Schedule Assistance (일정도우미)

사물인터넷설계 3조

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01 | 서론

- 기술의 현황
- 사용 장비 및 소프트웨어

01 | 서론

• 기술의 현황 • 사용 장비 및 소프트웨어

기술의 현황

Shiftee

· 스케줄러

· 출퇴근 기록

· 휴가 관리

DAOU office

· 전자 결재

· 예약, 설문

· 메신저

NFC 출결알림

· NFC 태그 시

휴대전화로

출결 확인 문자 전송

사용 장비

[Raspberry Pi]

[NFC 리더기&카드]

소프트웨어

- Python(3.8)
- Visual Studio 2019

02 | 본론

- 프로젝트 선정 시 고려사항
- 여러 가지 방법의 검토 비교

02 | 본론

• 프로젝트 선정 시 고려사항 • 여러 가지 방법의 검토 비교

여러가지 방법 비교

1. GPS와 Wifi 이용
2. NFC 사용

검토 및 결정

NFC 사용

고려 사항

직원 개개인을 구별하여
일정 전송이 가능한가?

구현 가능성

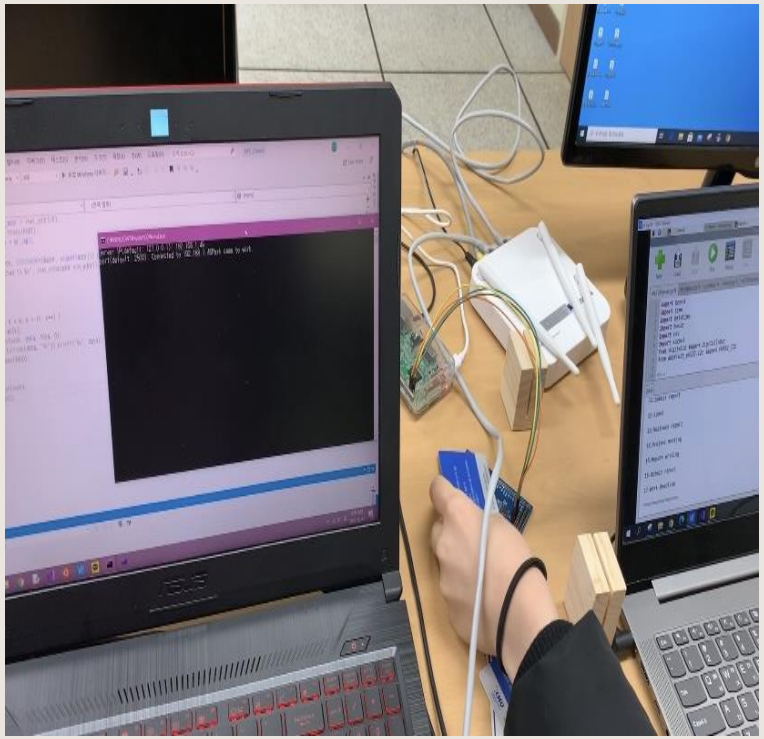
각 NFC에 맞는
직원 일정 데이터 구현

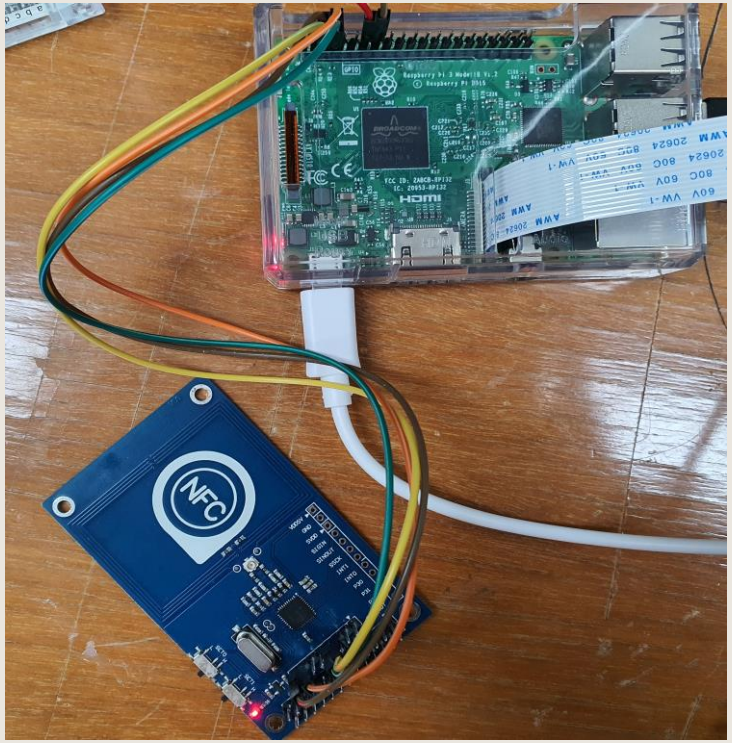
03 | 설계

- 시스템 디자인
- 실험 및 고찰
- 소스코드

03 | 설계

- 시스템 디자인

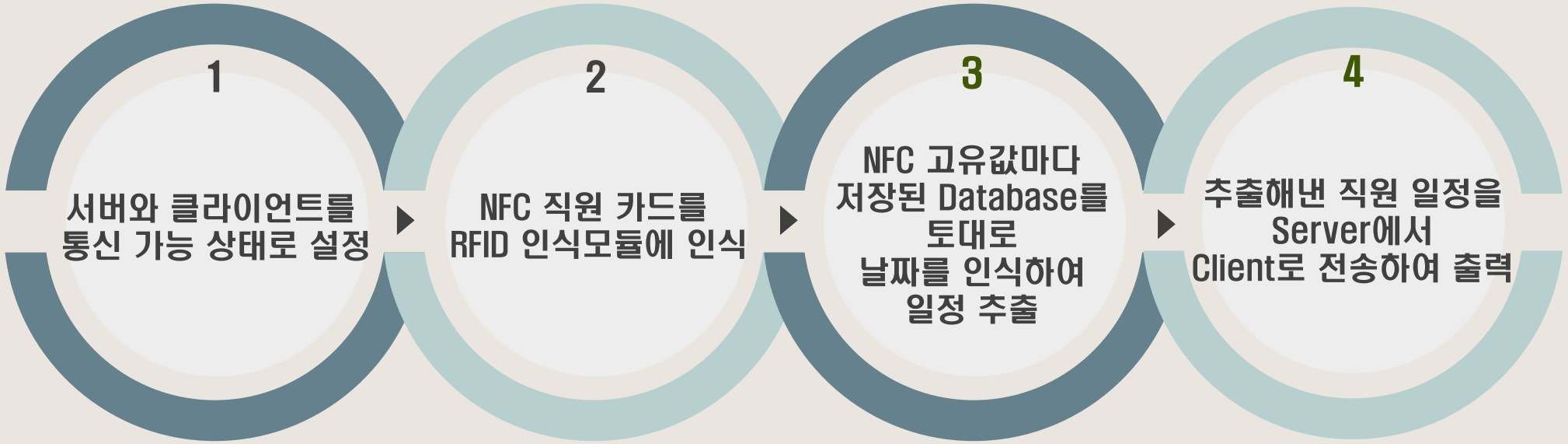




- 라즈베리 파이에 RFID 인식 모듈을 연결하여 nfc 카드 태그
- Python으로 Server 프로그램 구동
- C++로 Client 프로그램 구동
- NFC 리더기에 카드가 인식되면 Server에서 Client로 저장된 데이터 전송

03 | 설계

- 시스템 디자인 – 실행 단계



03 | 설계

- 실험 및 고찰

1. TCP를 사용하여 table이 포함된 server 코드로 실행하니 오류 발생

⇒ BUFSIZE대로 전송 데이터가 출력되지 않고 한 바이트씩 출력되는 문제
임시로 BUFSIZE 대신 숫자 3을 입력하여 세 바이트씩 출력하도록 수정했으나 3글자 이상인 경우 오류가 발생함.

