IOT PROJECT : **DIGISCRIPT**

made by
Steve DEMEULEMEESTER
Guillaume JOBIN
Thomas CORNIER
Thomas ARPIN
Nicolas DZIURDA

Digiscript

EFREI - PROMO 2020
ISCE

Description of the product :

Digiscript is a text translator for visually impaired people in Braille it will allow blind people to have an easier access to computers. For example, our object will be able to analyse a picture and display informations such as if there are people in the picture, if there are any celebrity and it will display that in Braille. Our main targets are people with visual impairments. We can quickly become a leader in this market thanks to the a lack of competition.
We'll use some software and hardware during the realization of the our project :
- Amazon rekognition, to compute information about the pictures and stock them in a csv files/txt file
- Braille translation via an integrated program in arduino.
- an object that makes the aptic returns

Context

There is currently no text-to-braille translator, and we want to fill that gap. Most accessories for blind people use text to speech technologies. Like for example speaking watches and speaking connected object in general. Most mathematical texts are not accessible to blind people. Currently, a impaired student who wants to work on a mathematical book has no other resource than a "live" reader! There is virtually no book of electronic mathematic

Dev of a Connected object for blind translation :

Main goal : Make images and texts more accessible to the visually impaired.

Functional Needs: Access information captured on a computer screen through Braille. No application just an on/off button to activate or not the product.

Constraints : Development in Java for the use of Amazon Rekognition and in Arduino for the connected object. Have an ergonomic product for users.

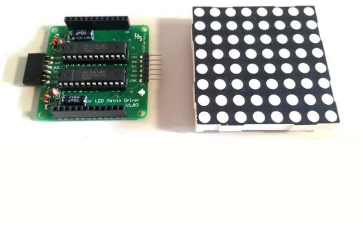
Expected results: Creation of models, integration, and a final product which can display informations about pictures in braille through lights.

Exigences : Have a nice results and be userfriendly

Target: Impaired or Blind peoples.

Materials

Arduino Uno	
Computer	
Wire	

Led matrix 8x8	

Usage of Amazon Rekognition

In our project, we would like to use images containing text to translate them into Braille.However, for starters we will use Amazon Rekognition to recognize famous people to translate their name into Braille.

Amazon Rekognition facilitates this image recognition work. This tool allows us to find similar faces in a large image collection.

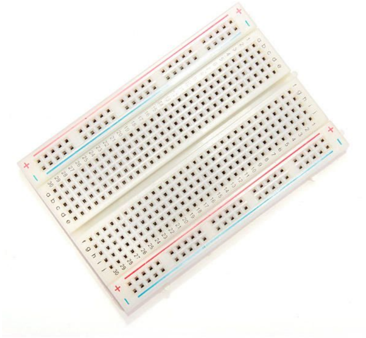
Then we will use this service to detect text in an image. We'll be able to extract the text, such as traffic signs, license plates.... During this analysis, the tool returns a label with the detected text and a rectangular frame as well as a reliability index for each line or word recognized.

Technical details of the implementation

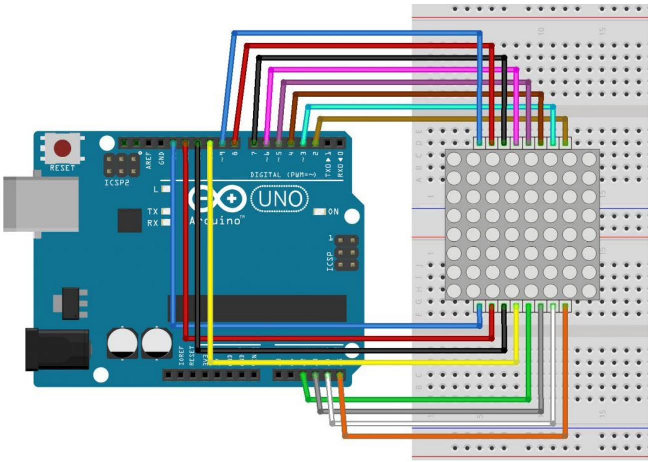
Montage :

