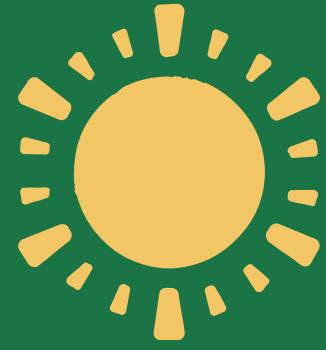


IOT GARDENING SYSTEM

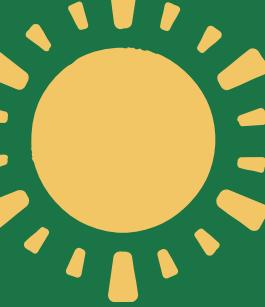
[INTEL-EDGE] MINIPROJECT

김윤우, 이지원



INTRODUCTION





- 현대인의 바쁜 생활 속에 홈가드닝 시스템이 정신적인 풍요로움을 제공
- 가드닝에 있어서 번거로운 과정을 해결
- AIoT 기술을 활용하여 자동화 및 최적의 재배 환경 제공



조도, 온/습도,
토양습도 확인

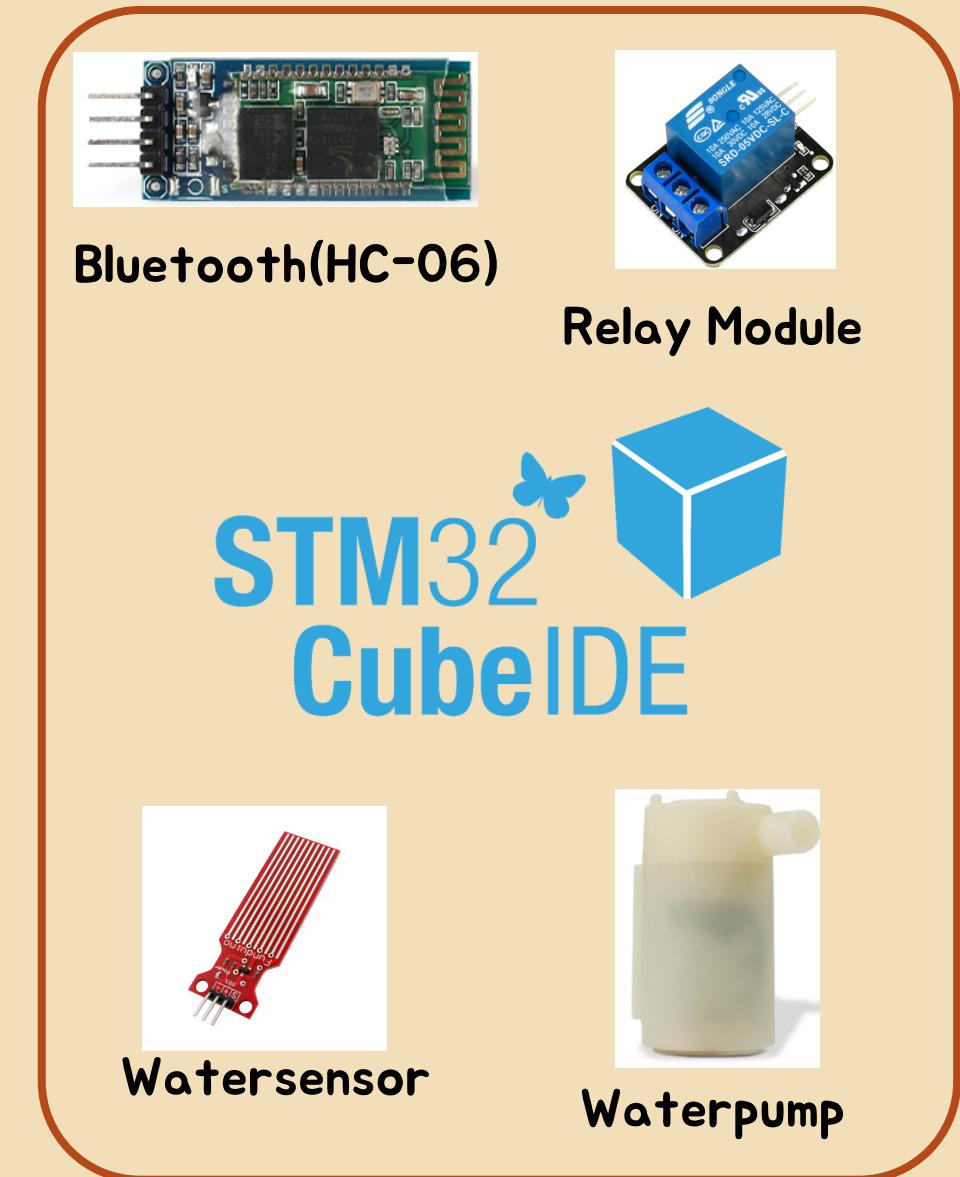
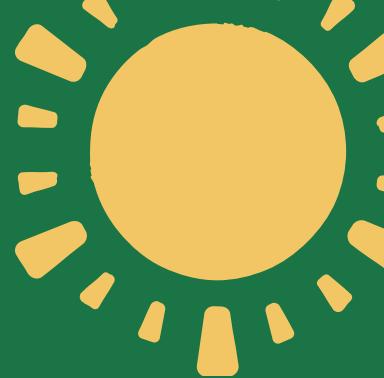


