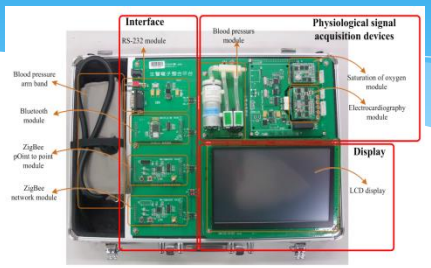
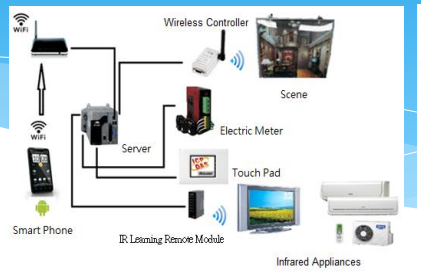
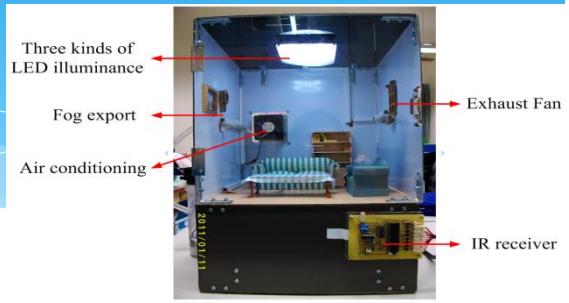
Laboratory Research Focus and Introduction

Host: Prof. Wen-Tsai Sung
Department of Electrical Engineering ,
National Chin-Yi University of Technology, Taiwan

(Our Lab. Research Project)







Technology

- IOT
- Sensors
- WSNs
- Cloud
- RFID
- Embedded
- WOT

Special topic

1. Automation Aquaculture and Environmental Monitoring System
2. Remote Medical Care System
3. Wisdom LED Lighting Control System
4. Intelligent Life Environmental Monitoring and Automation System

Related Applications

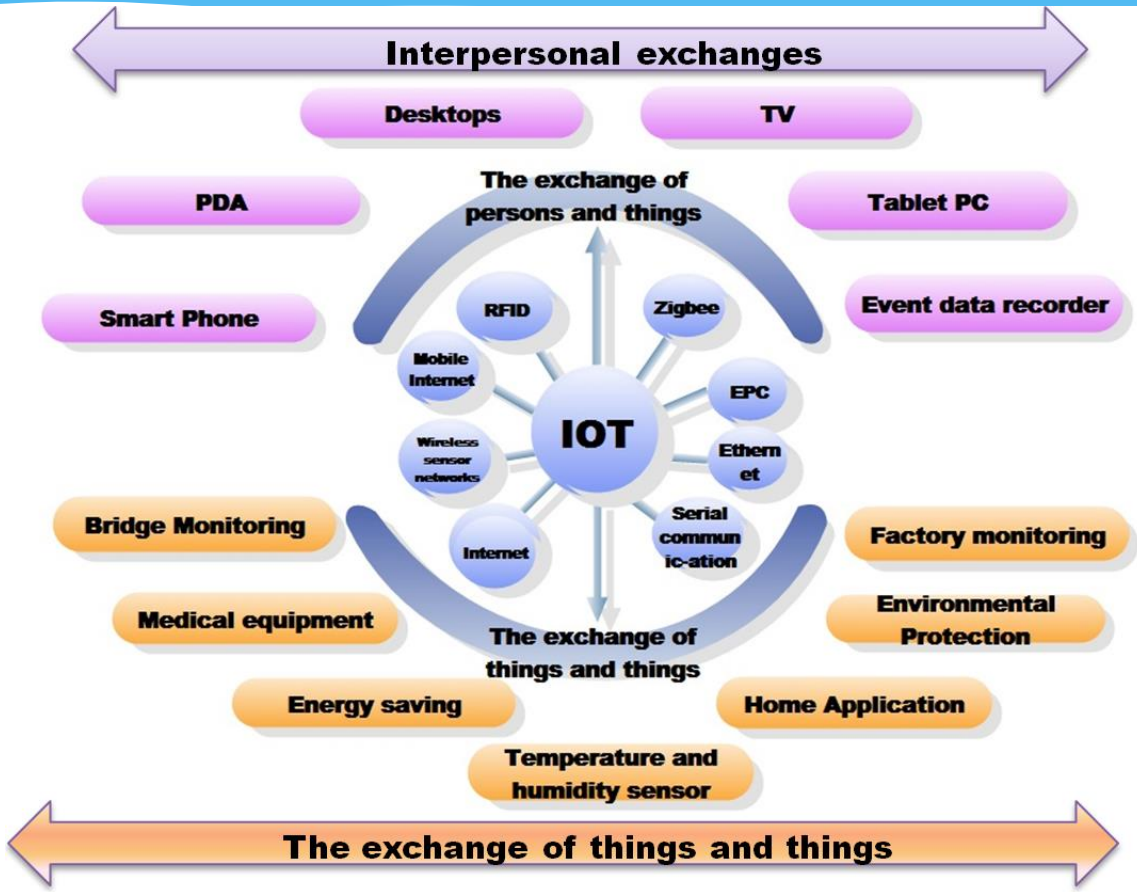
Sensing
Cloud
Application

- Patent
- Published
- Technology Transfer

The Lab. I host is TI University Joint Lab and Maker Race Training Base

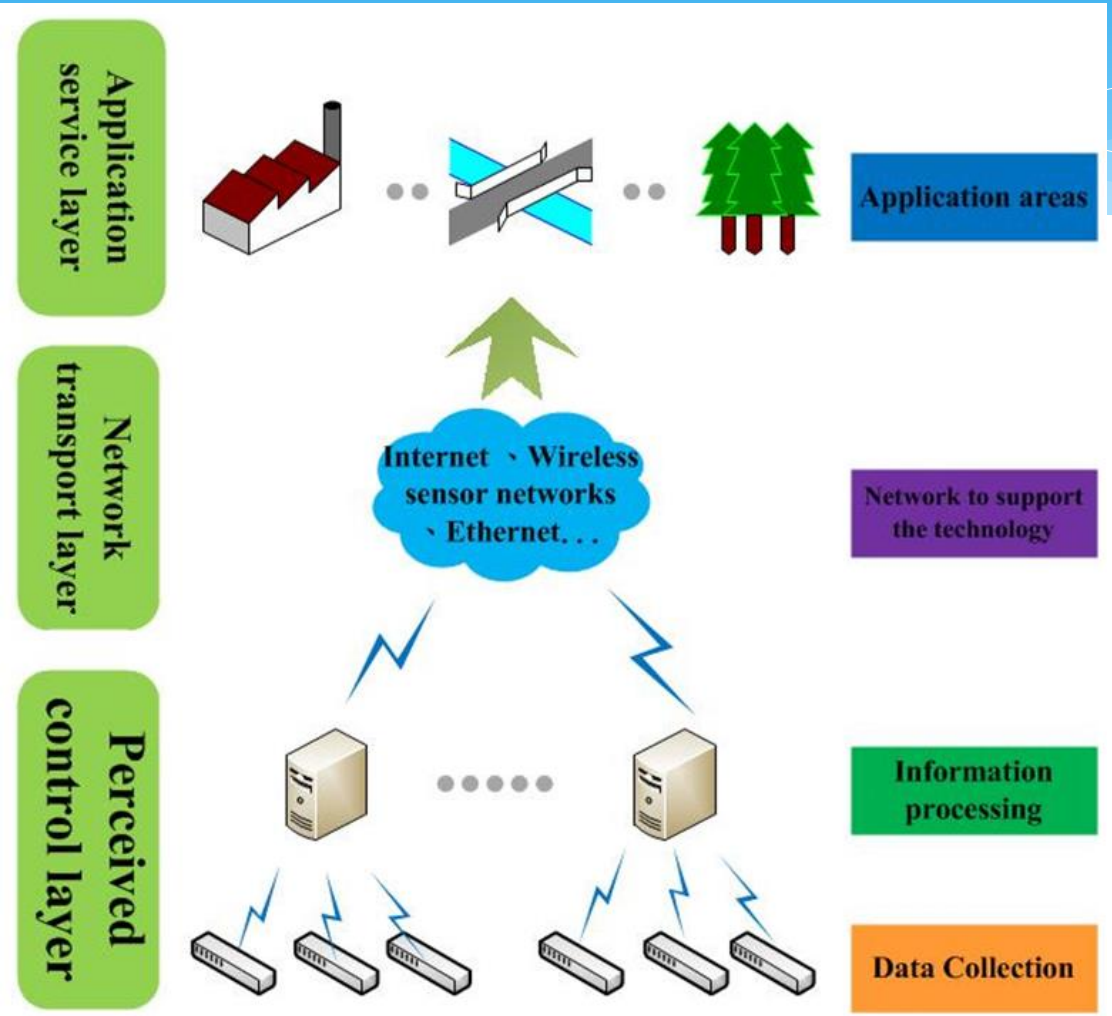
The Lab. I host is Intel University Joint Lab

Technologies involved and related applications of IoT.

