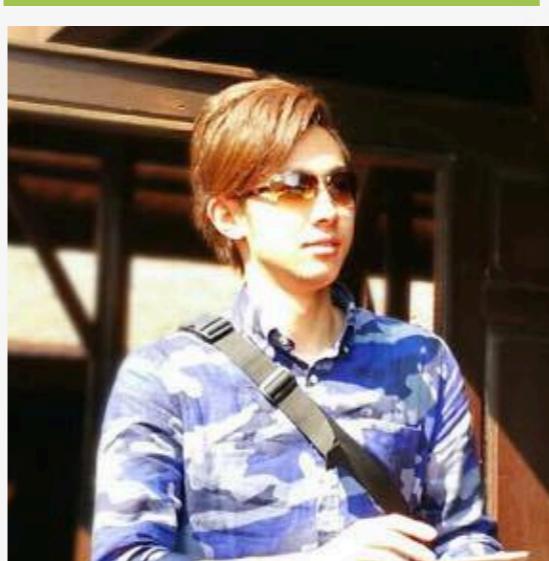
Tonmai

Chanon
Khongprasongsiri



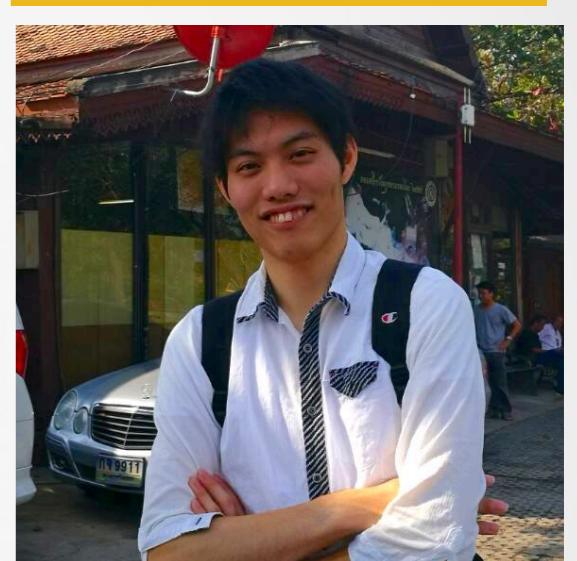
Now

Saranporn Rotrat



Yuya

Yuya Takase

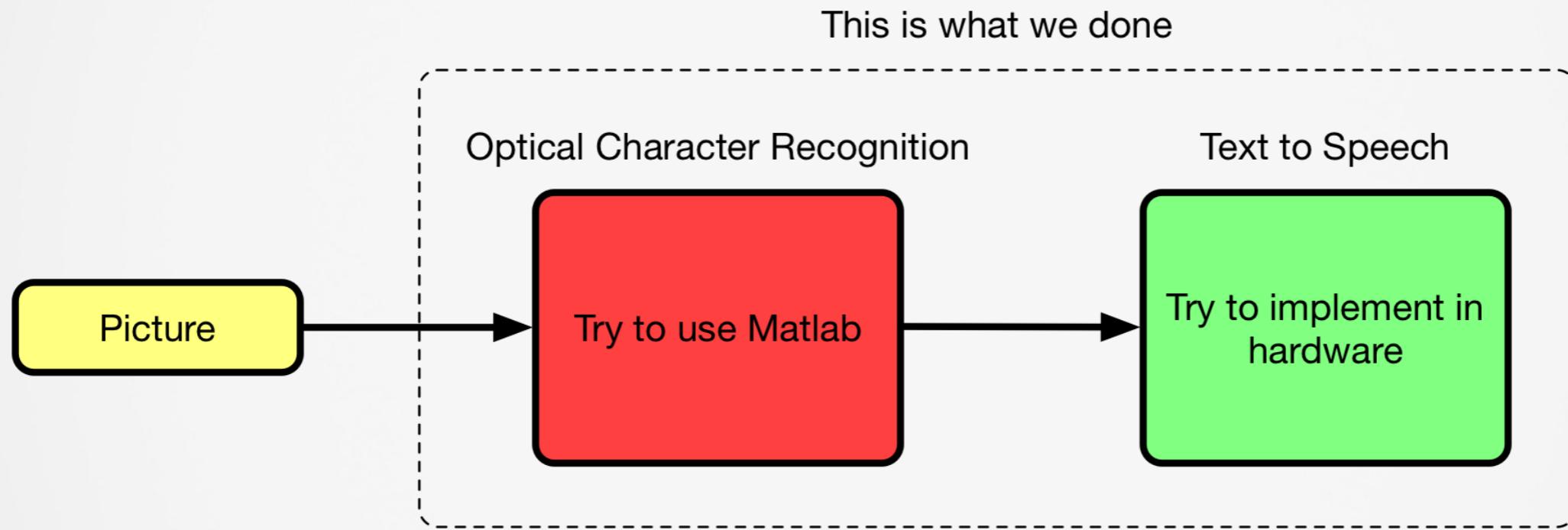


Makoto

Makoto Okabe

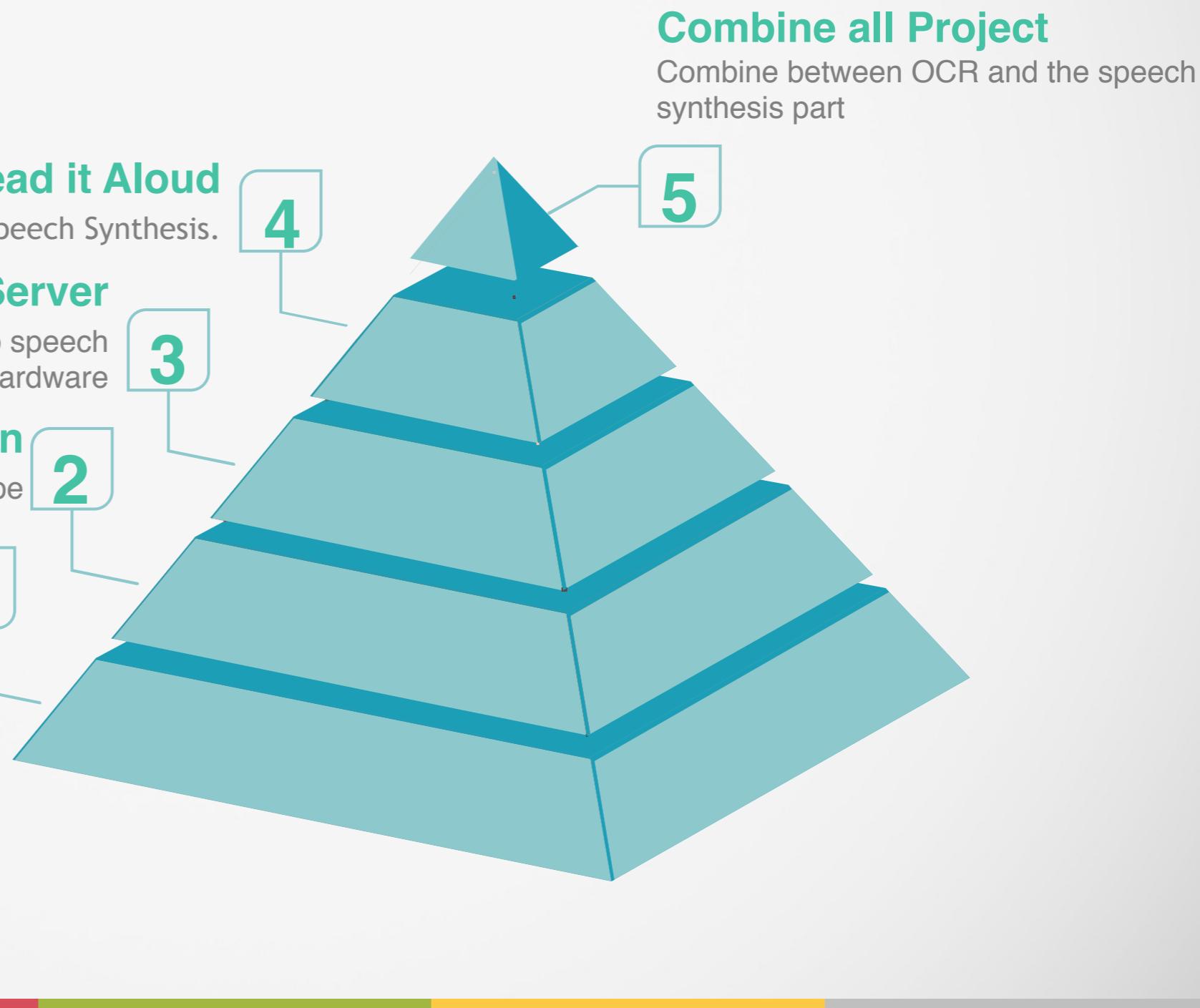
Objective

We are strongly believe that we can improve how people with visual impairment can read. This project concerns about how we can extract the text from the paper and read it out loud. This innovation will help blind people read faster than this day.



- Optical Character Recognition : Just Picture to Text
- Text to Speech : Try to Read out loud