원격 모니터링



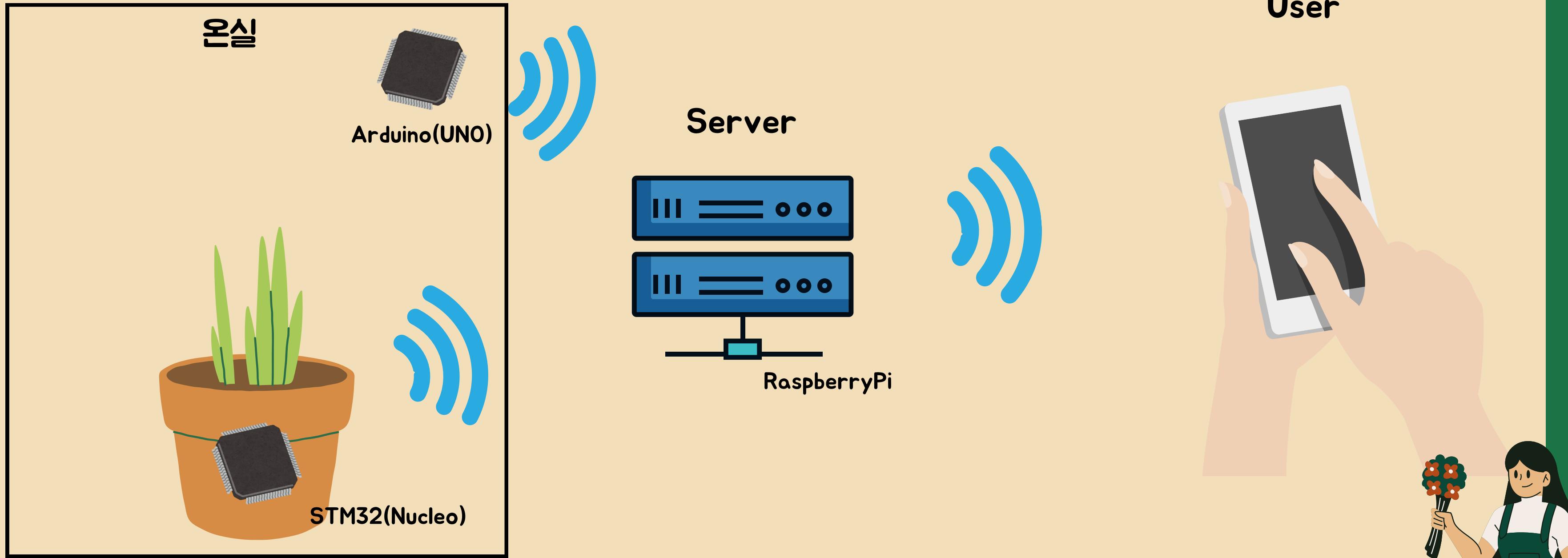
원격 제어



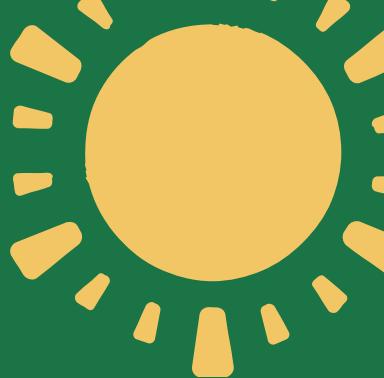


구성도

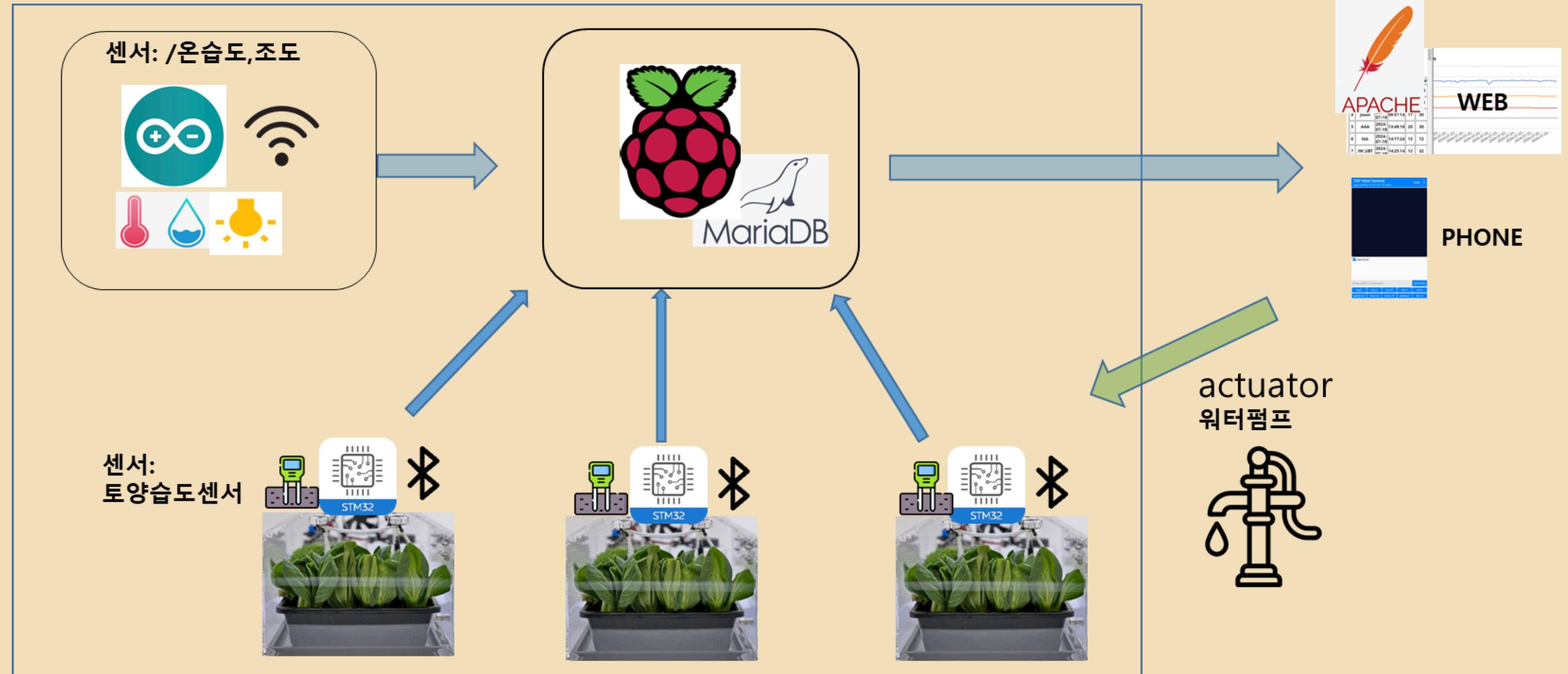