⇒ TCP에서 UDP로 변경하여 정상적인 BUFSIZE가 수신되어 오류 해결

2. 위 UDP 코드 실행 시 라즈베리 파이에서 UDP 오류, TCP 정상작동

⇒ table을 server 코드에 넣는 것이 아닌 따로 csv 파일을 만들어 제작

⇒ 다시 UDP에서 TCP로 코드 변경

3. 서버 코드에 등록되지 않은 카드가 찍히면 오류 발생

⇒ 등록되지 않은 카드 인식 시, “등록되지 않은 카드가 인식되었다” 는 문구가 출력된 후 계속 실행되도록 함.

03 | 설계

- csv 파일 목록

	A	B	C	D	E	F	G
1	2020-11-30	Kim	Lee	Park	Choi	Jo	Han
2	9	Document preparation and review	Attending conference	Morning meeting	receipt confirmation	Product management	Planning and management
3	10	Morning meeting	Send email to customer	Report writing	machine management	Customer visit	Document management
4	11	Create progect report	Drafting a project	Submit report	Quality Management	Customer visit	Planning report preparation
5	12	Lunch	Lunch	Lunch	lunch	lunch	lunch
6	13	Preparation of interim report	Planning Team Meeting	Business report	product production	Quality Report Preparation	Goods delivery
7	14	Customer visit	Document review	Project meeting	product production	Quality Report Preparation	Customer delivery
8	15	Conference	Document payment	Report writing	product production	Defective Product Test	Customer delivery
9	16	Result report preparation	Weekly work report	Submit report	meeting	meeting	meeing
10	17	Work deadline	Work deadline	Work deadline	Shipment confirmation	wearing consuming goods shipped status table	Work deadline
11	2020-12-01	Kim	Lee	Park	Choi	Jo	Han
12	9	Document preparation and review	Attending conference	Morning meeting	receipt confirmation	Product management	Planning and management
13	10	Morning meeting	Send email to customer	Report writing	machine management	Customer visit	Document management
14	11	Create progect report	Drafting a project	Submit report	Quality Management	Customer visit	Planning report preparation
15	12	Lunch	Lunch	Lunch	lunch	lunch	lunch
16	13	Preparation of interim report	Planning Team Meeting	Business report	product production	Quality Report Preparation	Goods delivery
17	14	Customer visit	Document review	Project meeting	product production	Quality Report Preparation	Customer delivery
18	15	Conference	Document payment	Report writing	product production	Defective Product Test	Customer delivery
19	16	Result report preparation	Weekly work report	Submit report	meeting	meeting	meeing
20	17	Work deadline	Work deadline	Work deadline	Shipment confirmation	wearing consuming goods shipped status table	Work deadline
21	2020-12-02	Kim	Lee	Park	Choi	Jo	Han
22	9	Document preparation and review	Attending conference	Morning meeting	receipt confirmation	Product management	Planning and management
23	10	Morning meeting	Send email to customer	Report writing	machine management	Customer visit	Document management
24	11	Create progect report	Drafting a project	Submit report	Quality Management	Customer visit	Planning report preparation
25	12	Lunch	Lunch	Lunch	lunch	lunch	lunch
26	13	Preparation of interim report	Planning Team Meeting	Business report	product production	Quality Report Preparation	Goods delivery
27	14	Customer visit	Document review	Project meeting	product production	Quality Report Preparation	Customer delivery
28	15	Conference	Document payment	Report writing	product production	Defective Product Test	Customer delivery
29	16	Result report preparation	Weekly work report	Submit report	meeting	meeting	meeing
30	17	Work deadline	Work deadline	Work deadline	Shipment confirmation	wearing consuming goods shipped status table	Work deadline