Working Plan

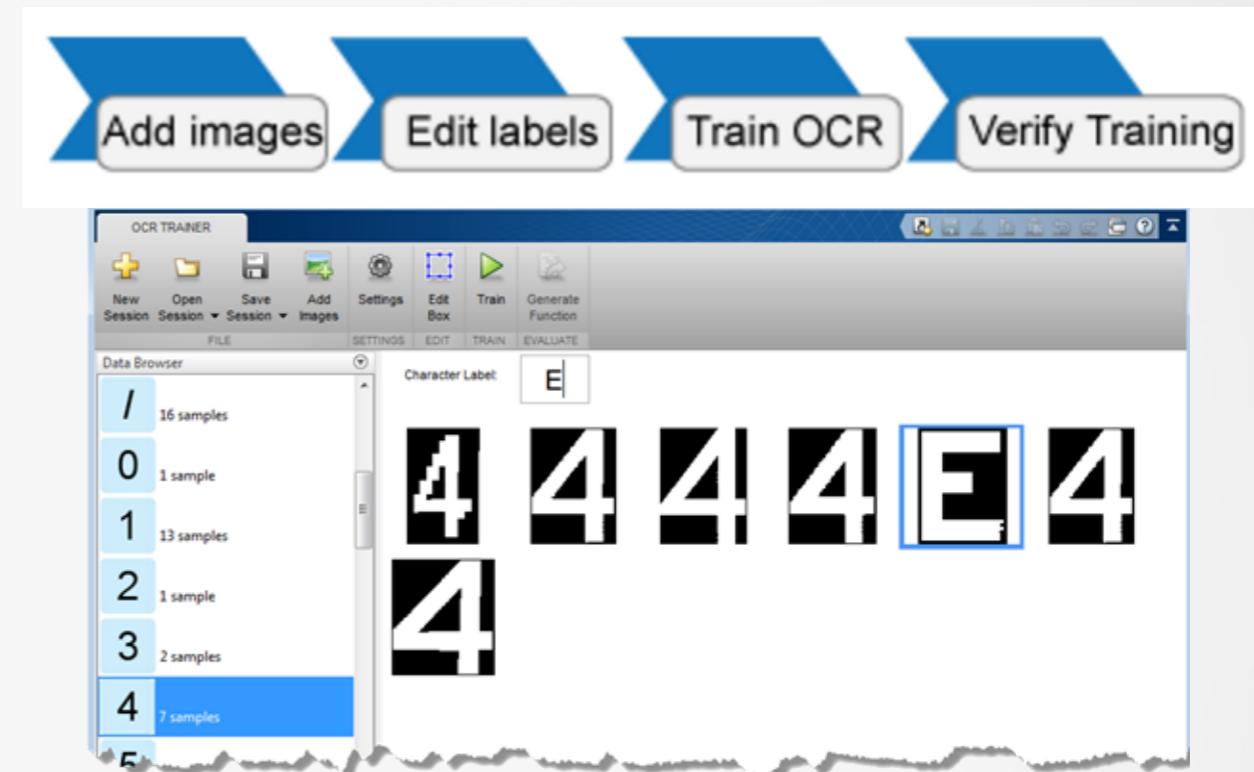


What we have done in Thailand...