• 시스템 개요



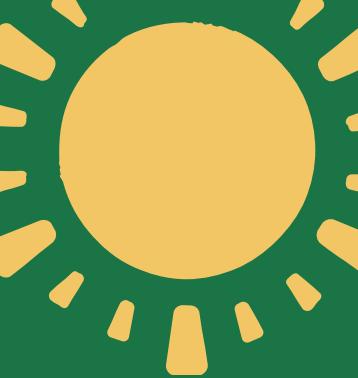
구성도



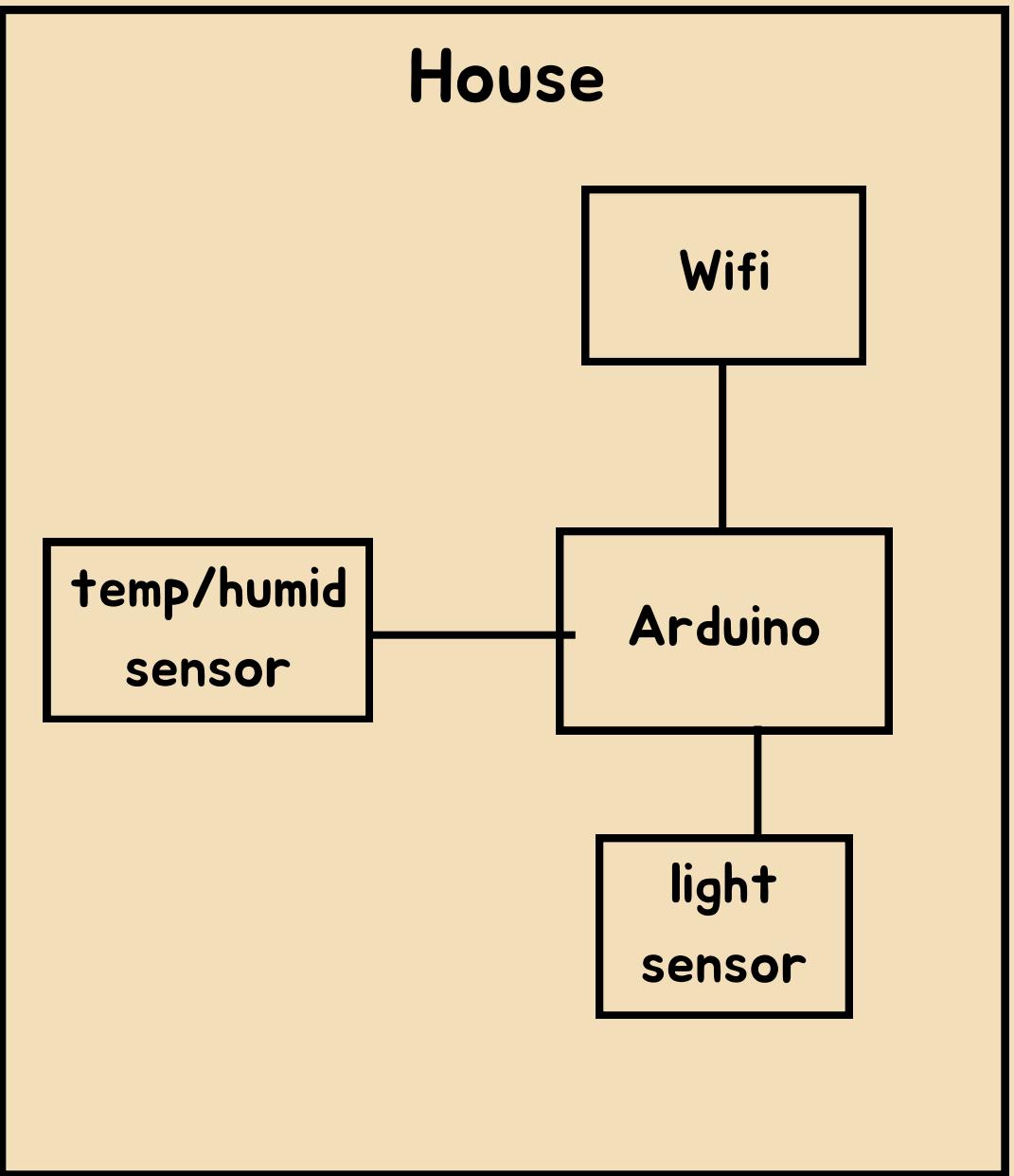
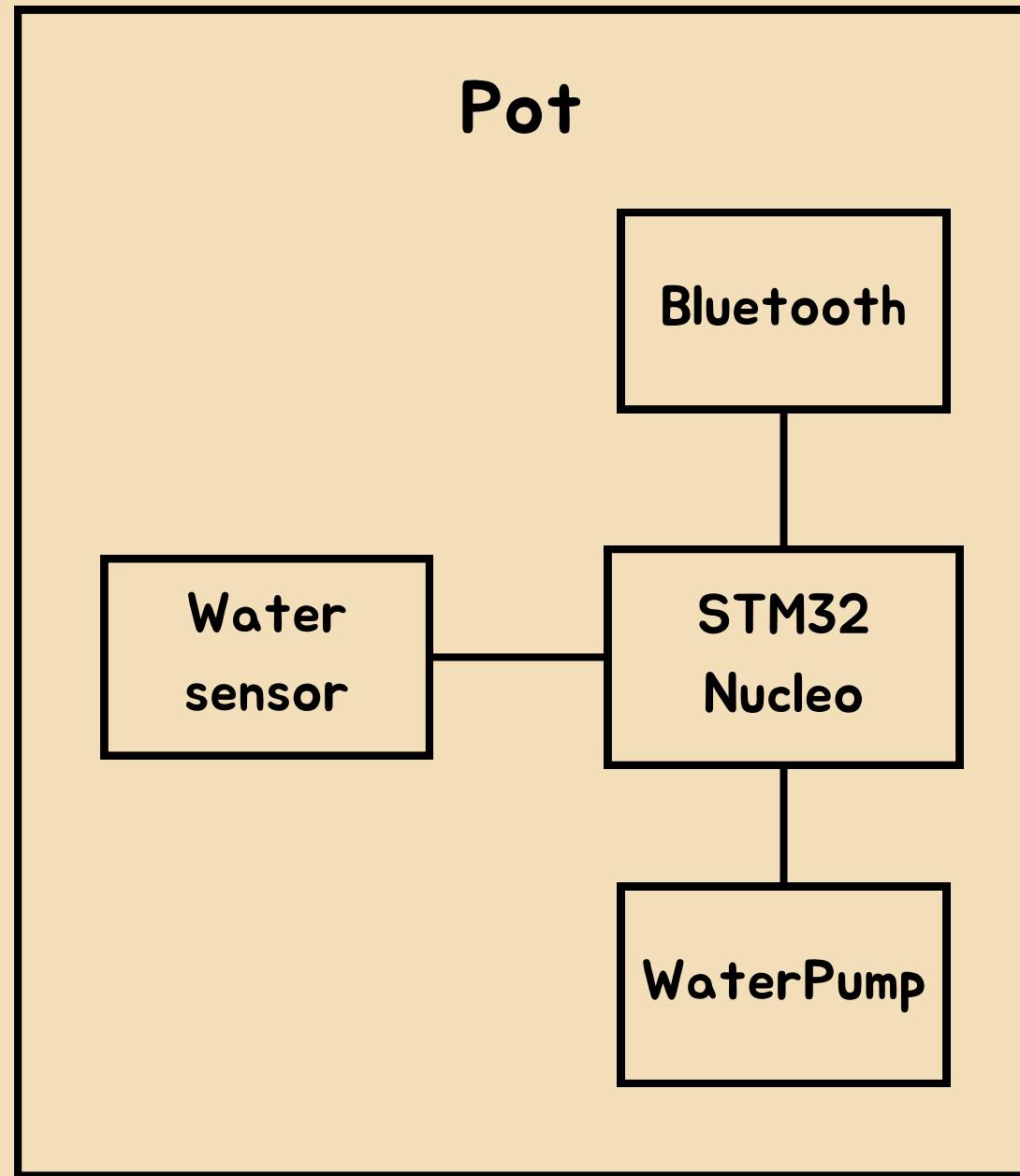
• 시스템 개요