For our project we have used an arduino uno, a 400 Hole breadboard

and one mini breadboard and a led matrix 8x8 and 16 wires :



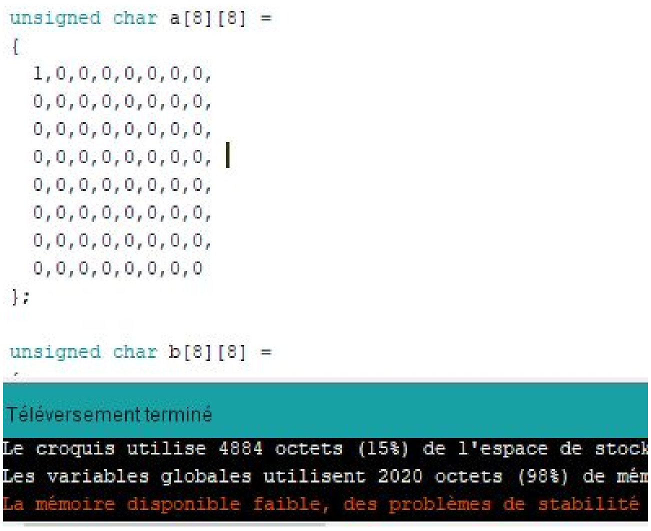
It doesn’t matter which pins of the microcontroller we have assigned the columns/rows to, because we can modify assignment in our arduino code. So, we just have choose a way that make wiring more convenient.
You can see below a schema of our montage :



Then, we just have to connect our arduino uno to our computer and we can “upload” our code in it.

CODE ARDUINO :

Firstable, we tried to translate the alphabet from ASCII to braille. In order to do that in arduino and to display it on our matrix 8x8 we have decided to code our “braille letters” under the form of 8x8 matrix where the 1 were representing the “switch-on” led and the 0 on the matrix were the “switch-off” led.



```
unsigned char a[8][8] =
{
  1,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0,
  0,0,0,0,0,0,0,0
};

unsigned char b[8][8] =
```

Téléversement terminé

```
Le croquis utilise 4884 octets (15%) de l'espace de stock
Les variables globales utilisent 2020 octets (98%) de mém
La mémoire disponible faible, des problèmes de stabilité
```

But, this way of encoding the alphabet was really really memory intensive and could lead to some trouble when we wanted to display huge sentence in our led matrix. So, thanks to the advice of our professor we have decided to switch to another method of encoding, we have used a byte type to represent our alphabet. However we have needed to change the whole code to display our alphabet.

In order to display the results of Amazon Rekognition on the led matrix 8x8 we had to implement a function which was able to parse the data from a csv file and display them on braille. Unfortunately, we don't success to implement it.

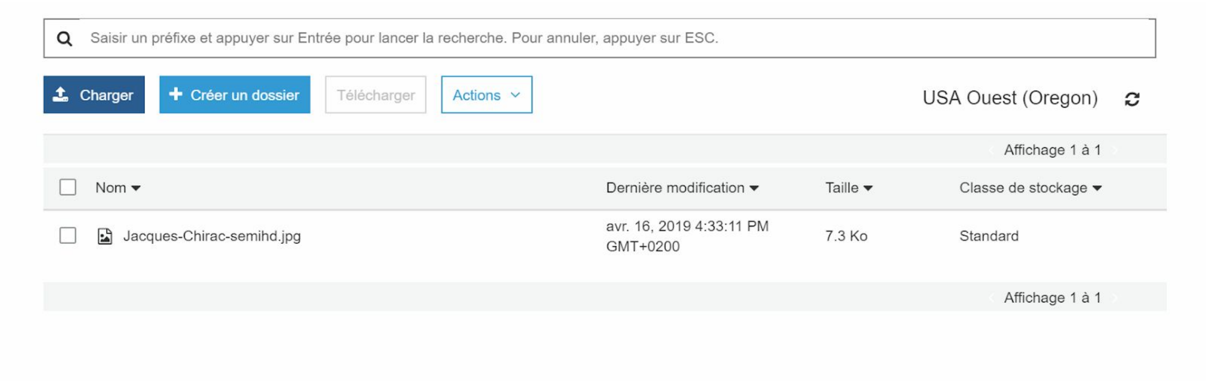
To do the amazon rekognition we conigurated an account. We have defined an user with AWS IAM. We have download aws sdk. to use the algorithm we took credentials of the account. First we would to have informations on a Java program. We synchronized our program with aws cloud. However we had problem with the maven project. We lost a lot of times on it. We needed to change our way. To simple the process we use the algorithm directly on the command line. For our test we used a Jacque Chirac picture in our aws bucket. And we had result. We can also use to recognise objects.