Computer Vision

Tesseract is an open-source OCR engine that was developed at HP

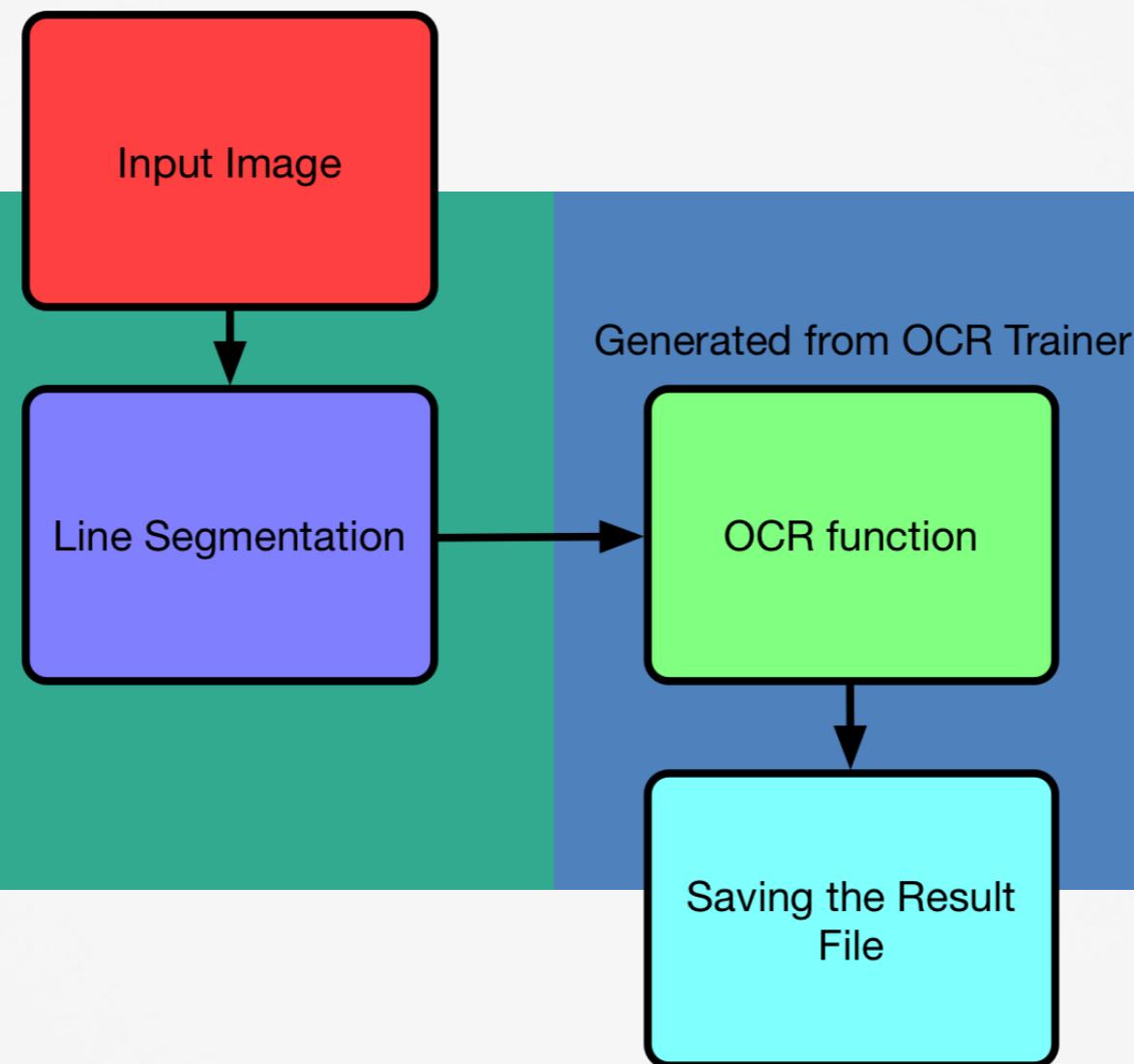


OCR in MATLAB

We were using the OCR trainer provided by MATLAB to recognize the word.

OCR Main Architecture

Line Segmentation
We checked for the column that the result of summation was equal to zero.



We labeled the character for training the program in the OCR Trainer provided by MATLAB.

OCR Trainer

PROBLEM OCCURED FOR OCR PART

1. The problem with detecting the character.

Solution : Developing the OCR function by training it further.

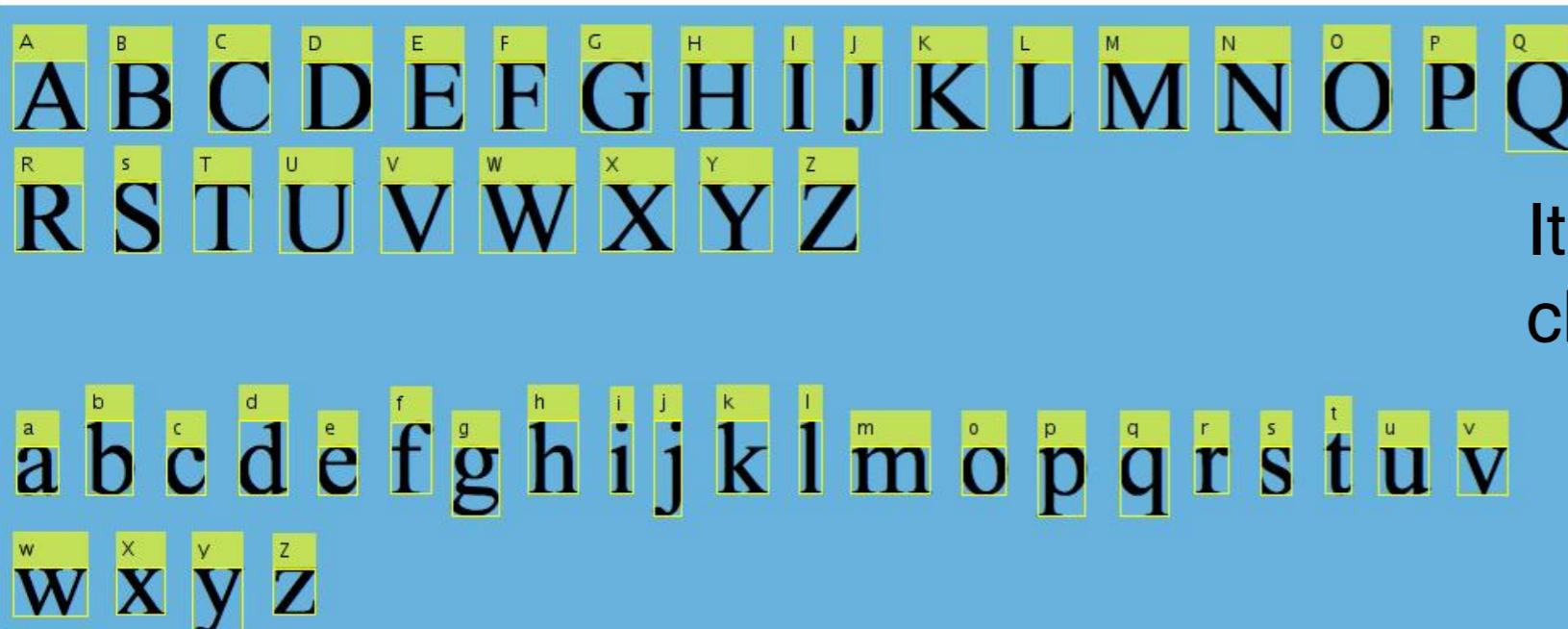
2. The problem with detecting line

Solution : Separating the line before jumping to OCR function.

3. The problem with detecting space

Solution : Looking into the OCR function to increase or decrease the sensitivity of detecting space.

Result OCR: Sentences & Paragraph



It could recognize the word and character almost perfectly.

We discover physics by learning how to measure the quantities involved in physics. Among these quantities are length, time, mass, temperature, pressure, and electric current.