구성도

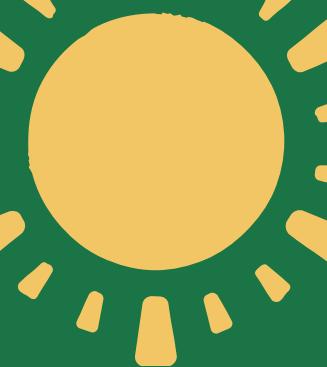
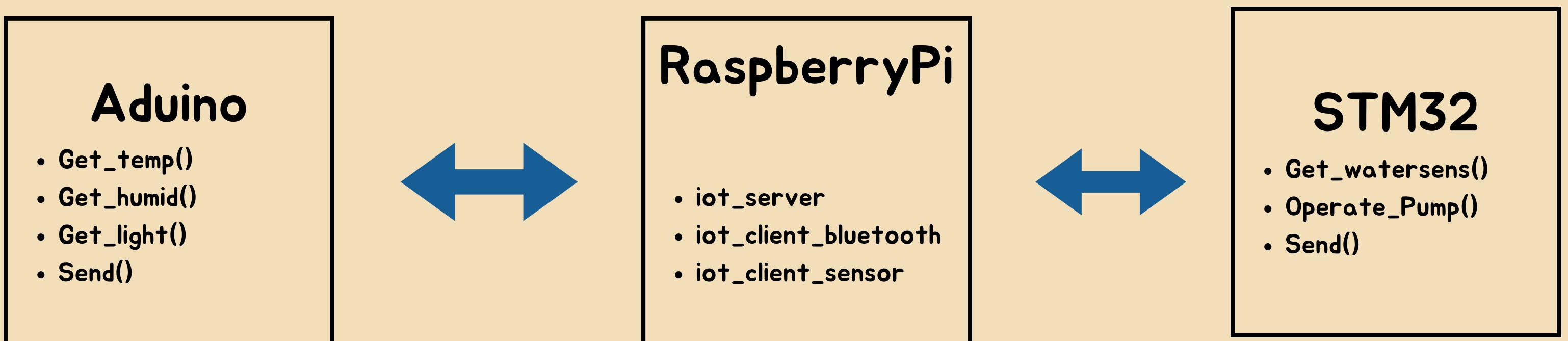


• 회로도

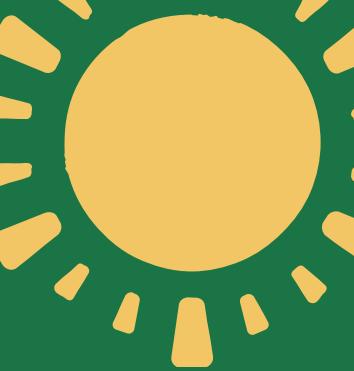


구성도

• 함수구성



구현

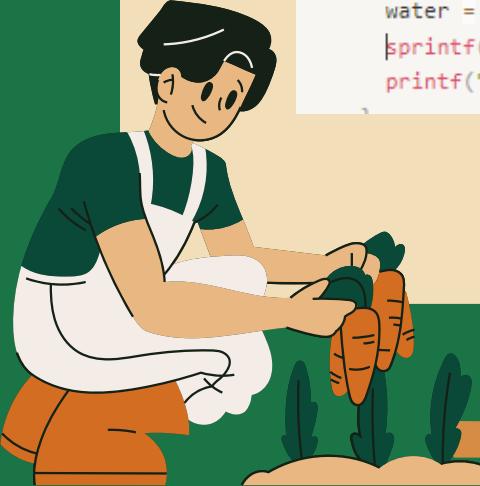


- Arduino

```
humid = dht.readHumidity();
temp = dht.readTemperature();
sprintf(sendBuf, "[JW_SQL]SENSOR@%d@%d@%d\n", (int)temp, (int)humid, light);
client.write(sendBuf, strlen(sendBuf));
sprintf(sendBuf, "[PHONE]@TEMP%d@HUMID%d@LIGHT%d\n", (int)temp, (int)humid, light);
client.write(sendBuf, strlen(sendBuf));
client.flush();
```

- iot_client_sensor (DB insert)

```
void* recv_msg(void* arg)
{
    while (1) {
        if(!strcmp(pArray[1],"SENSOR") && (i == 5)){
            illu = atof(pArray[2]);
            temp = atof(pArray[3]);
            humid = atof(pArray[4]);
            sprintf(sql_cmd, "insert into sensor(name, date, time, illu, temp, humid) values(\"%s\",%s,%f,%f,%f,%f)\n",recvId,sql_cmd);
            printf("db %s\r\n", sql_cmd);
        }
        else if(!strcmp(pArray[1],"WATER") && (i == 3)){
            water = atof(pArray[2]);
            sprintf(sql_cmd, "insert into pot(name, date, time, water) values(\"%s\",now(),now(),%f)\n",recvId,sql_cmd);
            printf("db %s\r\n", sql_cmd);
        }
    }
}
```



- STM32

```
int main(void)
{
    while (1)
    {
        if (tim3IsrFlag) // every one second
        {
            tim3IsrFlag = 0;

            HAL_ADC_Start(&hadc1);
            HAL_ADC_PollForConversion(&hadc1, HAL_MAX_DELAY);
            uint32_t adcValue = HAL_ADC_GetValue(&hadc1);
            water = (adcValue / 4095.0) * 100.0;
            HAL_ADC_Stop(&hadc1);
        }

        if(getSensorTime != 0 && !(secCount % getSensorTime))
        {
            sprintf(sendBuf, "[%s]WATER@%.2f\n",recvId,water);
            HAL_UART_Transmit(&huart6, (uint8_t *)sendBuf, strlen(sendBuf), 0xFFFF);
            HAL_Delay(30);
            sprintf(sendBuf, "[PHONE]WATER@%.2f\n",water);
            HAL_UART_Transmit(&huart6, (uint8_t *)sendBuf, strlen(sendBuf), 0xFFFF);
        }
    }
}
```

