

國立臺北大學電機工程學系專題報告

群眾控制閘門 (中文題目)

Crowd Controlling Gate (英文題目)

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執行期間：104 年 9 月至 105 年 6 月

為提高同學製作專題之品質，讓更多校內外人士分享同學們成長的喜悅，我們將以更正式的方式將同學辛苦的成果收錄成冊。本格式說明旨在各組專題報告之格式規範，讓報告的合籍更有保存價值：

(撰寫專題報告時請刪除本欄文字)

1. 篇幅：六頁。
2. 紙張：一律使用 A4 尺寸白紙。
3. 版面：每頁左、右、上、下各留 2.5 公分空白，並於下端中央標明頁次。
4. 文字：字型宜選擇清晰亦辨識者，內文大小 12 點、標題粗體字為宜。
5. 封面：一律使用 A4 尺寸白紙，依欄位鍵入專題題目、組員姓名、指導老師姓名、執行期間。
6. 繳交：彙整(1)專題製作計畫書、(2)專題報告、(3)專題報告海報等檔案，分別以 DOC、PPT 之原始檔案及 PDF 兩種格式，燒錄儲存於光碟片中，並於系上訂定時程之前將光碟片繳回系辦公室。

1. 摘要

於本專題報告作一概述。

- 關鍵字：Human Technology
- Fourth industrial revolution
- Internet of Things
- Smart City
- Reduce the Cost
- Environmental Protection

2. 簡介

The global population is getting higher and higher. It directly makes consuming behavior increase. When people still buy things in physical store, queuing will still exist. There are limited number of counters, entrances and exits. We try to use this machine to control the crowd, guide the crowd.

3.

4. 專題進行方式



Hardware-Kinect V2

- Infrared ray: emit infrared ray
- Depth sensor: receive the infrared ray that is reflected

Image Processing

Jimmy Xiao 蕭仕承

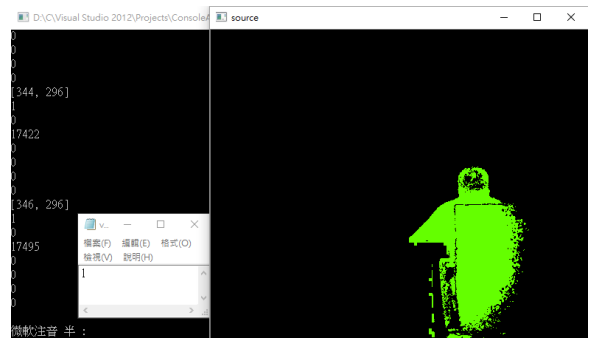
- Kinect SDK 2
- OpenCV
- Body Index:
 - Processing the data from depth sensor, we can get the information for each pixel which tell us if there is any people or not .
 - The data will be store in index.
- **GetDefaultKinectSensor() → IKinectSensor**
 - *check if kinect is ready or not.*
- **get_DepthFrameSource() → IDepthFrameSource**
 - *call the depth sensor.*
- **OpenReader() → IDepthFrameReader**
 - *read the data from depth sensor.*
- **AcquireLatestFrame() → IDepthFrame**
 - *read the latest frame.*
- **OpenCV:**
 - Turn index into color map.

```

if (pFrame->AccessUnderlyingBuffer(&uSize, &pBuffer) == S_OK)
{
    for (y = 0; y < iHeight; ++y)
    {
        for ( x = 0; x < iWidth; ++x)
        {
            uBodyIdx = pBuffer[x + y * iWidth];

            if (uBodyIdx < 6)
            {
                if (uBodyIdx == 0)
                    a++;
                if (uBodyIdx == 1)
                    b++;
                if (uBodyIdx == 2)
                    c++;
                if (uBodyIdx == 3)
                    d++;
                if (uBodyIdx == 4)
                    e++;
                if (uBodyIdx == 5)
                    f++;
            }
            mImg.at<cv::Vec3b>(y, x) = aColorTable[uBodyIdx];
        }
    }
}

```

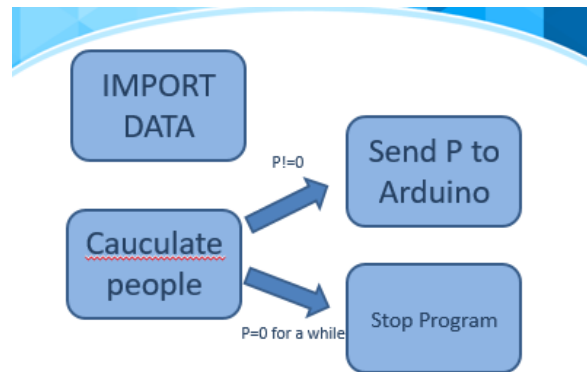


```

cv::Vec3b aColorTable[7] =
{
    cv::Vec3b(255,0, 255),
    cv::Vec3b(0, 255, 100),
    cv::Vec3b(0, 255, 0),
    cv::Vec3b(255, 255, 0),
    cv::Vec3b(255, 0, 255),
    cv::Vec3b(0, 255, 255),
    cv::Vec3b(0, 0, 0),
};