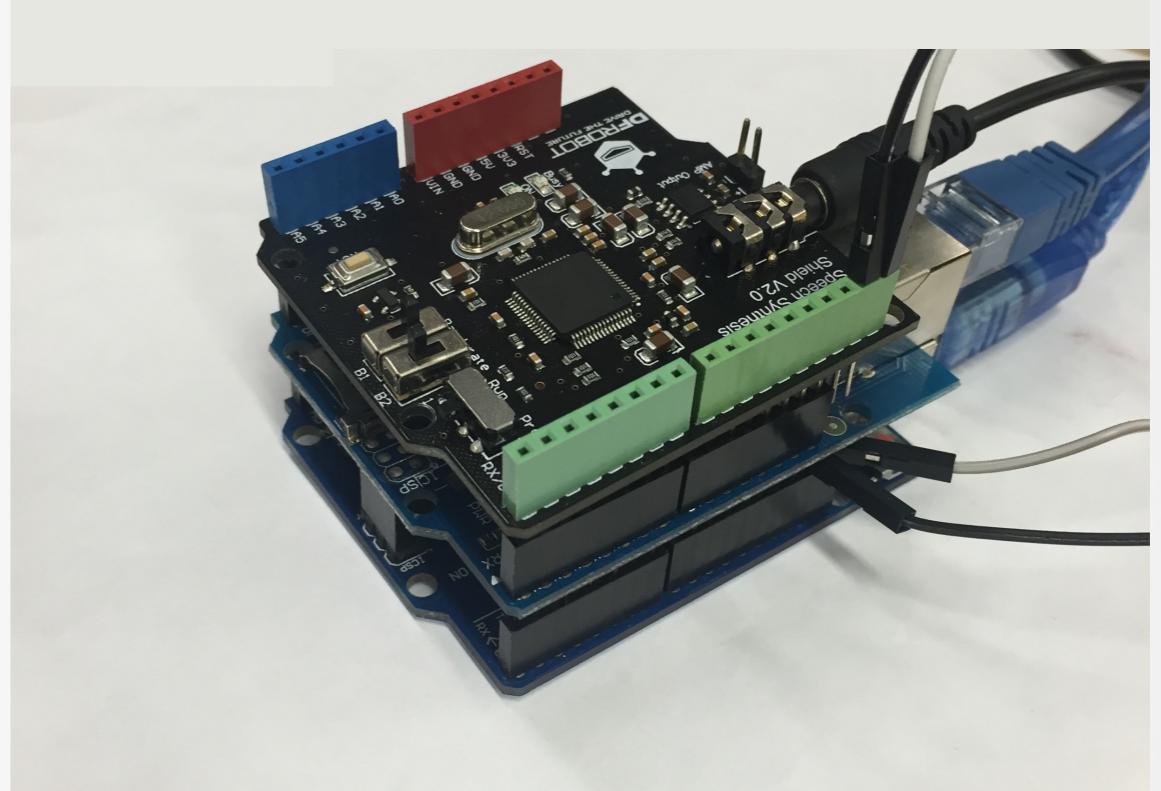
We discover physics by learning how to measure the quantities involved in physics. Among these quantities are length, time, mass, temperature, pressure, and electric current.

What we have done in Japan...



Flask Web Development

Flask is a micro-framework for Python based on Werkzeug, Jinja 2 and good intentions.



Arduino with Speech Synthesis

We try to use the Speech synthesis to speak out loud.

Why do we use Flask?



Flask is like what a lego box
on the left which you can
build everything under the
sun!

The Ultimate Flask Boilerplate

```
from flask import Flask
app = Flask(__name__)

@app.route("/")
def hello():
    return "Hello World!"

if __name__ == "__main__":
    app.run()
```



```
from flask import Flask, render_template
from flask_script import Manager
app = Flask(__name__, template_folder='templates')

app.debug = True
app.secret_key = 'development key'
app.config['TEMPLATES_AUTO_RELOAD'] = True

manager = Manager(app)

@app.route('/')
def index():
    return render_template('index.txt')

if __name__ == '__main__':
    manager.run()
```

It returns the `index.txt` to the local IP.

Ethernet Shield



- The Arduino Ethernet Shield 2 allows an Arduino board to connect to the internet.
- The Wiznet W5500 provides a network (IP) stack capable of both TCP and UDP. It supports up to eight simultaneous socket connections.