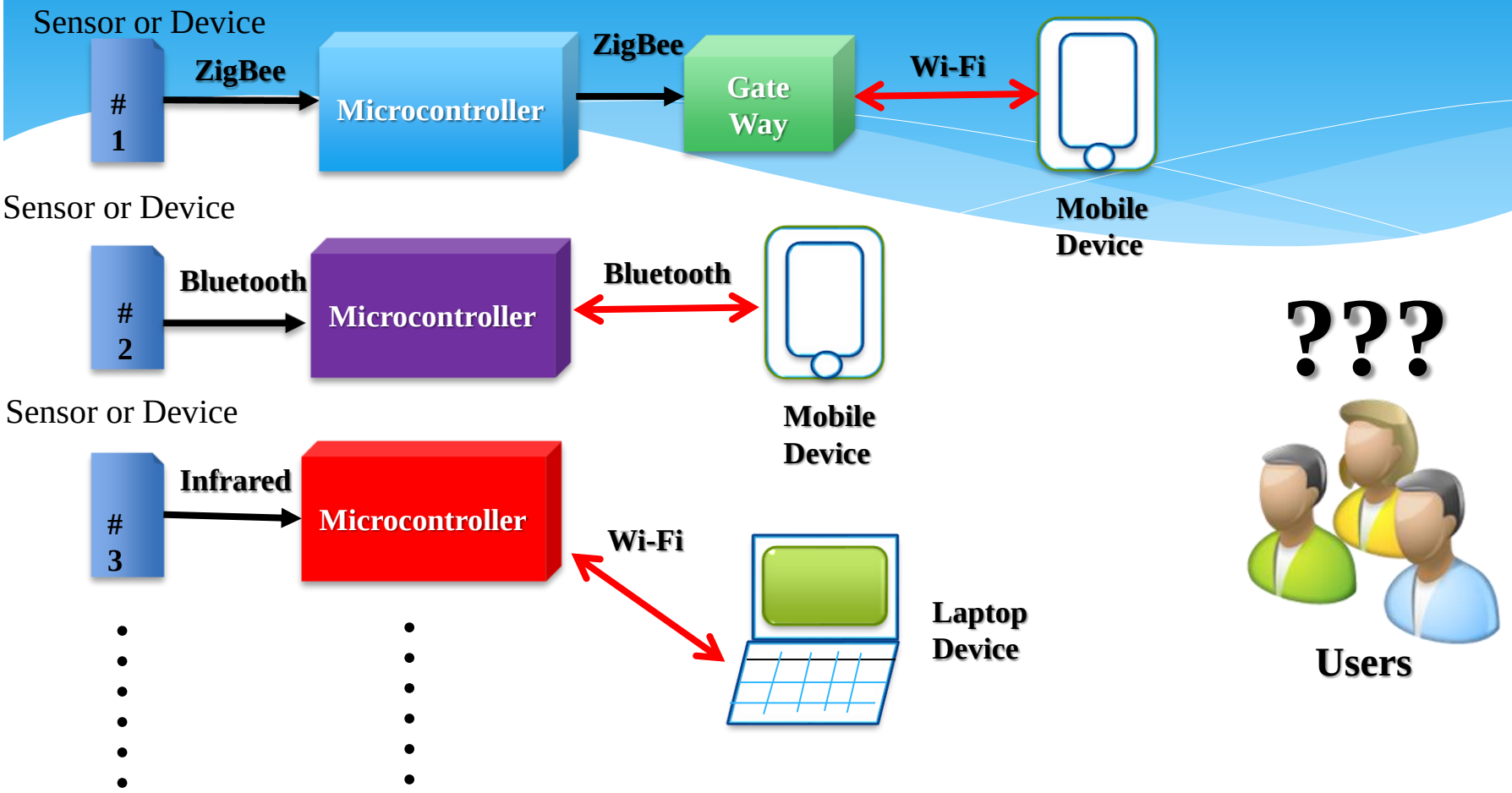


An IOT providing smart service is the combination of an Internet and a Sensors Network.

IoT architecture

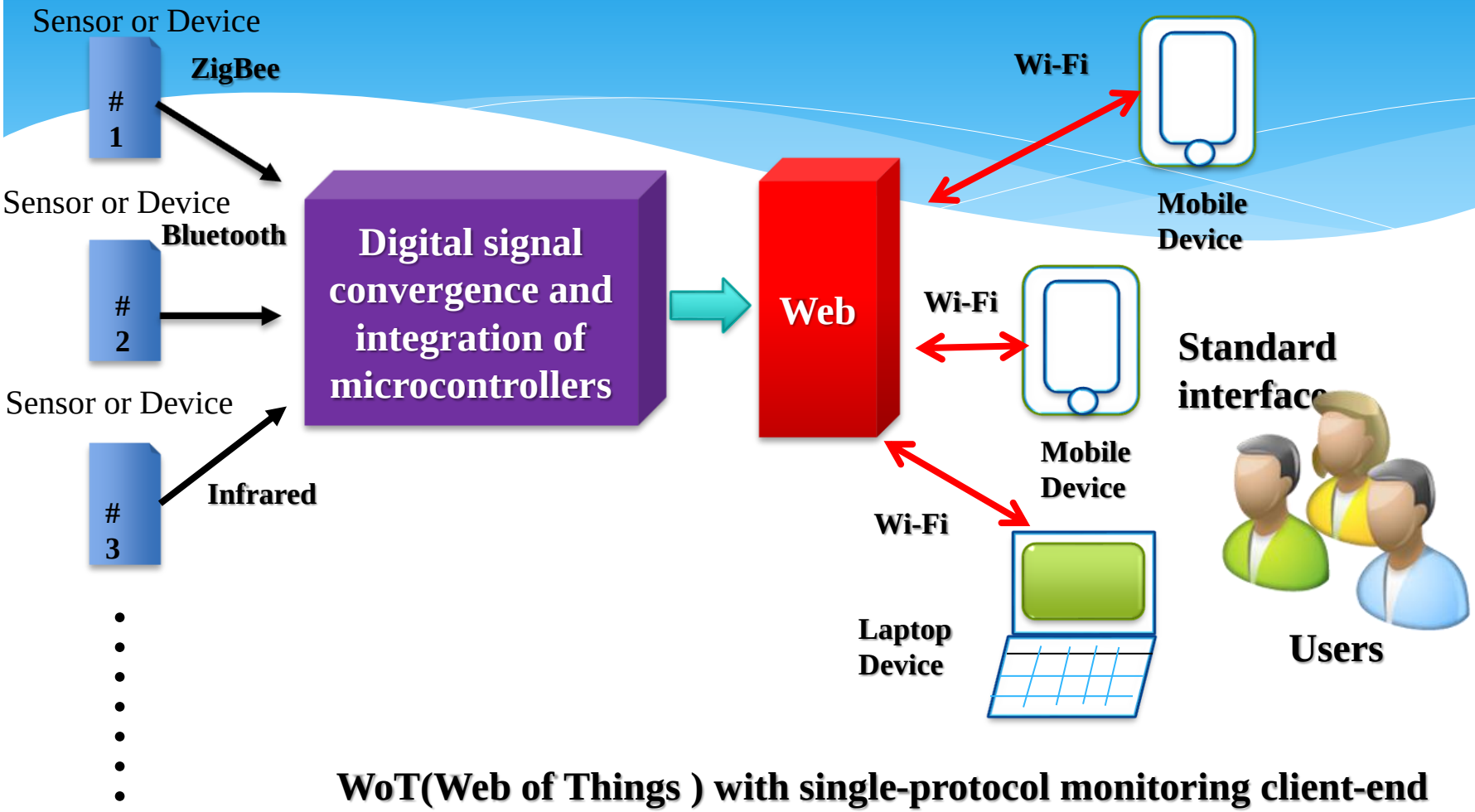


IOT and WOT comparison



IoT(Internet of Things) with multi-protocol monitoring client-end

IOT and WOT comparison



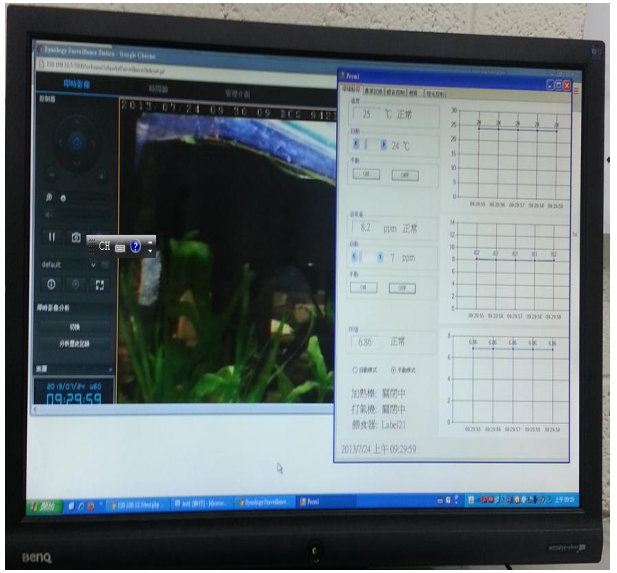
WoT(Web of Things) with single-protocol monitoring client-end