03 | 설계

- csv 파일 목록

31	2020-12-03	Kim	Lee	Park	Choi	Jo	Han
32	9	Document preparation and review	Attending conference	Morning meeting	receipt confirmation	Product management	Planning and management
33	10	Morning meeting	Send email to customer	Report writing	machine management	Customer visit	Document management
34	11	Create progect report	Drafting a project	Submit report	Quality Management	Customer visit	Planning report preparation
35	12	Lunch	Lunch	Lunch	lunch	lunch	lunch
36	13	Preparation of interim report	Planning Team Meeting	Business report	product production	Quality Report Preparation	Goods delivery
37	14	Customer visit	Document review	Project meeting	product production	Quality Report Preparation	Customer delivery
38	15	Conference	Document payment	Report writing	product production	Defective Product Test	Customer delivery
39	16	Result report preparation	Weekly work report	Submit report	meeting	meeting	meeing
40	17	Work deadline	Work deadline	Work deadline	Shipment confirmation	wearing consuming goods shipped status table	Work deadline
41	2020-12-04	Kim	Lee	Park	Choi	Jo	Han
42	9	Document preparation and review	Attending conference	Morning meeting	receipt confirmation	Product management	Planning and management
43	10	Morning meeting	Send email to customer	Report writing	machine management	Customer visit	Document management
44	11	Create progect report	Drafting a project	Submit report	Quality Management	Customer visit	Planning report preparation
45	12	Lunch	Lunch	Lunch	lunch	lunch	lunch
46	13	Preparation of interim report	Planning Team Meeting	Business report	product production	Quality Report Preparation	Goods delivery
47	14	Customer visit	Document review	Project meeting	product production	Quality Report Preparation	Customer delivery
48	15	Conference	Document payment	Report writing	product production	Defective Product Test	Customer delivery
49	16	Result report preparation	Weekly work report	Submit report	meeting	meeting	meeing
50	17	Work deadline	Work deadline	Work deadline	Shipment confirmation	wearing consuming goods shipped status table	Work deadline

03 | 설계

- Server 소스코드 – Python

```
import board
import time
import datetime
import busio
import csv
import socket
from digitalio import DigitalInOut
from adafruit_pn532.i2c import PN532_I2C

s=socket.socket() #AF_INET, SOCK_STREAM
address = ("", 2500)
s.bind(address)
s.listen(1)
print('Waiting...')
c_socket, c_addr = s.accept()
print("Connection from ", c_addr)

uid1 = ['0xf1', '0x50', '0x3b', '0x21']     #Kim
uid2 = ['0x46', '0x73', '0xcb', '0xb2']     #Lee
uid3 = ['0x96', '0x34', '0xdc', '0xb2']     #Park
uid4 = ['0x8d', '0x31', '0xfe', '0x44']     #Choi
uid5 = ['0xb6', '0x3', '0xc8', '0xb2']      #Jo
uid6 = ['0xb6', '0xc1', '0xe6', '0xb2']     #Han
```

TCP

각 NFC 카드의 고유값 저장

03 | 설계

- Server 소스코드

```
Tdate = [0, 10, 20, 30, 40]
t = [1, 2, 3, 4, 5, 6, 7, 8, 9]
date = 0
```

csv table
uid value entering column > 0

```
i2c = busio.I2C(board.SCL, board.SDA)
reset_pin = DigitalInOut(board.D6)
req_pin = DigitalInOut(board.D12)
pn532 = PN532_I2C(i2c, debug=False, reset=reset_pin, req=req_pin)
ic, ver, rev, support = pn532.firmware_version
print("Found PN532 with firmware version: {0}.{1}".format(ver, rev))
pn532.SAM_configuration()
```

setting nfc

```
ins = open("1st week of December_schedule.csv", "r")
#ins = open("December 2nd week_schedule.csv", "r")
#ins = open("December 3rd week_schedule.csv", "r")
#ins = open("December 4th week_schedule.csv", "r")
st = [] #schedules Table

for line in ins:
    row = line.rstrip().split(',')
    st.append(row)
```