Connect to
specified address



Access File

Arduino

Read File

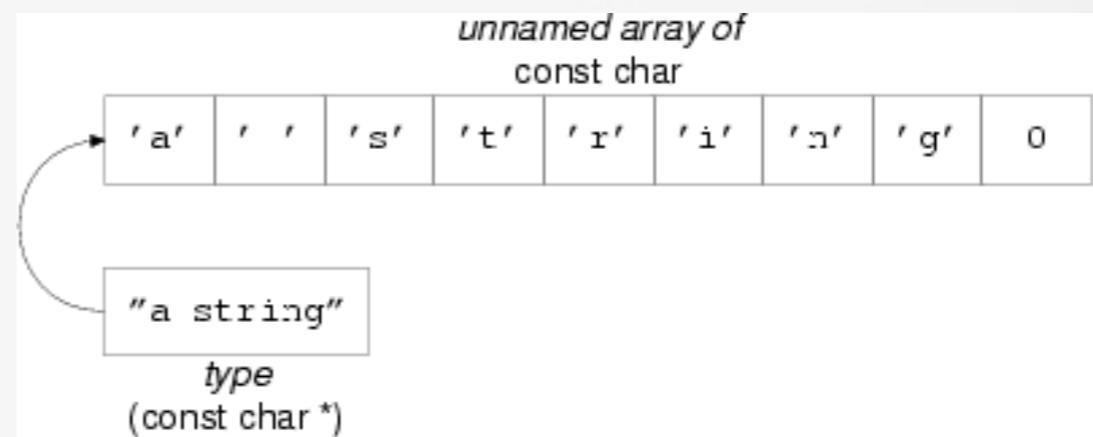


Display characters



Save text to an array variable

I am a girl ♀♀
♀\$[h0][m8][g2][v5]