Arduino PWM Experiment-IoT Basic

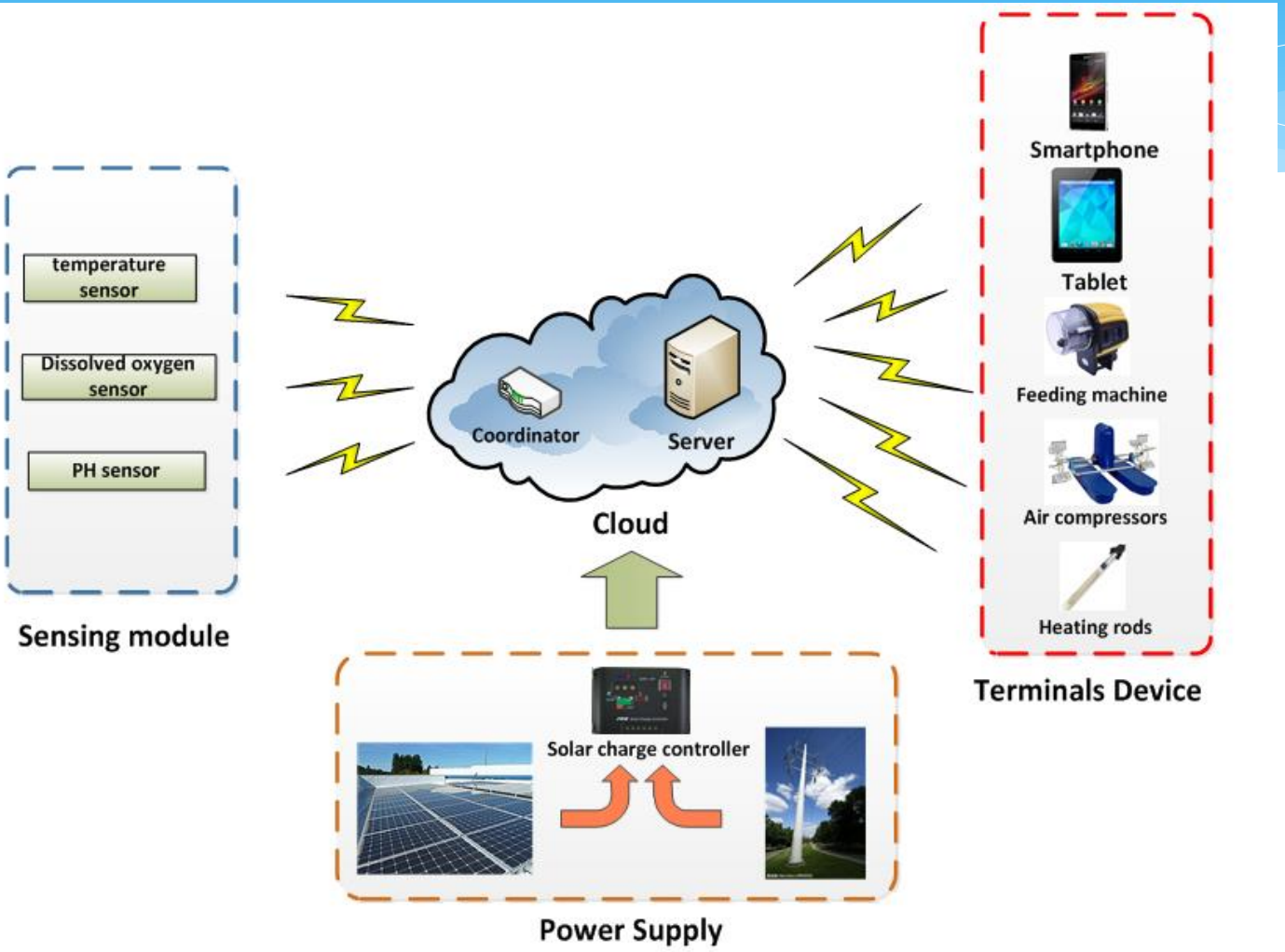
The 2014 IEEE International Conference on Systems, Man, and Cybernetics (SMC2014)

Paper Title: Multisensors Realtime Data Fusion Optimization for IOT Systems

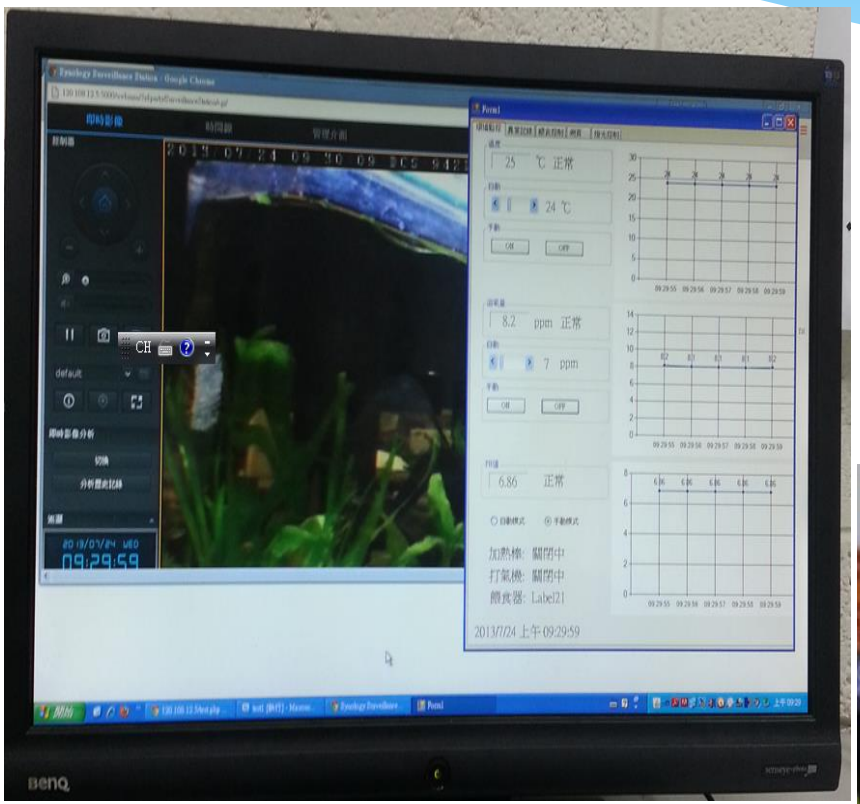
Automation Aquaculture and Environmental Monitoring System



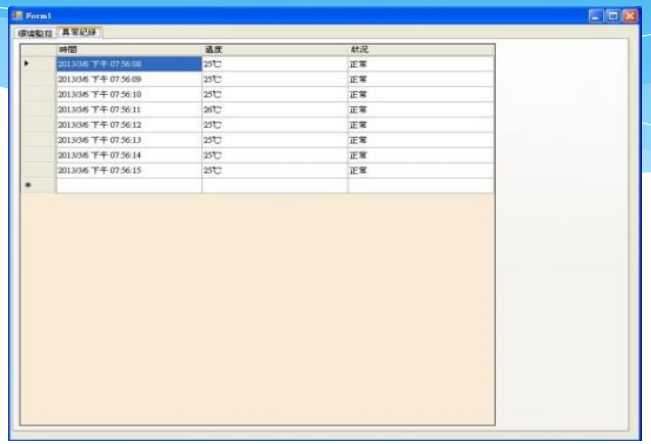
Automation Aquaculture and Environmental Monitoring System--System Architecture



Automation Aquaculture and Environmental Monitoring System--Wireless monitoring interface