Database array 제작

03 | 설계

- Server 소스코드

```
now = datetime.datetime.now()
nowDate = now.strftime('%Y-%m-%d')
```

check today ' s date

```
for i in Tdate :
  if st[i][0] == nowDate :
    date = i
```

find today ' s date

```
print("Waiting for RFID/NFC card...")

while True :

  uid = pn532.read_passive_target(timeout=0.5)

  if uid is None:
    continue

  uidn = [hex(i) for i in uid]
  print(uidn)
  n=0
```

find UID

03 | 설계

- Server 소스코드

```
if uidn == uid1 :
    print("uid1:", uidn) #uidn is change a name or ipadress
    n = 1

 if uidn == uid2 :
    print("uid2:", uidn)
    n = 2

 if uidn == uid3 :
    print("uid3:", uidn)
    n = 3

 if uidn == uid4 :
    print("uid4:", uidn)
    n = 4

 if uidn == uid5 :
    print("uid5:", uidn)
    n = 5

 if uidn == uid6 :
    print("uid6:", uidn)
    n = 6

 if n == 0 :
    ncard = "This card is not registered.\n"
    print("This card is not registered.\n")
    c_socket.send(ncard.encode())
    time.sleep(1)
    print("Waiting for RFID/NFC card...")
    continue

 uidprint = st[0][n] + " came to work.\n"
 c_socket.send(uidprint.encode())
```

UID 1~6 differentiation

등록되지 않은 카드일 경우 “This card is not registered.” 표시 후 다른 카드 대기

03 | 설계

- Server 소스코드

```
    print(uidprint)

    for i in t :
      schedule = st[date + i][0]+ ":"+ st[date + i][n] +"\n"
      print(schedule)
      c_socket.send(schedule.encode())

    c_socket.send('==================\n'.encode())

    time.sleep(3)

    print("Waiting for RFID/NFC card...")

c.close()
```

print schedule

03 | 설계

- Client 소스코드 – C++

```
#define _CRT_SECURE_NO_WARNINGS
#define _WINSOCK_DEPRECATED_NO_WARNINGS
#pragma comment(lib, "ws2_32")
#include <winsock2.h>
#include <string.h>
#include <stdlib.h>
#include <stdio.h>
#include <windows.h>

#define BUFSIZE    1024

void err_quit(char* msg)
{
   LPVOID lpMsgBuf;
   FormatMessage(
      FORMAT_MESSAGE_ALLOCATE_BUFFER | FORMAT_MESSAGE_FROM_SYSTEM,
      NULL, WSAGetLastError(),
      MAKELANGID(LANG_NEUTRAL, SUBLANG_DEFAULT),
      (LPTSTR)&lpMsgBuf, 0, NULL);
   MessageBox(NULL, (LPCTSTR)lpMsgBuf, msg, MB_ICONERROR);
   LocalFree(lpMsgBuf);
   exit(1);
}
```

최신 VC++ 컴파일 시 경고 방지

소켓 함수 오류 출력 후 종료

03 | 설계

- Client 소스코드

```
void err_display(char* msg)
{
    LPVOID lpMsgBuf;
    FormatMessage(
        FORMAT_MESSAGE_ALLOCATE_BUFFER | FORMAT_MESSAGE_FROM_SYSTEM,
        NULL, WSAGetLastError(),
        MAKELANGID(LANG_NEUTRAL, SUBLANG_DEFAULT),
        (LPTSTR)&lpMsgBuf, 0, NULL);
    printf("[%s] %s", msg, (char*)lpMsgBuf);
    LocalFree(lpMsgBuf);
}

int _recv_ahead(SOCKET s, char* p)
{
    __declspec(thread) static int nbytes = 0;
    __declspec(thread) static char buf[1024];
    __declspec(thread) static char* ptr;

    if (nbytes == 0 || nbytes == SOCKET_ERROR) {
        nbytes = recv(s, buf, sizeof(buf), 0);
        if (nbytes == SOCKET_ERROR) {
            return SOCKET_ERROR;
        }
        else if (nbytes == 0)
            return 0;
        ptr = buf;
    }

    --nbytes;
    *p = *ptr++;
    return 1;
}
```