Speech Synthesizer

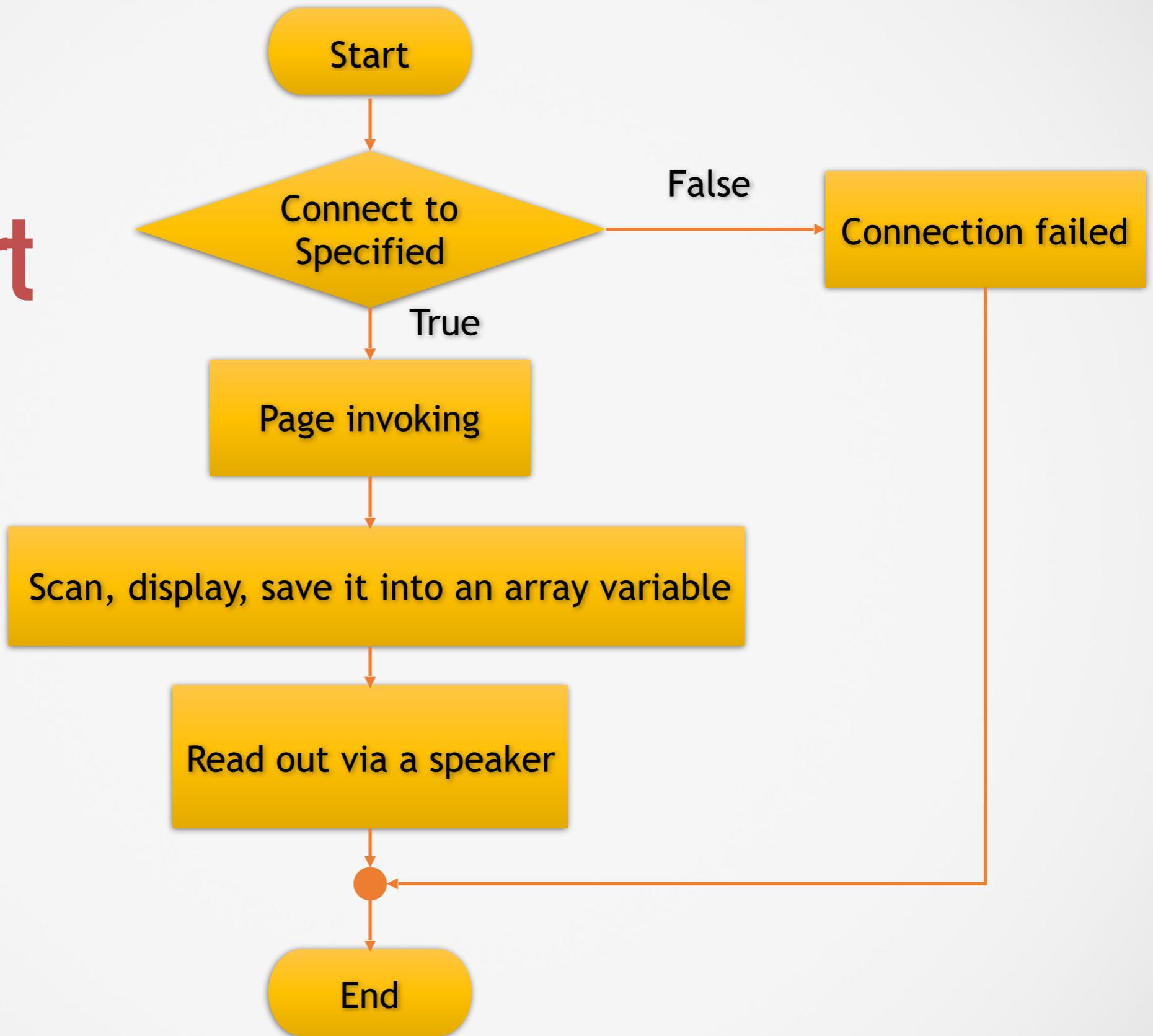
Read the array
variable



Speak out



Flowchart



Coding

```
//Ethernet Shield part  
  
byte mac[] = { 0xDE, 0xAD, 0xBE, 0xEF, 0xFE, 0xED };  
byte ip[] = { 192, 168, 11, 52 }; //assigned arduino LAN IP address  
byte server[] = { 192, 168, 11, 54 }; // laptop running apache LAN IP address  
EthernetClient client; //apache web server running on port 80  
  
void setup()  
{  
    Ethernet.begin(mac, ip);  
    Serial.begin(9600);  
    Serial.println("starting simple arduino client test");  
    Serial.println();  
    delay(1000);  
  
    Serial.println("connecting...");  
  
    if (client.connect(server,5000)) {  
        Serial.println("connected");  
        client.println("GET / HTTP/1.0"); //php page invoking my  
        client.println();  