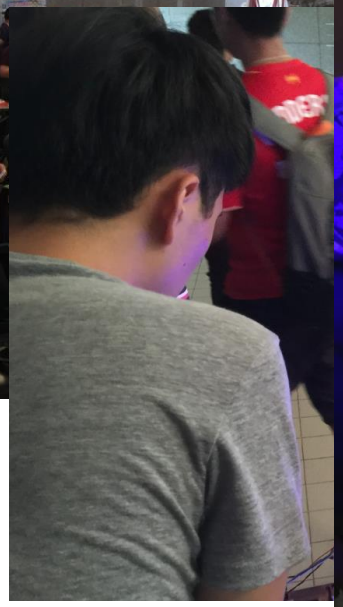
IP Camera real-time images and monitoring GUI

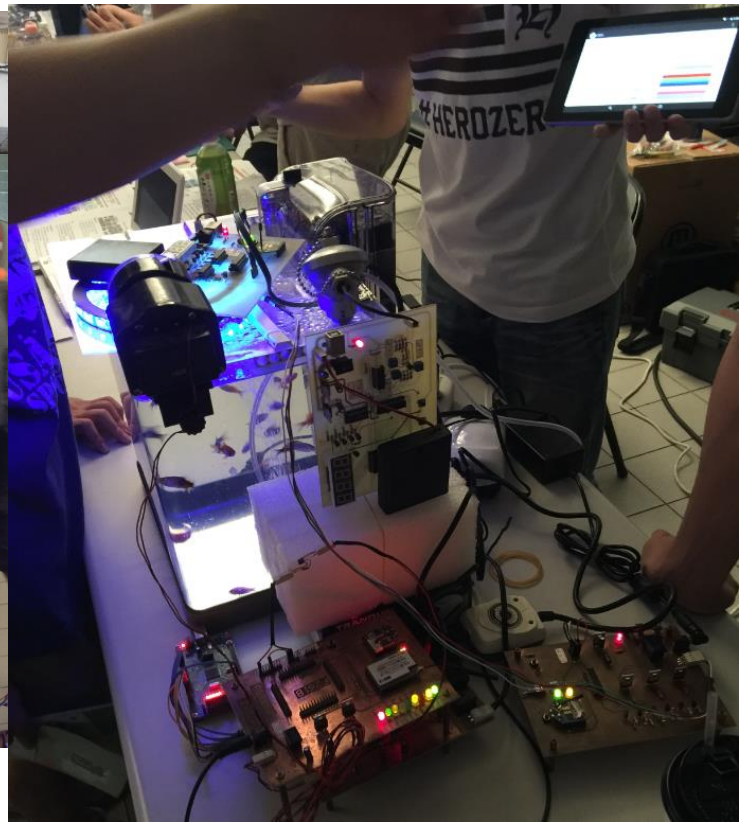


Abnormal record interface

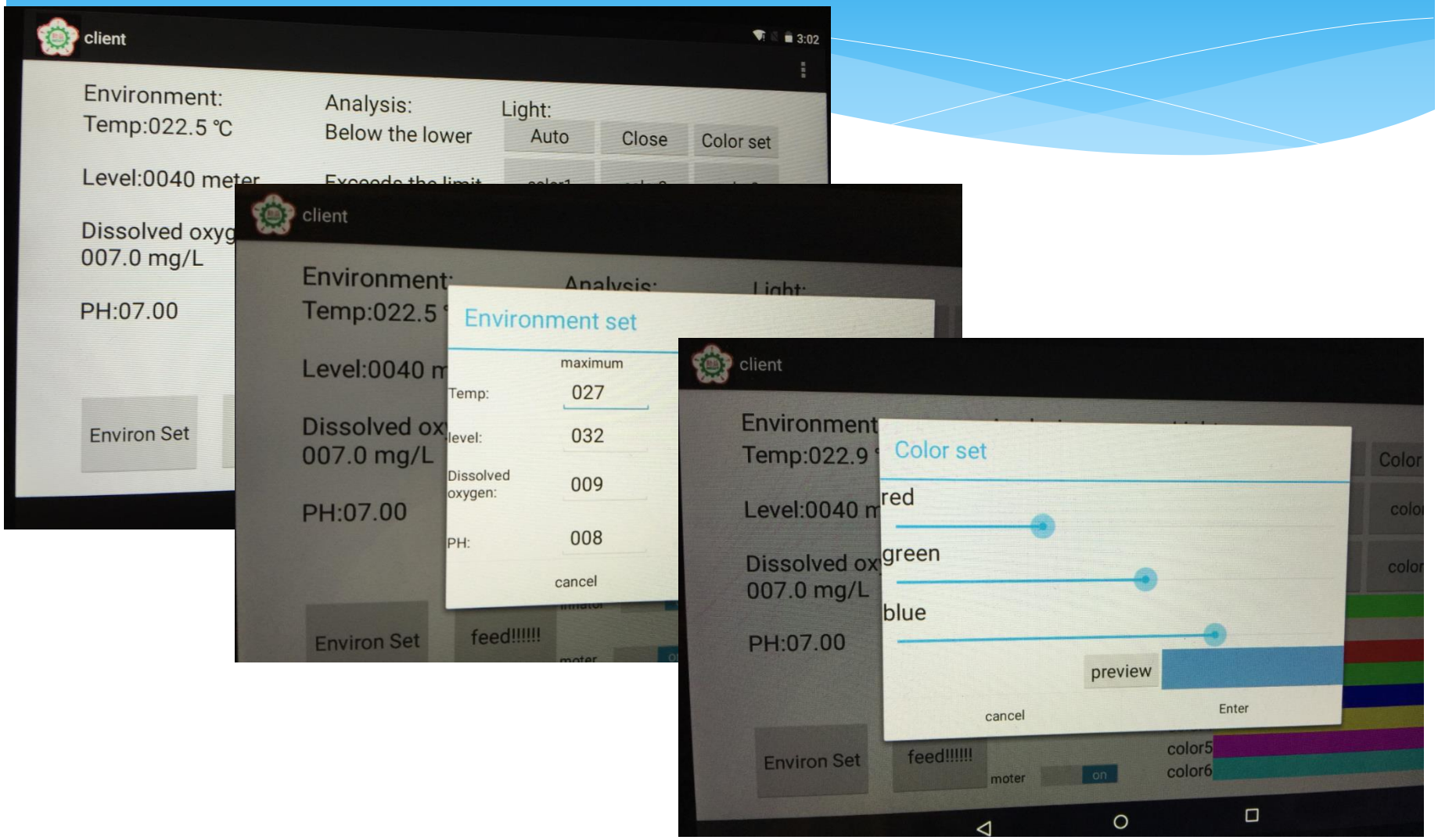
Various Colors LED Function

Automation Aquaculture and Environmental Monitoring System--Wireless monitoring interface





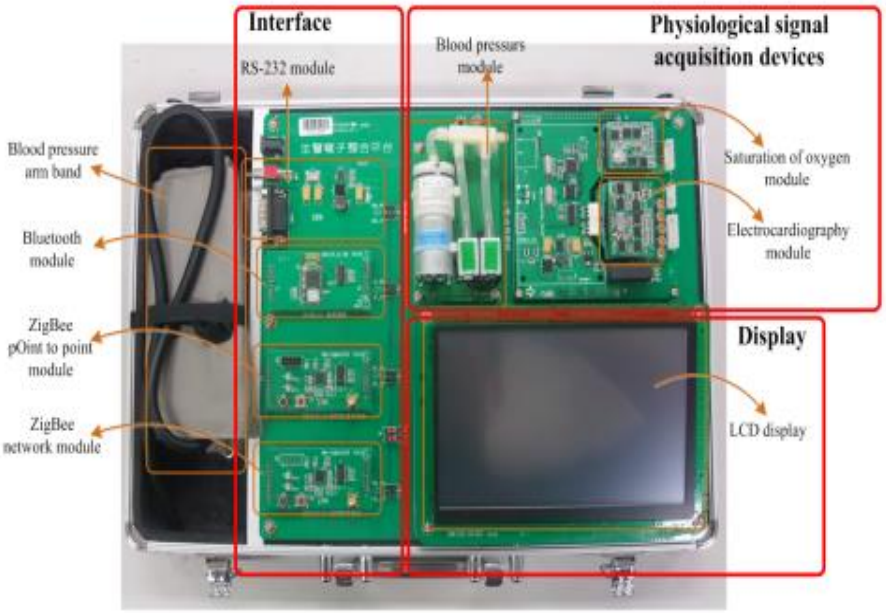
Automation Aquaculture and Environmental Monitoring System--Wireless monitoring interface