구현



• iot_server

```
msg : [POT->JW_AND] PUMP@OFF
msg : [JW_AND->POT] LED@ON
msg : [JW_AND->POT] LED@OFF
Disconnect ID:JW_AND ( ip:192.168.100.90,fd:5,sockcnt:3)
Disconnect ID:POT ( ip:127.0.0.1,fd:9,sockcnt:2)
[POT] New connected! ( ip:127.0.0.1,fd:8,sockcnt:3)
Disconnect ID:POT ( ip:127.0.0.1,fd:8,sockcnt:2)
[POT] New connected! ( ip:127.0.0.1,fd:5,sockcnt:3)
msg : [JW_UBT->ALLMSG] LED@ON
msg : [JW_UBT->ALLMSG] LED@OFF
msg : [JW_SQL->ALLMSG] GETWATER@5
msg : [POT->JW_SQL] WATER@0.17
msg : [POT->PHONE] WATER@0.17
msg : [POT->JW_SQL] WATER@0.10
msg : [POT->PHONE] WATER@0.10
msg : [POT->JW_SQL] WATER@0.00
msg : [POT->PHONE] WATER@0.00
msg : [POT->JW_SQL] WATER@0.02
msg : [POT->PHONE] WATER@0.02
msg : [JW_SQL->ALLMSG] GETWATER
msg : [POT->JW_SQL] WATER@0.05
msg : [POT->PHONE] WATER@0.05
```

9. 10.10.141.79 (1)

• iot_client_sensor

```
inserted 1 rows
[JW_UBT]LED@ON
[JW_UBT]LED@OFF
GETWATER@5
[JW_SQL]GETWATER@5
[POT]WATER@0.17
db insert into pot(name, date, time, water) values("POT",now()
,now(),0.170000)
inserted 1 rows
[POT]WATER@0.10
db insert into pot(name, date, time, water) values("POT",now()
,now(),0.100000)
inserted 1 rows
[POT]WATER@0.00
db insert into pot(name, date, time, water) values("POT",now()
,now(),0.000000)
inserted 1 rows
[POT]WATER@0.02
db insert into pot(name, date, time, water) values("POT",now()
,now(),0.020000)
inserted 1 rows
GETWATER
```

```
pi@pi19:~/iot_server/iot_client_Bluetooth $ ./iot_client_bluetooth 127.0.0.1 5000 POT
SRV:[POT] New connected! ( ip:127.0.0.1,fd:8,sockcnt:3)
^C
pi@pi19:~/iot_server/iot_client_Bluetooth $ ./iot_client_bluetooth 127.0.0.1 5000 POT
SRV:[POT] New connected! ( ip:127.0.0.1,fd:5,sockcnt:3)
SRV:[JW_UBT]LED@ON
SRV:[JW_UBT]LED@OFF
SRV:[JW_SQL]GETWATER@5
ARD:[JW_SQL]WATER@0.17
ARD:[PHONE]WATER@0.17
[JW_SQL]GETWATER@5
ARD:[JW_SQL]WATER@0.10
ARD:[PHONE]WATER@0.10
ARD:[JW_SQL]WATER@0.00
ARD:[PHONE]WATER@0.00
ARD:[JW_SQL]WATER@0.02
ARD:[PHONE]WATER@0.02
SRV:[JW_SQL]GETWATER
ARD:[JW_SQL]WATER@0.05
ARD:[PHONE]WATER@0.05
```

10. 10.10.141.79 (1)