    } else {  
        Serial.println("connection failed");  
    }  
}  
  
byte ssr[500];//define a character string  
  
void loop()  
{  
    if (!client.connected()) {  
        Serial.println();  
        Serial.println("disconnecting.");  
        Serial.println("=====");  
        Serial.println("");  
        client.stop();  
        in = 0;  
        Serial.println(in);  
    }  
  
    if (in == 1) {  
        if (client.available()) {  
            i = i+1;  
        }  
    }  
  
    // End of Ethernet Shield & Arduino part
```

Ethernet Shield part

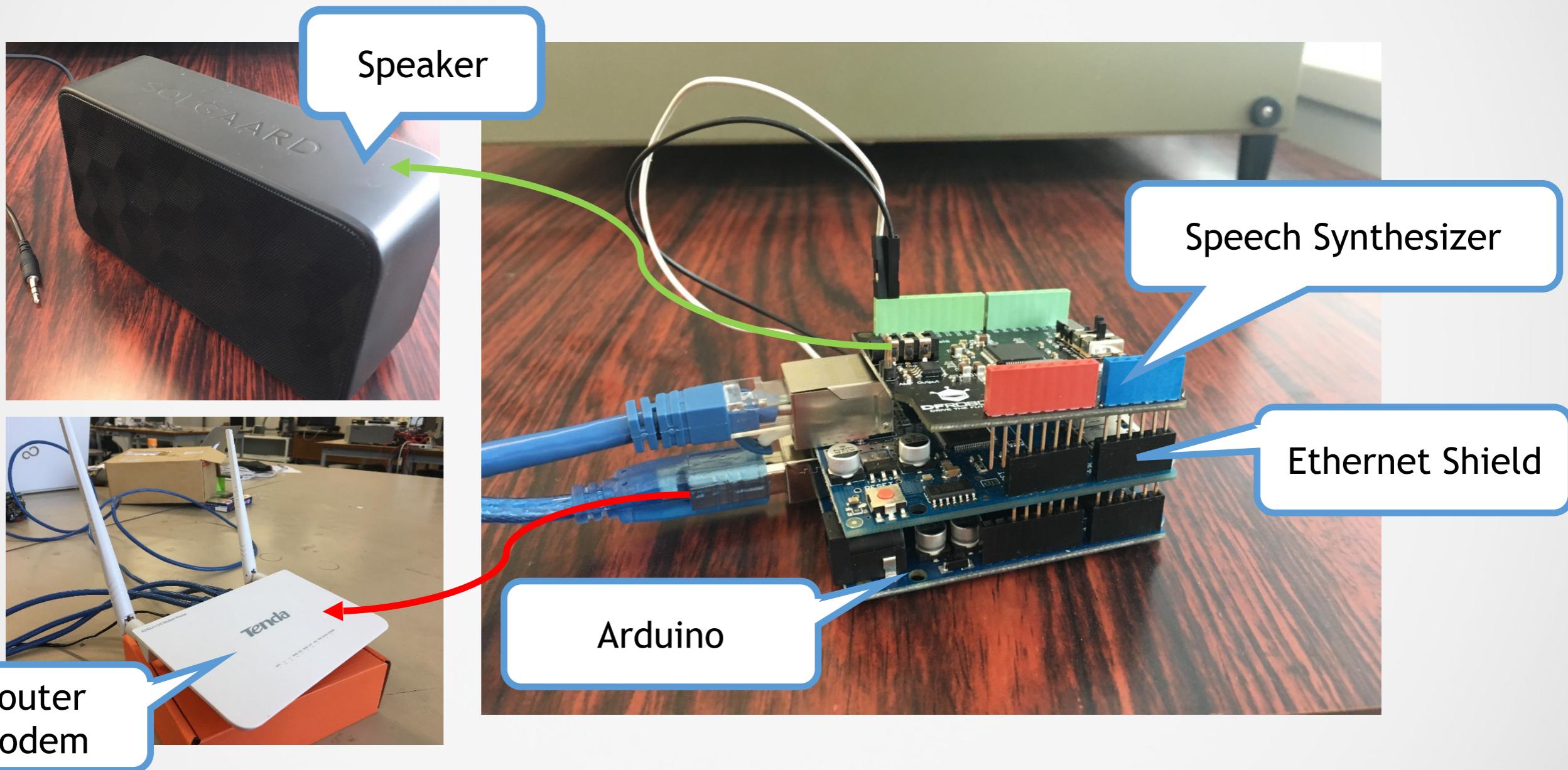
```
// End of Ethernet Shield & Arduino part  
  
for (int j=0; j <= i; j++){  
    c = client.read();  
    a[j] = c;  
    Serial.println(a[j]);  
}  
Serial.println(a);  
  
//End of Arduino part
```