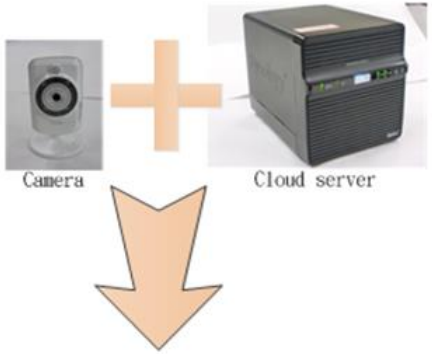


The Lab. I host is TI University Joint Lab and Maker Race Training Base

Wen-Tsai Sung*, Jui-Ho Chen, Kung-Wei Chang, "Mobile Physiological Measurement Platform with Cloud and Analysis Functions Implemented via IPSO", **IEEE Sensors Journal**, Volume:14 , Issue: 1,pp 111 – 123, Jan. 2014 **(SCIE/EI) IF: 1.475.**

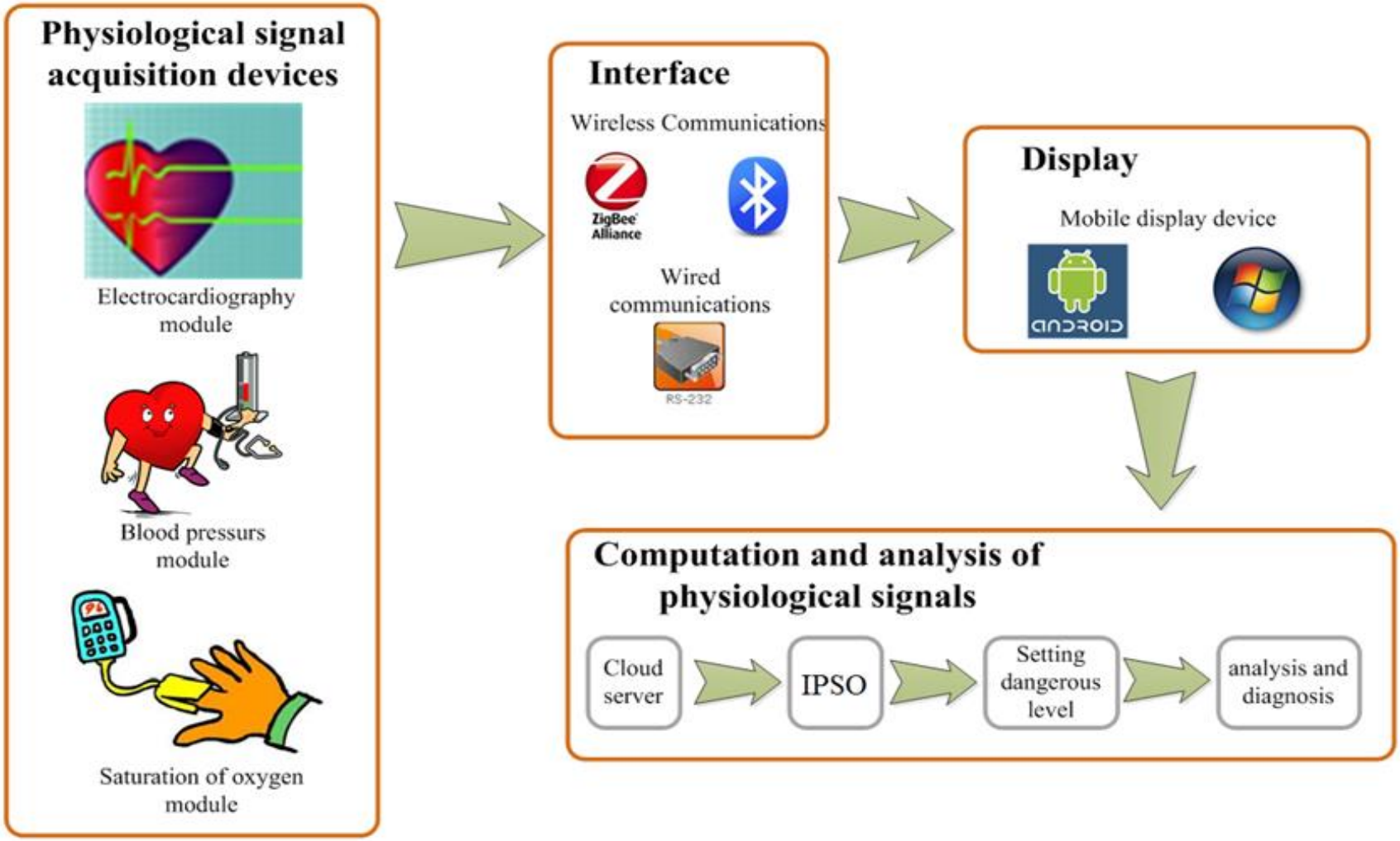
Remote Medical Care System





Remote monitoring interface

Remote Medical Care System-- System architecture diagram



Remote Medical Care System-Actual measurement flowchart system

ECG

Blood pressure

Saturation of oxygen

Mobile devices

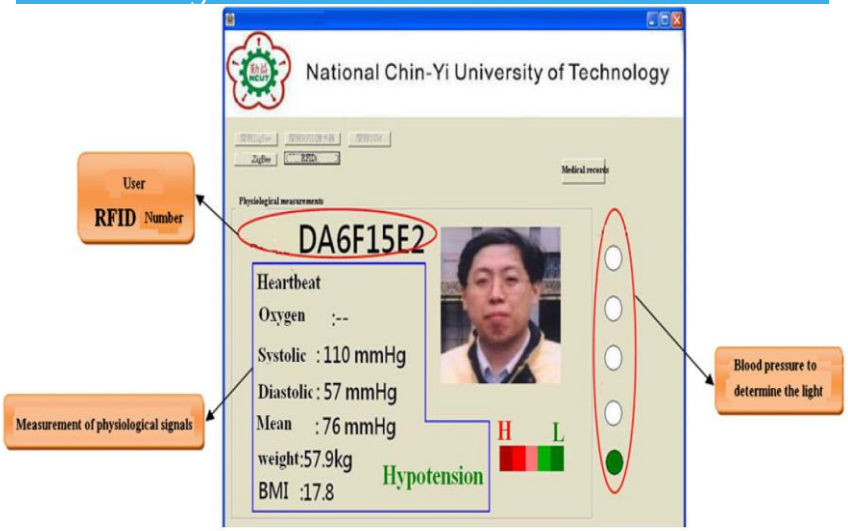
PC interface

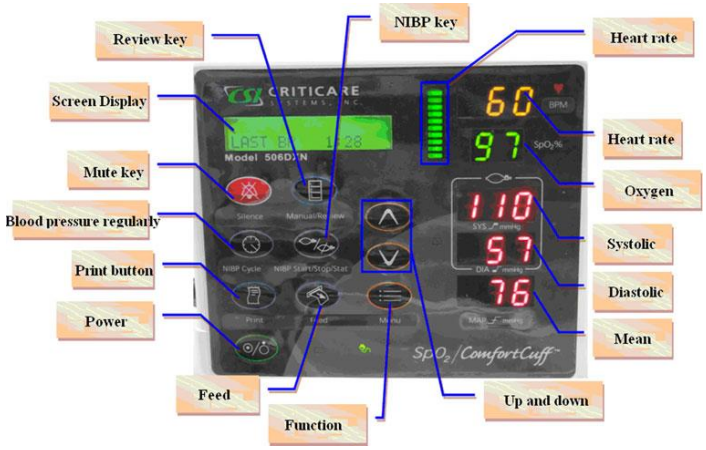
Camera

Cloud server

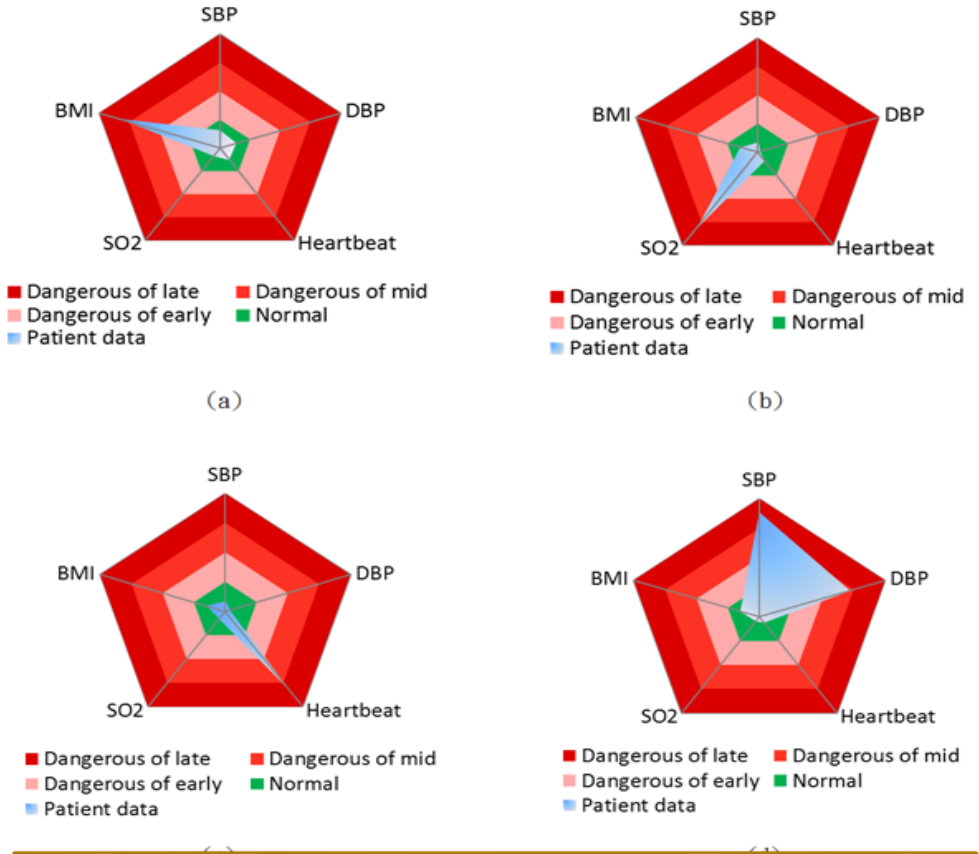
Remote monitoring interface