소켓 함수 오류 출력

내부 구현용 함수

03 | 설계

- Client 소스코드

```
int recvline(SOCKET s, char* buf, int maxlen)
{
    int n, nbytes;
    char c, * ptr = buf;

    for (n = 1; n < maxlen; n++) {
        nbytes = _recv_ahead(s, &c);
        if (nbytes == 1) {
            *ptr++ = c;
            if (c == '\n')
                break;
        }
        else if (nbytes == 0) {
            *ptr = 0;
            return n - 1;
        }
        else
            return SOCKET_ERROR;
    }

    *ptr = 0;
    return n;
}
```

사용자 정의 데이터 수신 함수

03 | 설계

- Client 소스코드

```
int main() {

    int retval;

    WSADATA wsa;
    if (WSAStartup(MAKEWORD(2, 2), &wsa) != 0)
        return 1;

    SOCKET sock = socket(AF_INET, SOCK_STREAM, 0);
    if (sock == INVALID_SOCKET) err_quit("socket()");

    int SERVERPORT = 2500;
    char SERVERIP[512] = { 0 }, PORT[512] = { 0 };

    printf("Server IP(default: 127.0.0.1): ");
    scanf("%[^\n]", &SERVERIP);
    if (!strcmp(SERVERIP, "\0")) strcpy(SERVERIP, "127.0.0.1");
    fflush(stdin);
    printf("port(default: 2500): ");
    scanf("%[^\n]", &PORT);
    if (strcmp(PORT, "\0")) SERVERPORT = atoi(PORT);
```

get SERVERIP, SERVERPORT

03 | 설계

- Client 소스코드

```
    SOCKADDR_IN serveraddr;
    ZeroMemory(&serveraddr, sizeof(serveraddr));
    serveraddr.sin_family = AF_INET;
    serveraddr.sin_addr.s_addr = inet_addr(SERVERIP);
    serveraddr.sin_port = htons(SERVERPORT);
    retval = connect(sock, (SOCKADDR*)&serveraddr, sizeof(serveraddr));
    if (retval == SOCKET_ERROR) err_quit("connect()");
    printf("\nConnected to %s \n", inet_ntoa(serveraddr.sin_addr));

    char buf[BUFSIZE + 1];

    while (1) {
        retval = recvline(sock, buf, BUFSIZE + 1);
        if (retval == SOCKET_ERROR) {
            err_display("recv()");
            break;
        }
        else if (retval == 0)
            break;
        printf("%s", buf);

    }
    closesocket(sock);
    WSACleanup();
    return 0;
}
```

connect()

receive and print data

04 | 결론

- 실험 결과
- 참고문헌
- Q & A

04 | 결론

- 실험결과 – Client 창

```
Server IP(default: 127.0.0.1): 192.168.1.46
port(default: 2500):
Connected to 192.168.1.46
Lee came to work.
9:Attending conference
10:Send email to customer
11:Drafting a project
12:Lunch
13:Planning Team Meeting
14:Document review
15:Document payment
16:Weekly work report
17:Work deadline
================
```

```
==================
Kim came to work.
9:Document preparation and review
10:Morning meeting
11:Create progect report
12:Lunch
13:Preparation of interim report
14:Customer visit
15:Conference
16:Result report preparation
17:Work deadline
==================
```

```
==================
Choi came to work.
9:receipt confirmation
10:machine management
11:Quality Management
12:lunch
13:product production
14:product production
15:product production
16:meeting
17:Shipment confirmation
==================
```

```
====================
Park came to work.
9:Morning meeting
10:Report writing
11:Submit report
12:Lunch
13:Business report
14:Project meeting
15:Report writing
16:Submit report
17:Work deadline
====================
```