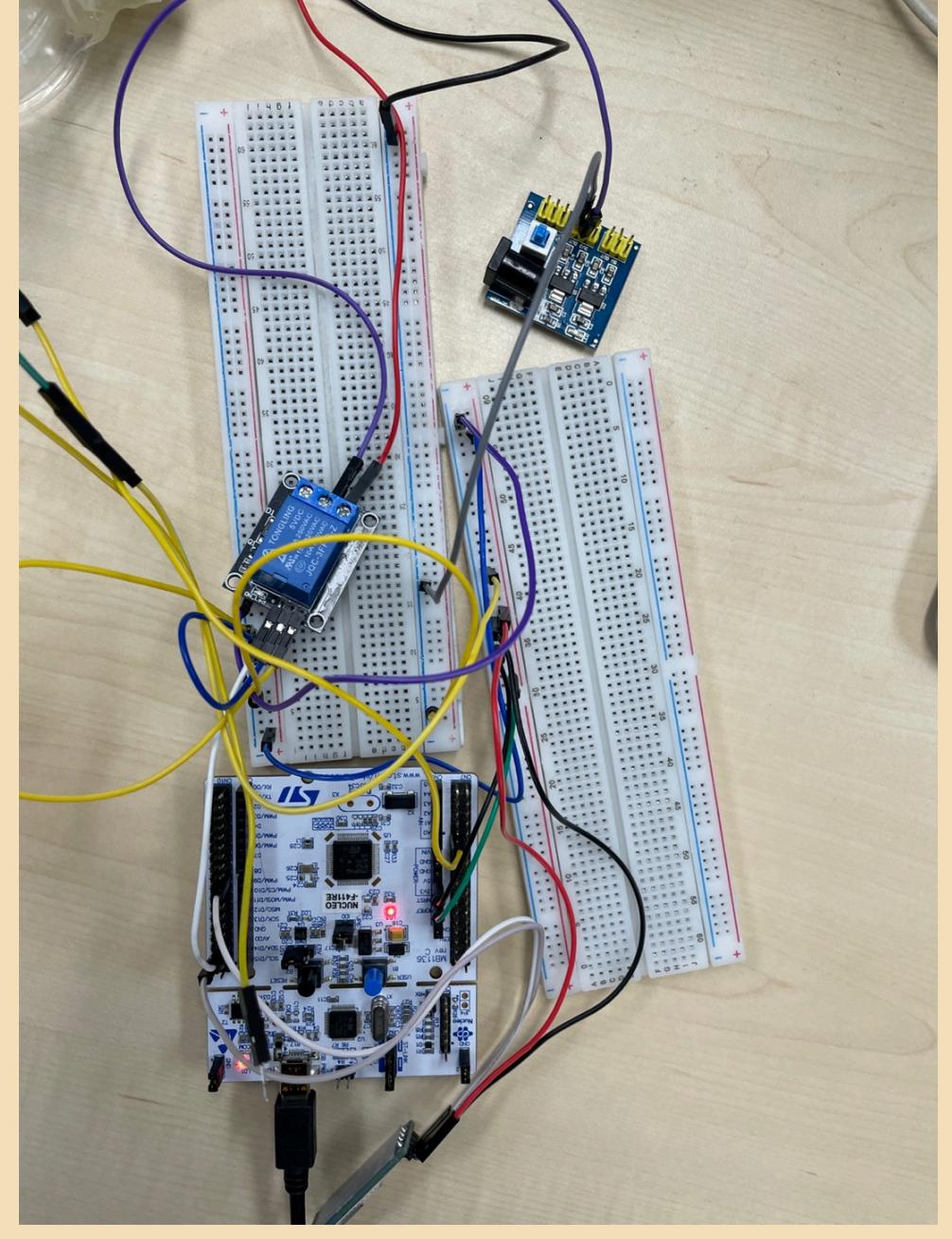
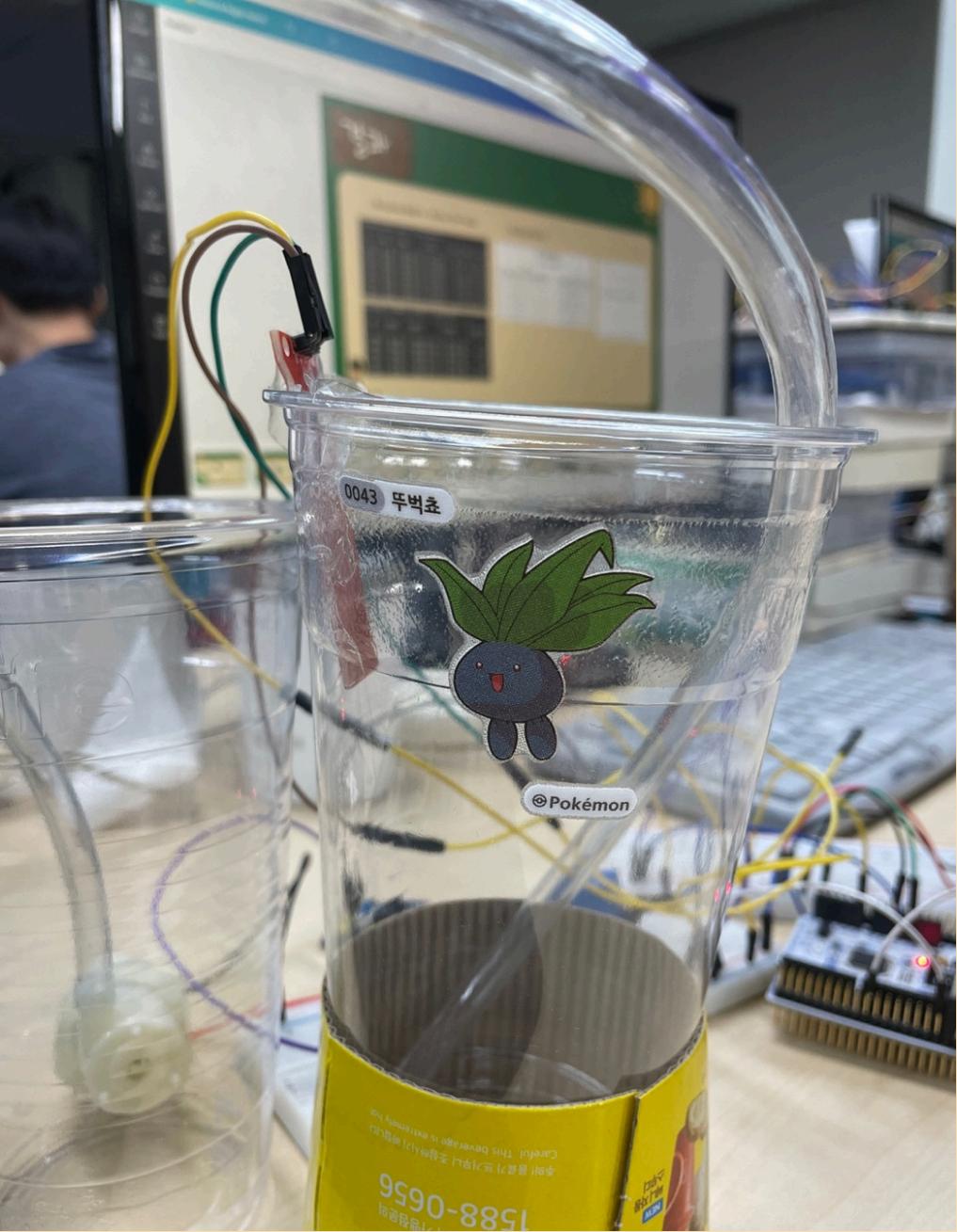
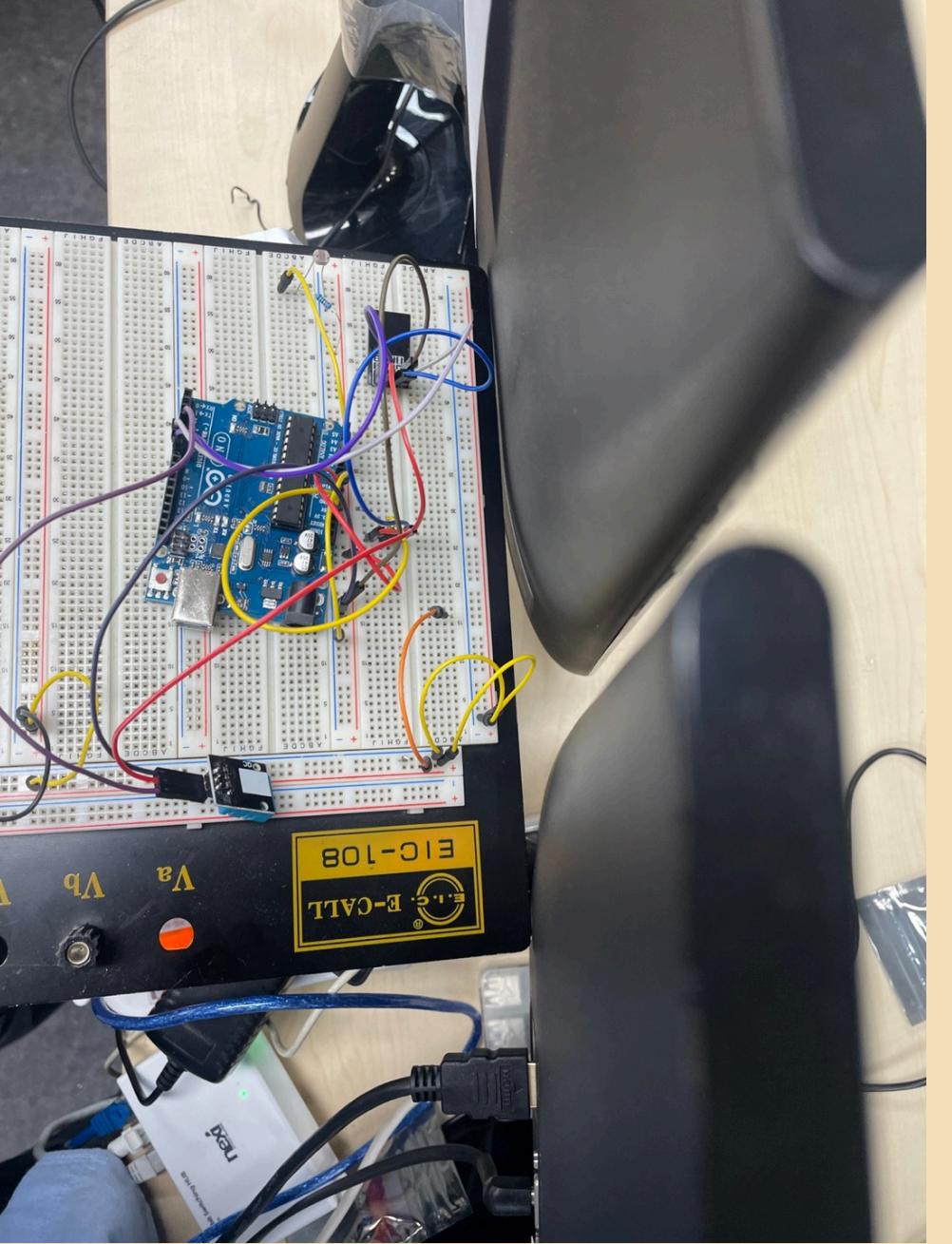
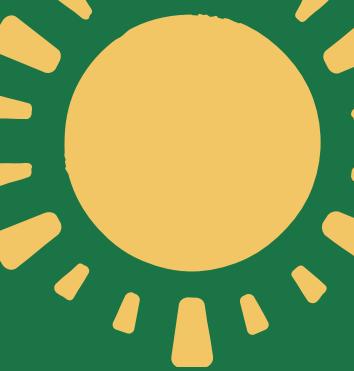
• iot_client_bluetooth

```
iPuTTY - COM3
[JW_SQL]WATER@0.17
[PHONE]WATER@0.17
[JW_SQL]WATER@0.10
[PHONE]WATER@0.10
[JW_SQL]WATER@0.00
[PHONE]WATER@0.00
[JW_SQL]WATER@0.02
[PHONE]WATER@0.02
bt : [JW_SQL]GETWATER
btData : [JW_SQL]GETWATER
[JW_SQL]WATER@0.05
[PHONE]WATER@0.05
```