Remote Medical Care System--Experimental Implementation and analysis





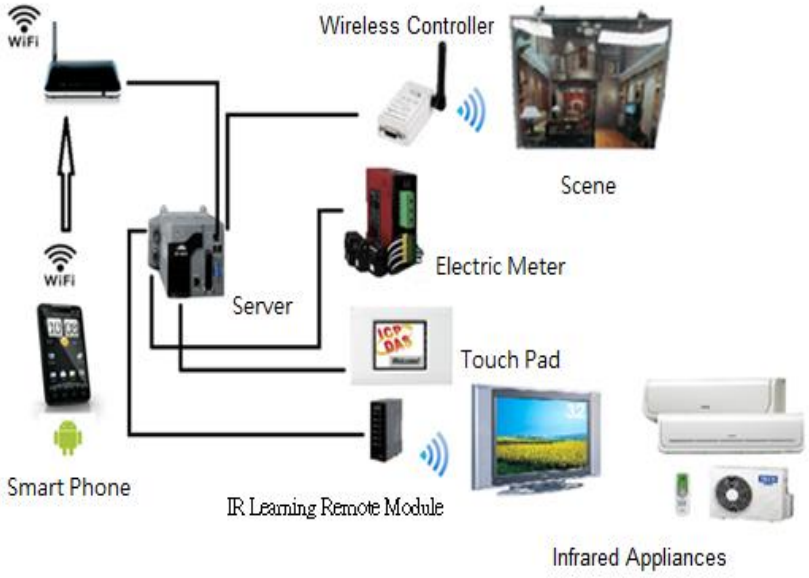
The system measurements diagram

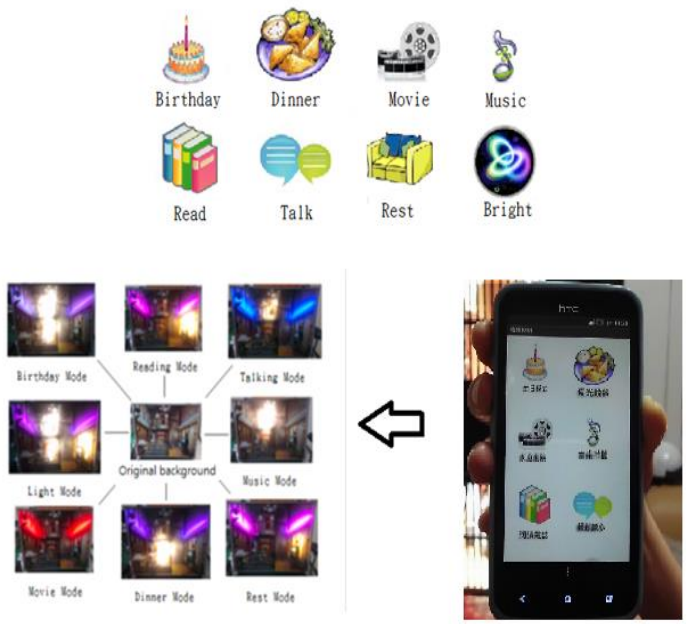


Physiological data index chart. (a) BMI value indicating patient is overweight, (b) oxygen saturation is deficient, (c) heartbeat is too fast, (d) blood pressure is too high.

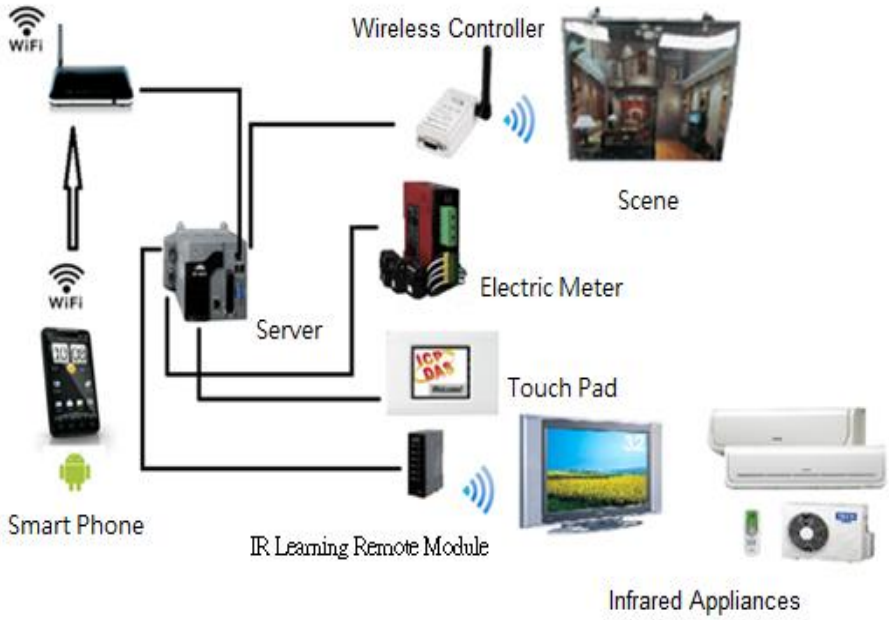
Wen-Tsai Sung*, Jia-Syun Lin, "Design and Implementation of a Smart LED Lighting System Using a Self Adaptive Weighted Data Fusion Algorithm", Sensors, 13, no. 12: 16915-16939. **(SCIE/EI) IF: 1.953.**

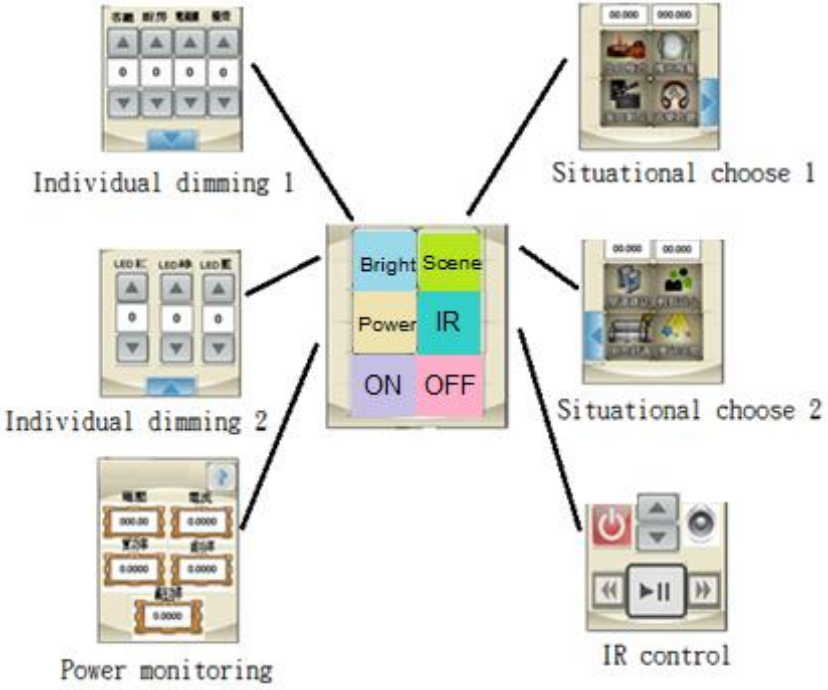
Wisdom LED Lighting Control System



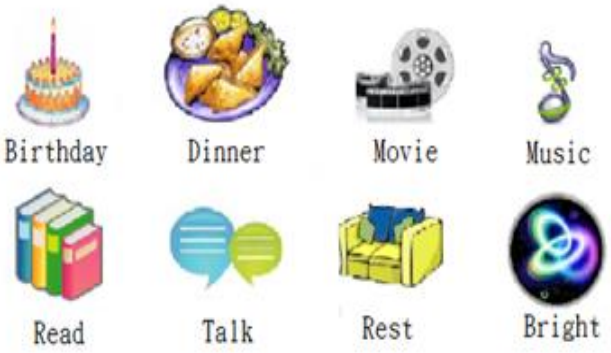


Wisdom LED Lighting Control System---System Devices architecture and Touch Pad diagram