We cleaned our txt with a Java program to have only the useful word

Tests :

User Manual :

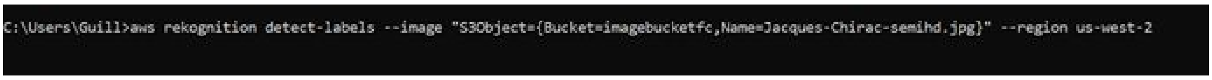
1) Store Picture on Amazon S3 Bucket


Saisir un préfixe et appuyer sur Entrée pour lancer la recherche. Pour annuler, appuyer sur ESC.
Charger
Créer un dossier
Télécharger
Actions
USA Ouest (Oregon)
Affichage 1 à 1

□	Nom	Dernière modification	Taille	Classe de stockage
□	Jacques-Chirac-semihd.jpg	avr. 16, 2019 4:33:11 PM GMT+0200	7.3 Ko	Standard

Affichage 1 à 1

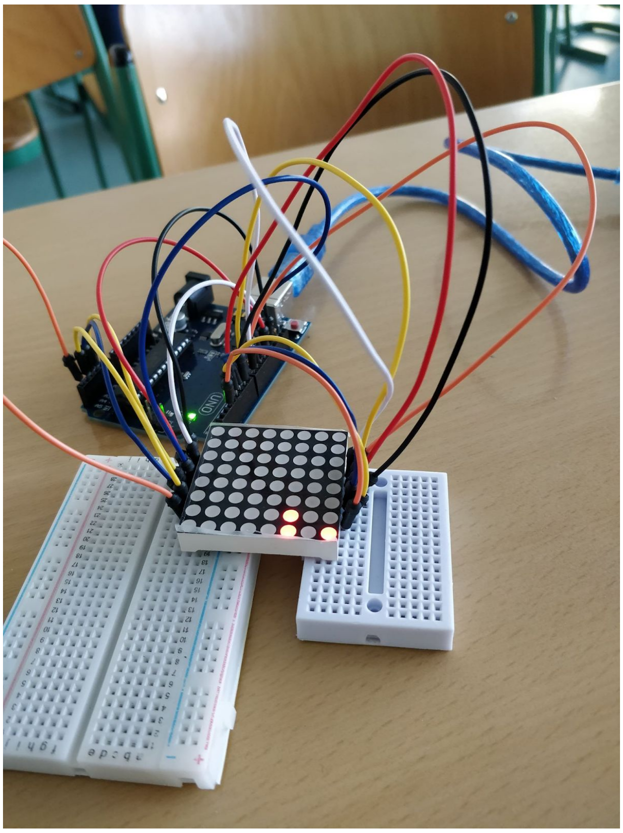
2) Launch Rekognition tool



```
C:\Users\Guill>aws rekognition detect-labels --image "S3Object={Bucket=imagebucketfc,Name=Jacques-Chirac-semihd.jpg}" --region us-west-2
```