```

Matlab



Data Calculation

Napoleon Lee 李御璿

This is Matlab Command Window

P is the number of people

Now are 5 people in the line

```

Command Window

P =
    5

i =
    0
  
```

When no people
 It will automatically add an (int) i
 When I is 10000
 The program will stop

```

Command Window

P =
    0

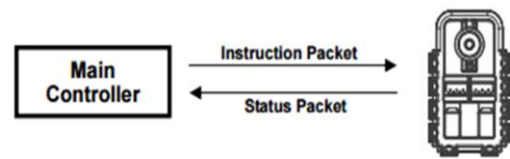
i =
    3766
  
```

Hardware-Dynamixel Ax-12A

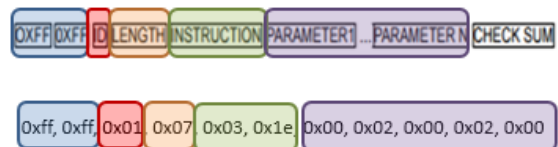
Landy Pan 潘桓甯

- Resolution : 0.29°
with running degree 0° ~ 300°
- Voltage : 9 ~ 12V
- Command Signal : Digital Packet
- Protocol Type : Half duplex
Asynchronous Serial
Communication
- Feedback : Position, Temperature,
Load, Input Voltage, etc.

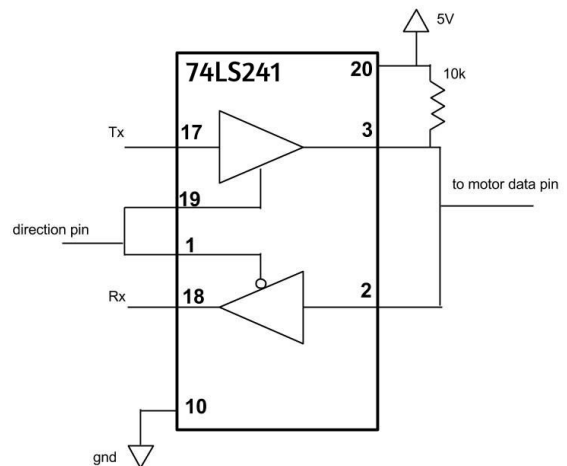
Servo Controlling



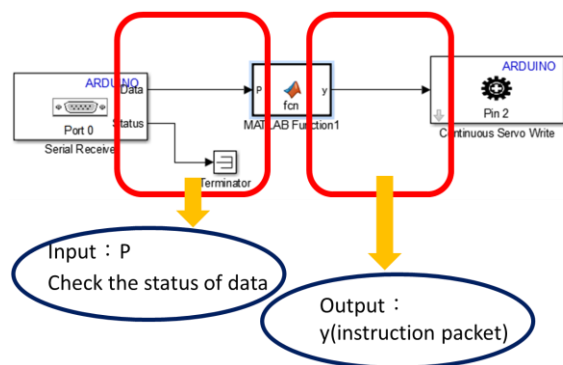
■ Instruction packet

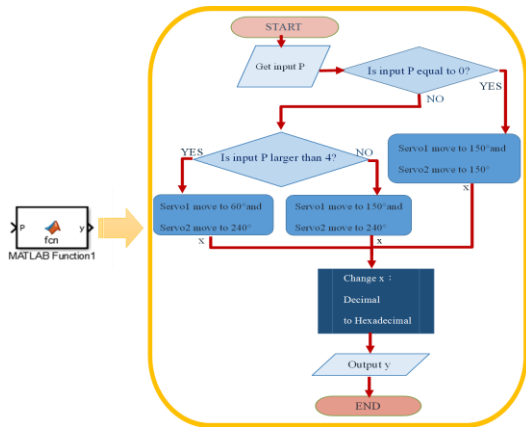


■ Extra circuit-74ls241



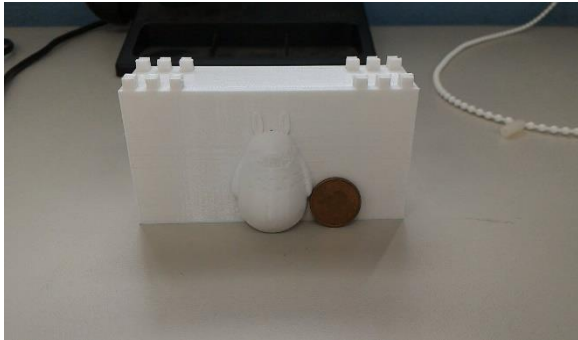
• Simulink in Matlab





5. 主要成果與評估

It was a shame that we do not make a usable prototype, but we still use the 3d-printer to print a model like this



On the top of this model we can put the servo motor on it, and connect it to the computer.

結語與展望

We still learn a lot of things while doing it. This is what we wish to finish in the future.

- Use in train station or MRT
- Concert or Club
- Not Just open gates, it will be able to calculate the best way to evacuate people.
- Or even we can use smartphone's App to push notification.
- With GPS it can show you how to exit, and even estimate the time it take.

6. 銘謝

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