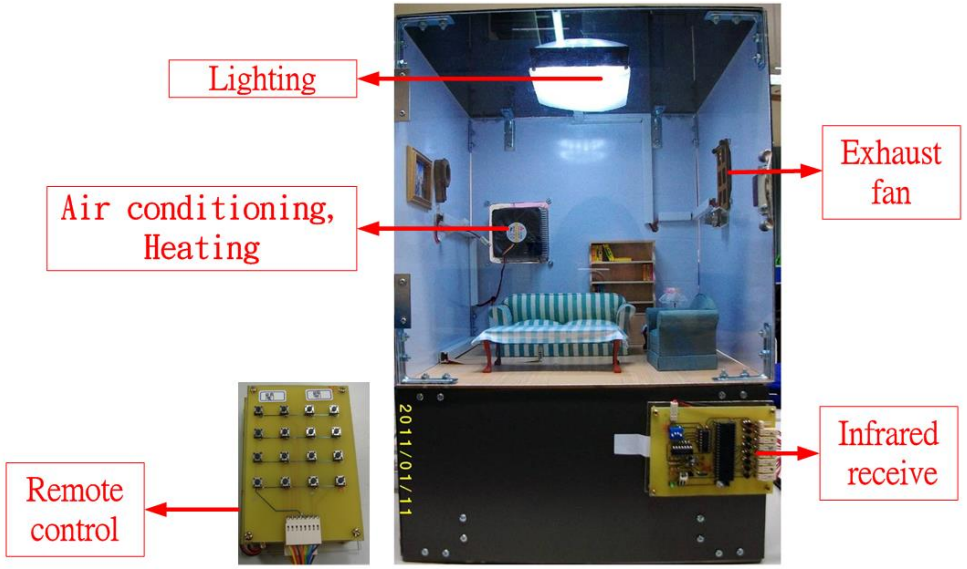
Wisdom LED Lighting Control System--The experimental results

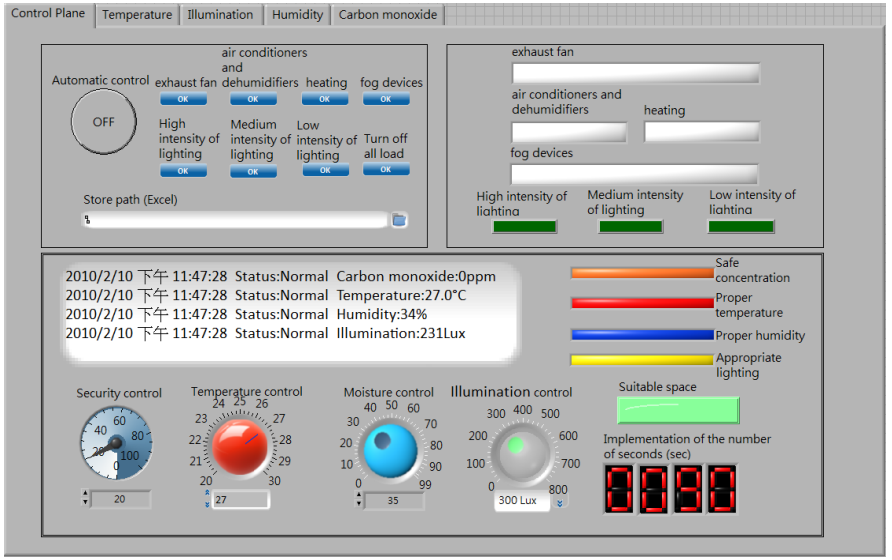


1.Wen-Tsai Sung*, Jui-Ho Chen, Hsi-Chun Wang "Optimization Data Fusion Approaches for Intelligent House System", Applied Mathematics & Information Sciences, Vol.6, No.7S ,pp. NO.14.. 2012,, (SCIE/EI) IF: 0.731

2. 2014瑞士日內瓦發明展銀牌, 2014美國匹茲堡發明展金牌(Exhibition of Inventions,)

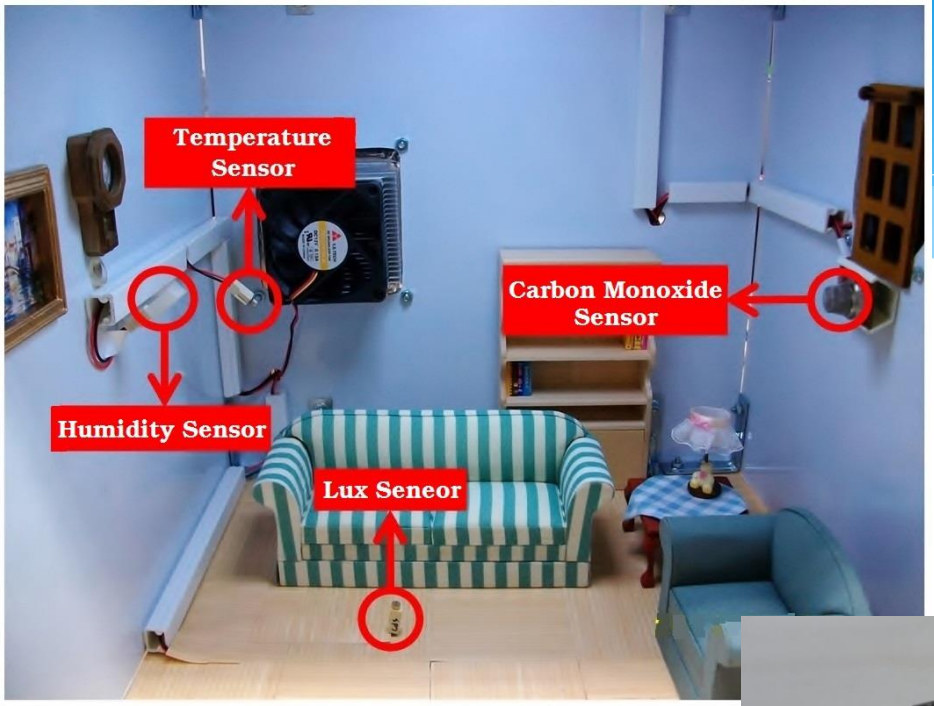
Intelligent Life Environmental Monitoring





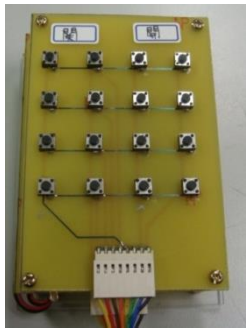
Smart house

Intelligent Life Environmental Monit

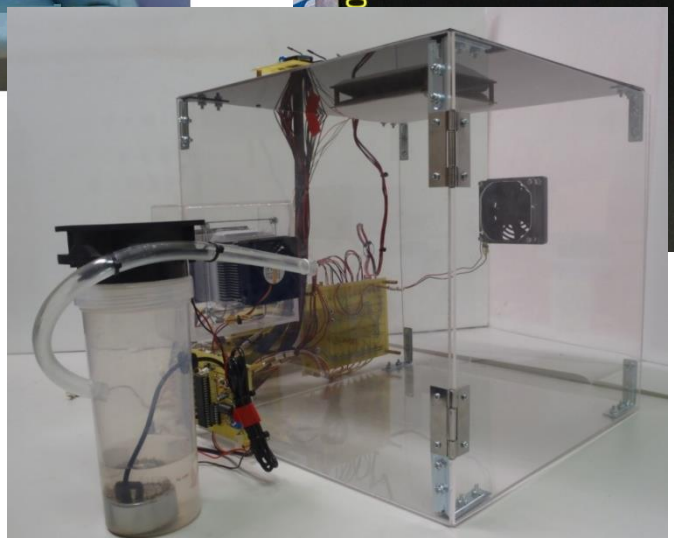


The position of sensors

Smart house



Hand-held remote control

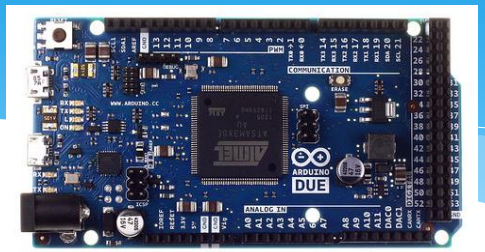


Semi-finished products

Ongoing projects

* Mobile optimizing and analyzing system
* Integrated controller connects devices and sensors by the different protocols
* Weather Station Framework