04 | 결론

- 실험결과 – Server 창

```
pi@rpi9:~/team3 $ python3 nfcTCPserver.py
Waiting...
Connection from  ('192.168.1.51', 13995)
Found PN532 with firmware version: 1.6
Waiting for RFID/NFC card...
['0x46', '0x73', '0xcb', '0xb2']
uid2: ['0x46', '0x73', '0xcb', '0xb2']
Lee came to work.

9:Attending conference

10:Send email to customer

11:Drafting a project

12:Lunch

13:Planning Team Meeting

14:Document review

15:Document payment

16:Weekly work report

17:Work deadline

==================
Waiting for RFID/NFC card...
['0xf1', '0x50', '0x3b', '0x21']
uid1: ['0xf1', '0x50', '0x3b', '0x21']
Kim came to work.

9:Document preparation and review

10:Morning meeting
```

```
Waiting for RFID/NFC card...
['0xf1', '0x50', '0x3b', '0x21']
uid1: ['0xf1', '0x50', '0x3b', '0x21']
Kim came to work.

9:Document preparation and review

10:Morning meeting

11:Create progect report

12:Lunch

13:Preparation of interim report

14:Customer visit

15:Conference

16:Result report preparation

17:Work deadline

==================
Waiting for RFID/NFC card...
['0x8d', '0x31', '0xfe', '0x44']
uid4: ['0x8d', '0x31', '0xfe', '0x44']
Choi came to work.

9:receipt confirmation

10:machine management

11:Quality Management

12:lunch
```

04 | 결론

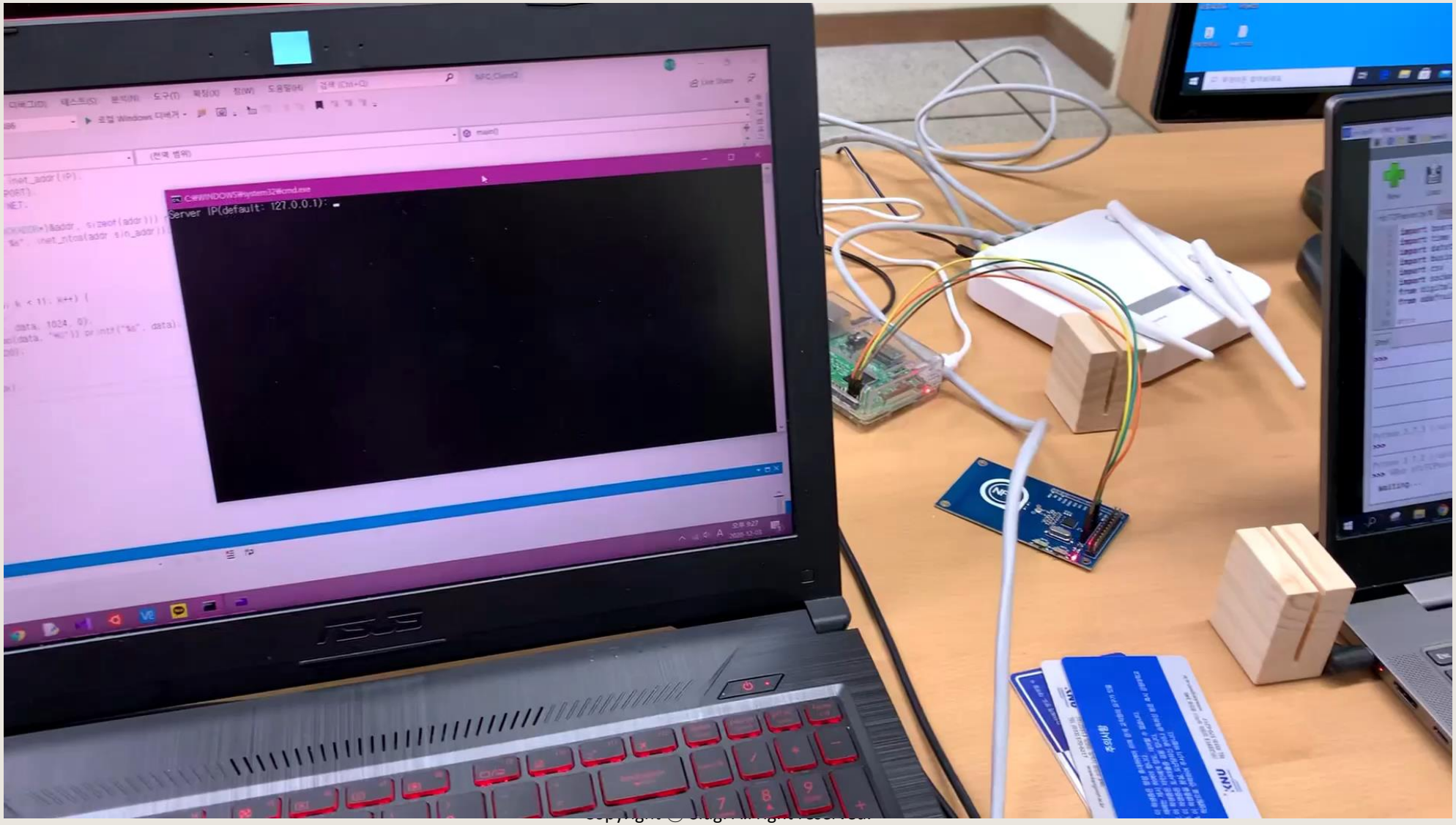
- 실험결과 – Server 창

```
Waiting for RFID/NFC card...
['0x8d', '0x31', '0xfe', '0x44']
uid4: ['0x8d', '0x31', '0xfe', '0x44']
Choi came to work.

9:receipt confirmation

10:machine management

11:Quality Management

12:lunch

13:product production

14:product production

15:product production

16:meeting

17:Shipment confirmation

==================
Waiting for RFID/NFC card...
['0x96', '0x34', '0xdc', '0xb2']
uid3: ['0x96', '0x34', '0xdc', '0xb2']
Park came to work.

9:Morning meeting

10:Report writing

11:Submit report

12:Lunch
```

```
14:product production

15:product production

16:meeting

17:Shipment confirmation

==================
Waiting for RFID/NFC card...
['0x96', '0x34', '0xdc', '0xb2']
uid3: ['0x96', '0x34', '0xdc', '0xb2']
Park came to work.

9:Morning meeting

10:Report writing

11:Submit report

12:Lunch

13:Business report

14:Project meeting

15:Report writing

16:Submit report

17:Work deadline

==================
Waiting for RFID/NFC card...
```