Arduino part

Speech synthesis part

```
// Begin of Speech Synthesis  
  
if (in == 0) {  
    Serial.println(in);  
    Serial.println(a);  
    SpeechSynthesis.buf_init(ssr);  
    SpeechSynthesis.English(ssr,4,"5");  
    SpeechSynthesis.English(ssr,6,a);  
    SpeechSynthesis.Espeaking(0,19,4,ssr);  
    while(true);  
}  
}  
  
// End of Speech Synthesis
```

Combination: Hardware Implementation



PROBLEM OCCURED FOR TTS PART

1. Speech Synthesizer could not deal with a long string.

Solution : Find a new library and new hardware.

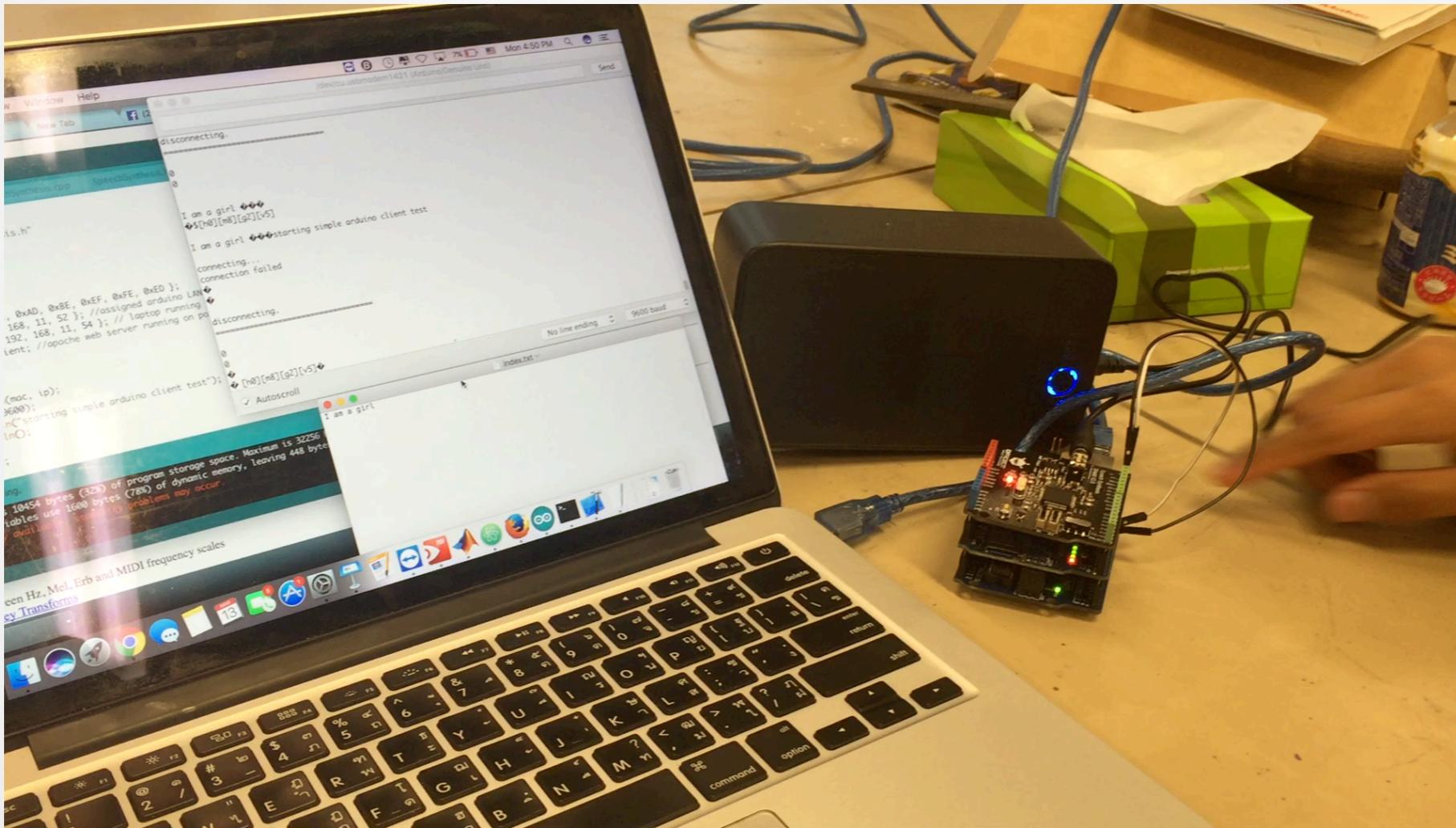
2. Arduino had less memory.

Solution : Use a new board such as Raspberry Pi.

3. Speech Synthesizer spoke like a robot.

Solution : Find a new library and a new hardware.

Combination: DEMO



Future Work

OCR Section

- Improve the accuracy of the character recognition
- Improve the variety of the input image

Speech Synthesis

- Use new hardware to solve the robot voice
- Try to use new software for the sound's frequency



Glasses which help blind people