3) Launch Arduino program

4) Watch the result



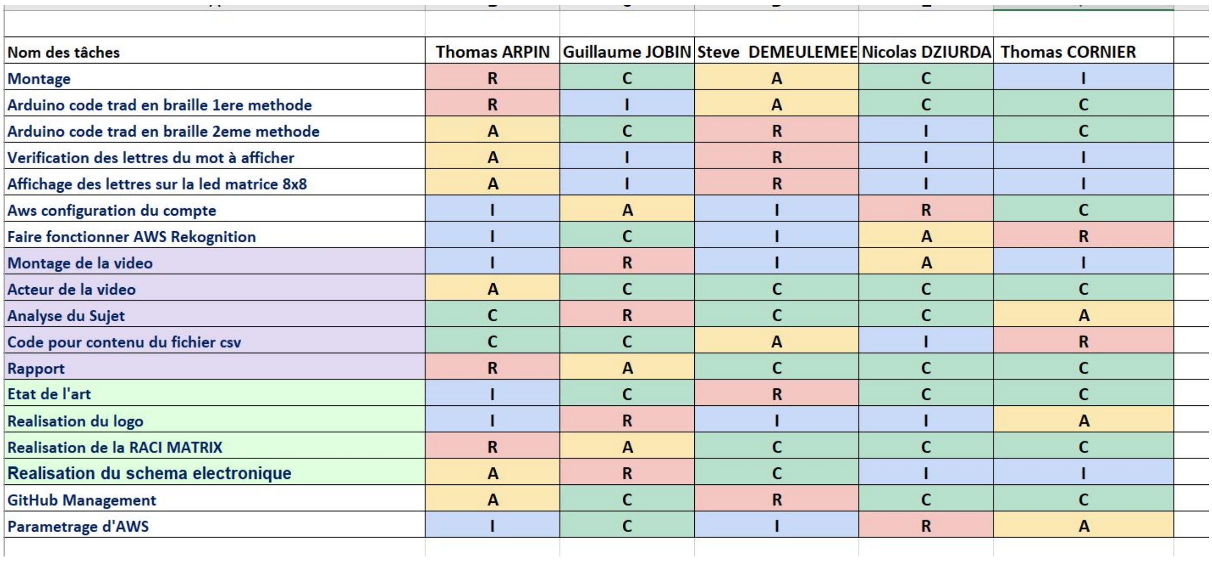
TESTS

1) We did two differents tests. First we used rekognizion in two ways: recognise celebrity, recognise forms. We add text test files on the repository.

2) We tested matrice on the arduino with simple matrix and complex matrix.

Calendar of our work

January	February	March	April
Analyse du sujet	Montage	Arduino code trad en braille 2	Mise en place de la vidéo
Logo	Arduino code trad en braille 1	Vérification des lettres	Essai mise en place code fichier csv
GitHub	Affichage des lettres	Compte AWS	Rapport
	Etat de l'art	Amazon Rek.	RACI Matrix
	Schéma électronique		



Nom des tâches	Thomas ARPIN	Guillaume JOBIN	Steve DEMEULEMEE	Nicolas DZIURDA	Thomas CORNIER
Montage	R	C	A	C	I
Arduino code trad en braille 1ere methode	R	I	A	C	C
Arduino code trad en braille 2eme methode	A	C	R	I	C
Verification des lettres du mot à afficher	A	I	R	I	I
Affichage des lettres sur la led matrice 8x8	A	I	R	I	I
Aws configuration du compte	I	A	I	R	C
Faire fonctionner AWS Rekognition	I	C	I	A	R
Montage de la video	I	R	I	A	I
Acteur de la video	A	C	C	C	C
Analyse du Sujet	C	R	C	C	A
Code pour contenu du fichier csv	C	C	A	I	R
Rapport	R	A	C	C	C
Etat de l'art	I	C	R	C	C
Realisation du logo	I	R	I	I	A
Realisation de la RACI MATRIX	R	A	C	C	C
Realisation du schema electronique	A	R	C	I	I
GitHub Management	A	C	R	C	C
Parametrage d'AWS	I	C	I	R	A

Conclusion :

At the beginning, it was very difficult because we have never touched an arduino. So we have troubled a lot on the montage, and also on the code part to display the right led with our alphabet.

For AWS, it was a nice introduction to it, especially to try out an API like Amazon Rekognition which is a very strong tool. We could have saved a lot of time to clean the data because we have implemented a full program to do it. We were not aware that such library could exist to do it.

To conclude, we thought the main functionalities have been implemented. We are capable to recognize some human and translate their names in braille.