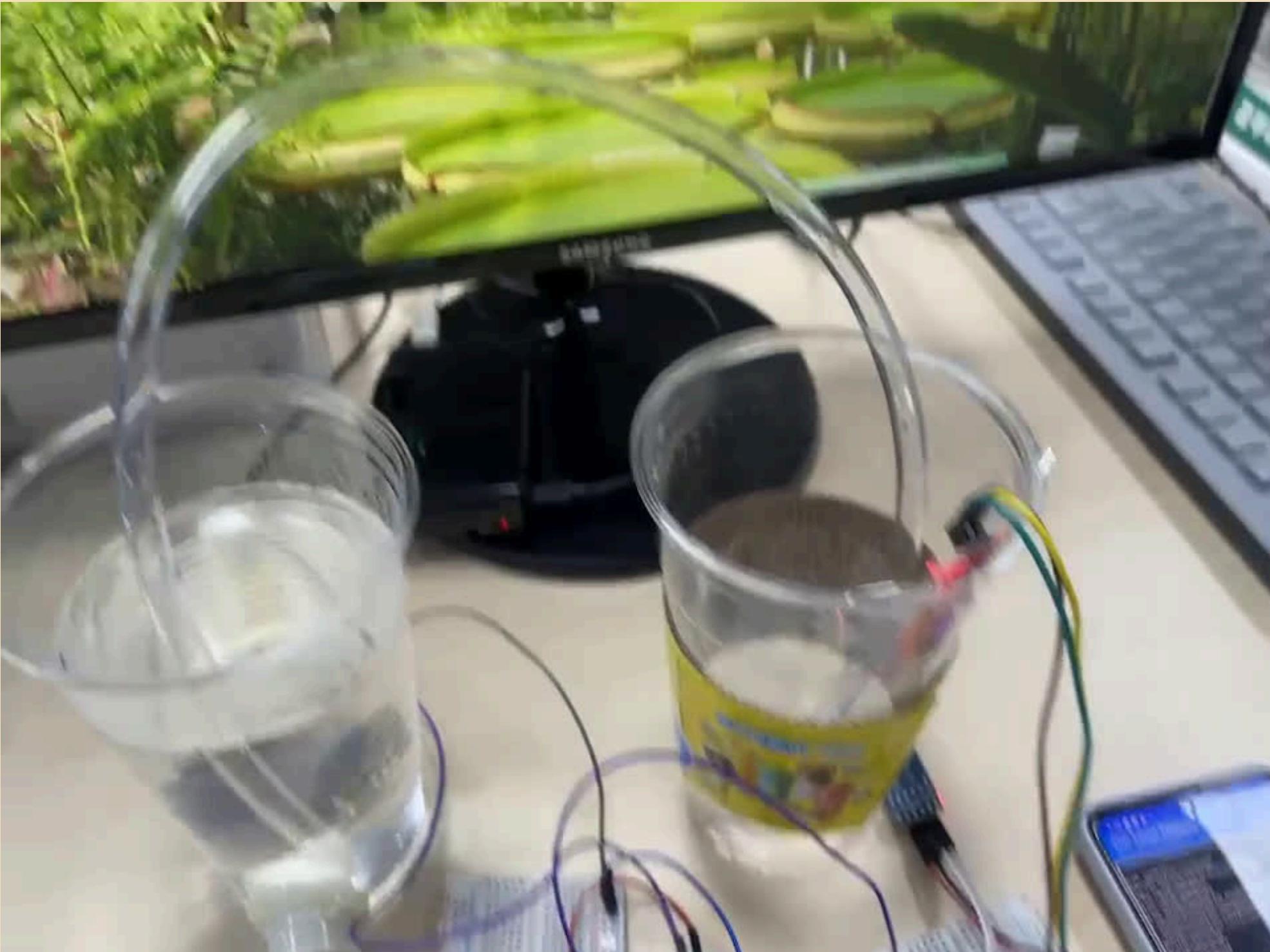
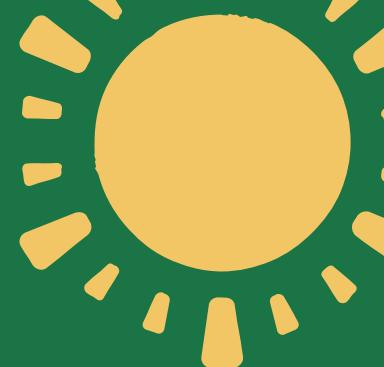
• STM32 uart2