04 | 결론

- 실험결과 – 동영상



04 | 결론

- 참고문헌

그림 1 - Raspberry Pi
https://kr.element14.com/raspberry-pi/raspberrypi3-modb-1gb/sbc-raspberry-pi-3-mod-b-1gb-ram/dp/2525226

그림 2 - NFC 리더기 & 카드
https://www.amazon.com/Raspberry-13-56MHz-Frequency-Interfaces-XYGStudy/dp/B07W4YKWFP

Shiftee
https://shiftess.io/ko

DAOU office
https://daouoffice.com/

NFC 연결
https://github.com/rankec/LPC-2124-NFC-PN532

Server
https://github.com/adafruit/Adafruit_CircuitPython_PN532/blob/master/examples/pn532_simpletest.py

Client
https://github.com/stein-sam-m/TCPClientServer https://github.com/gibjose/TCPClient

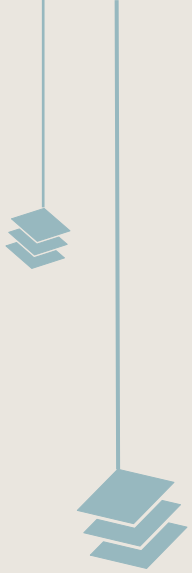
04 | 결론

- 참고문헌

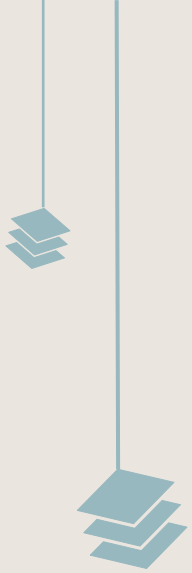
IOT 사물인터넷을 위한 파이썬 네트워크 프로그래밍
- TCP_process_server.py

TCP/IP 윈도우 소켓 프로그래밍
- TCPClient_Variable, TCPServer_Variable

http://news.jejunu.ac.kr/news/articleView.html?idxno=12325



Q & A



THANK YOU!