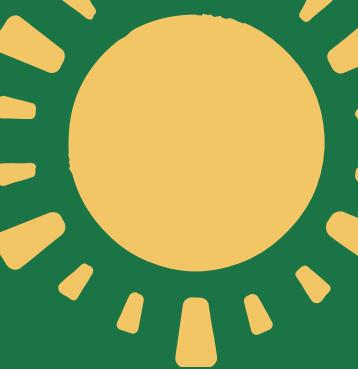
구현



시연영상



결과

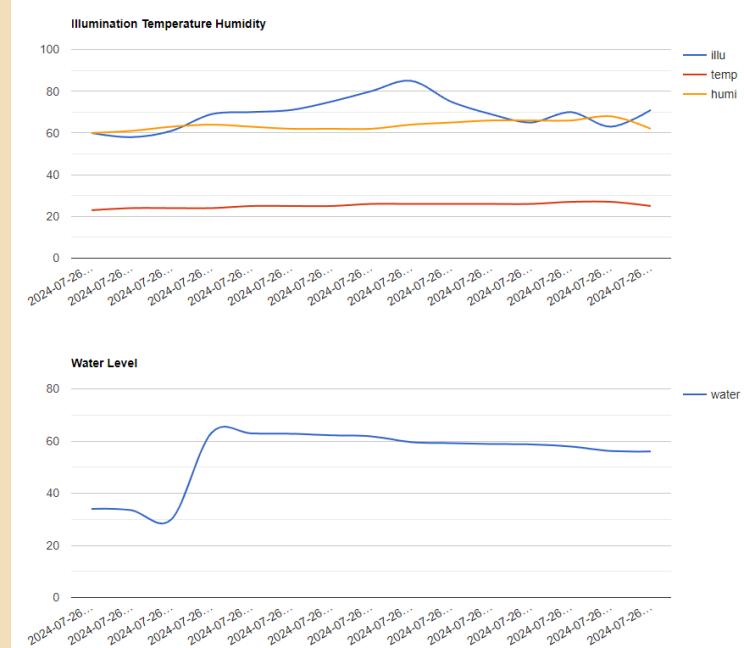
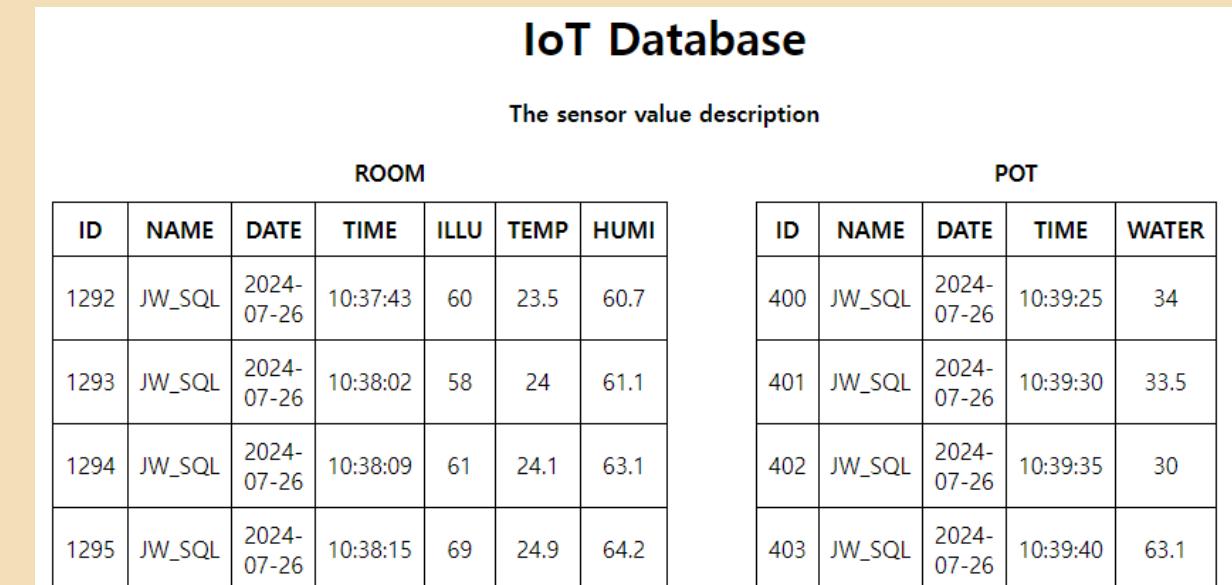


- Database Update - Sensor, Pot table

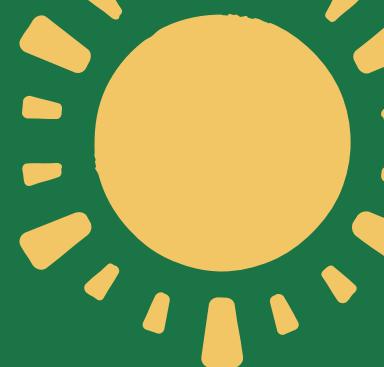
```
MariaDB [iotdb]> select * from sensor;
+----+-----+-----+-----+-----+-----+
| id | name | date | time | illu | temp | humi |
+----+-----+-----+-----+-----+-----+
| 1292 | JW_SQL | 2024-07-26 | 10:37:43 | 60 | 23.5 | 60.7 |
| 1293 | JW_SQL | 2024-07-26 | 10:38:02 | 58 | 24 | 61.1 |
| 1294 | JW_SQL | 2024-07-26 | 10:38:09 | 61 | 24.1 | 63.1 |
| 1295 | JW_SQL | 2024-07-26 | 10:38:15 | 69 | 24.9 | 64.2 |
| 1296 | JW_SQL | 2024-07-26 | 10:38:21 | 70 | 25.1 | 63.3 |
| 1297 | JW_SQL | 2024-07-26 | 10:38:26 | 71 | 25.3 | 62.3 |
| 1298 | JW_SQL | 2024-07-26 | 10:38:32 | 75 | 25.8 | 62.5 |
| 1299 | JW_SQL | 2024-07-26 | 10:38:40 | 80 | 26 | 62.8 |
```

```
MariaDB [iotdb]> select * from pot;
+----+-----+-----+-----+-----+
| id | name | date | time | water |
+----+-----+-----+-----+-----+
| 400 | JW_SQL | 2024-07-26 | 10:39:25 | 34 |
| 401 | JW_SQL | 2024-07-26 | 10:39:30 | 33.5 |
| 402 | JW_SQL | 2024-07-26 | 10:39:35 | 30 |
| 403 | JW_SQL | 2024-07-26 | 10:39:40 | 63.1 |
| 404 | JW_SQL | 2024-07-26 | 10:39:46 | 62.9 |
```

- Webpage Update



개선사항



**토양 습도 낮을 경우,
PUMP 작동 자동화**



**DB 누적 정보를 통해,
조명 작동 자동화**



**토양 영양분
모니터링 센서 적용**



감사합니다