Mobile optimizing and analyzing system



Integrated controller

ZigBee

Bluetooth

RFID/NFC

Wi-Fi

User or operator

Mobile Device

FFT PCA PSO Fuzzy ACA GA

Optimizing and analyzing Algorithm

Smartphone

Login
(Username) and (Password)

System main menu items
1.Temperature and Humidity
2.Analog and Digital vibration sensor
3.Five directions flame sensor
4.PIR sensor
5.Gas sensor
6.Digital control

Temperature
Humidity

Analog & Digital
Vibration sensor

Flame
sensor

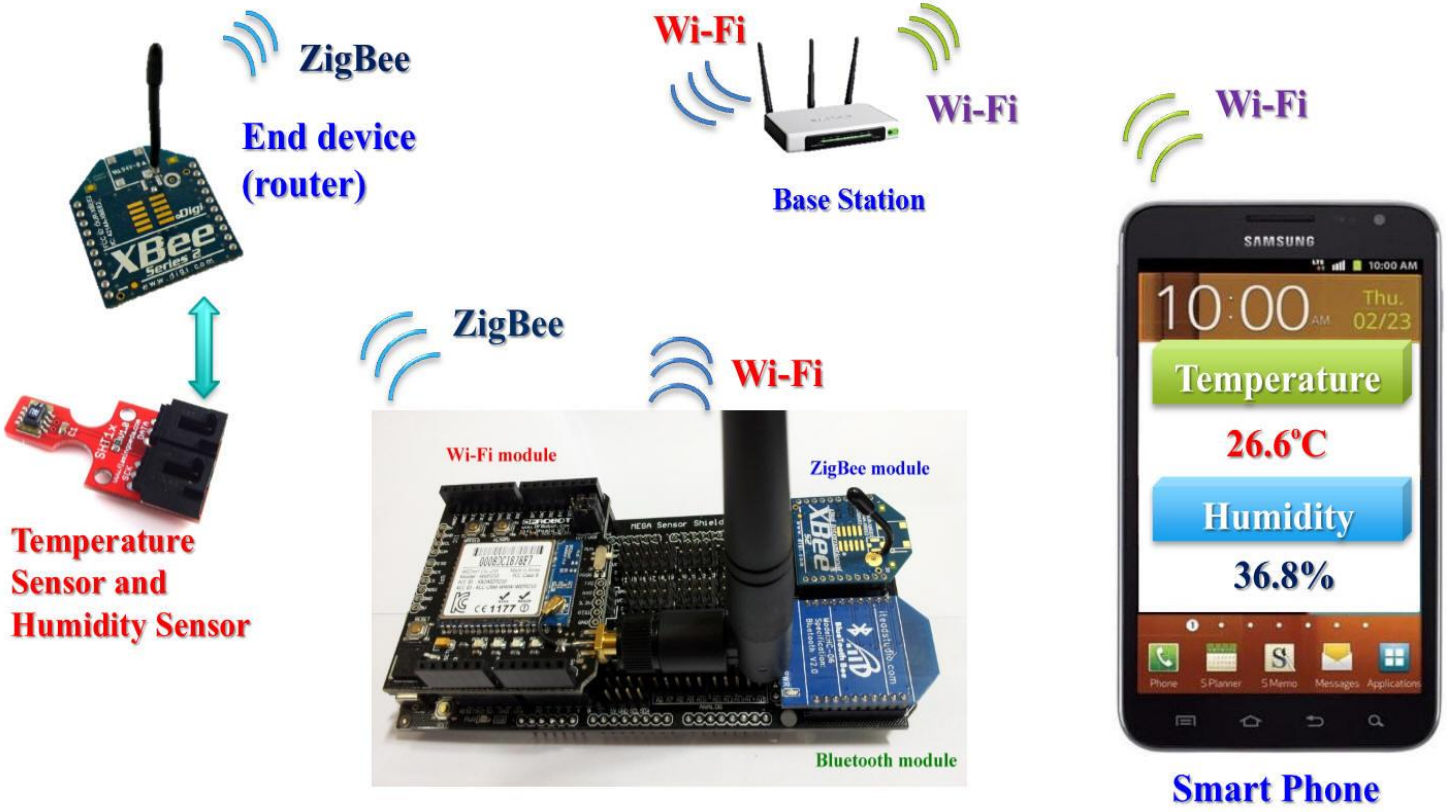
PIR
sensor

Gas
sensor

Digital
control

Integrated controller connects devices and sensors by the different protocols

Reduce radio wave interference

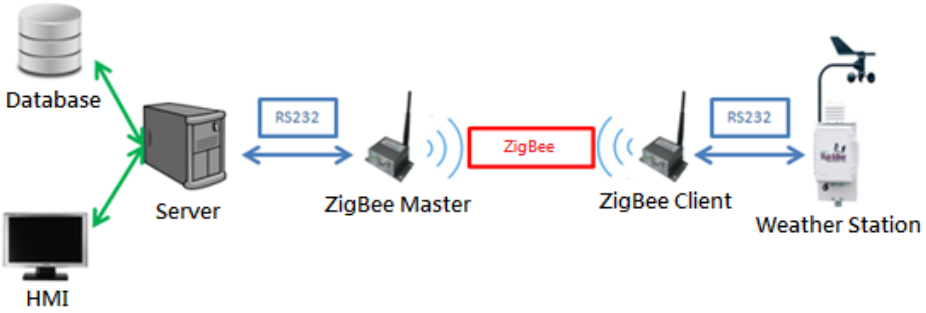


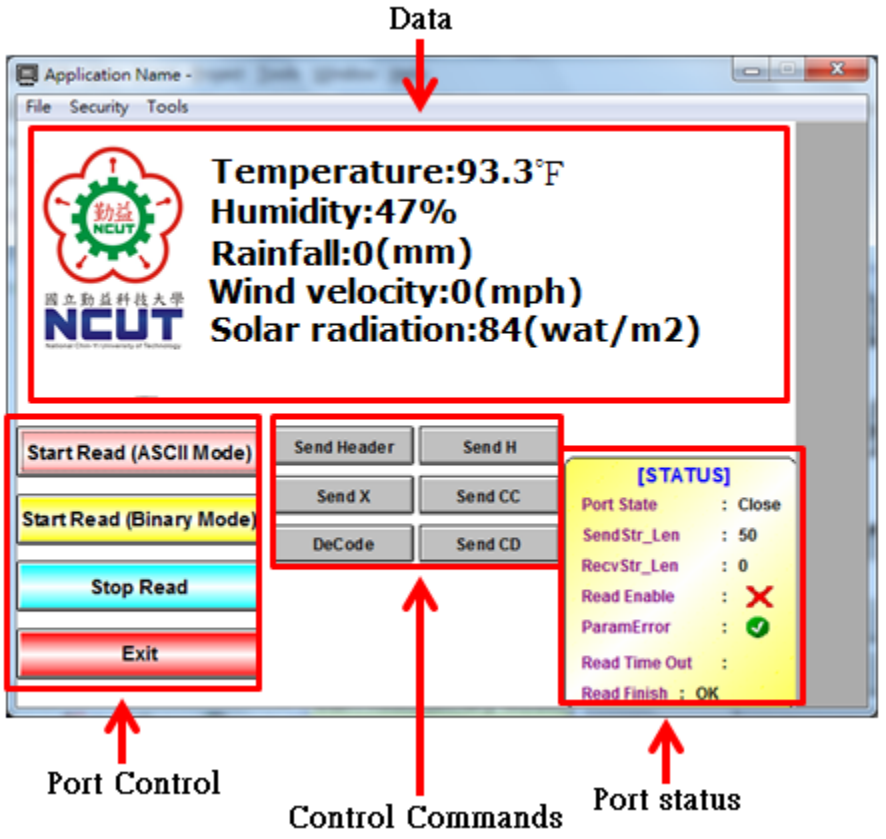
ZigBee ,Wi-Fi and Bluetooth module integration through the Arduino controller simultaneously

Weather Station Framework

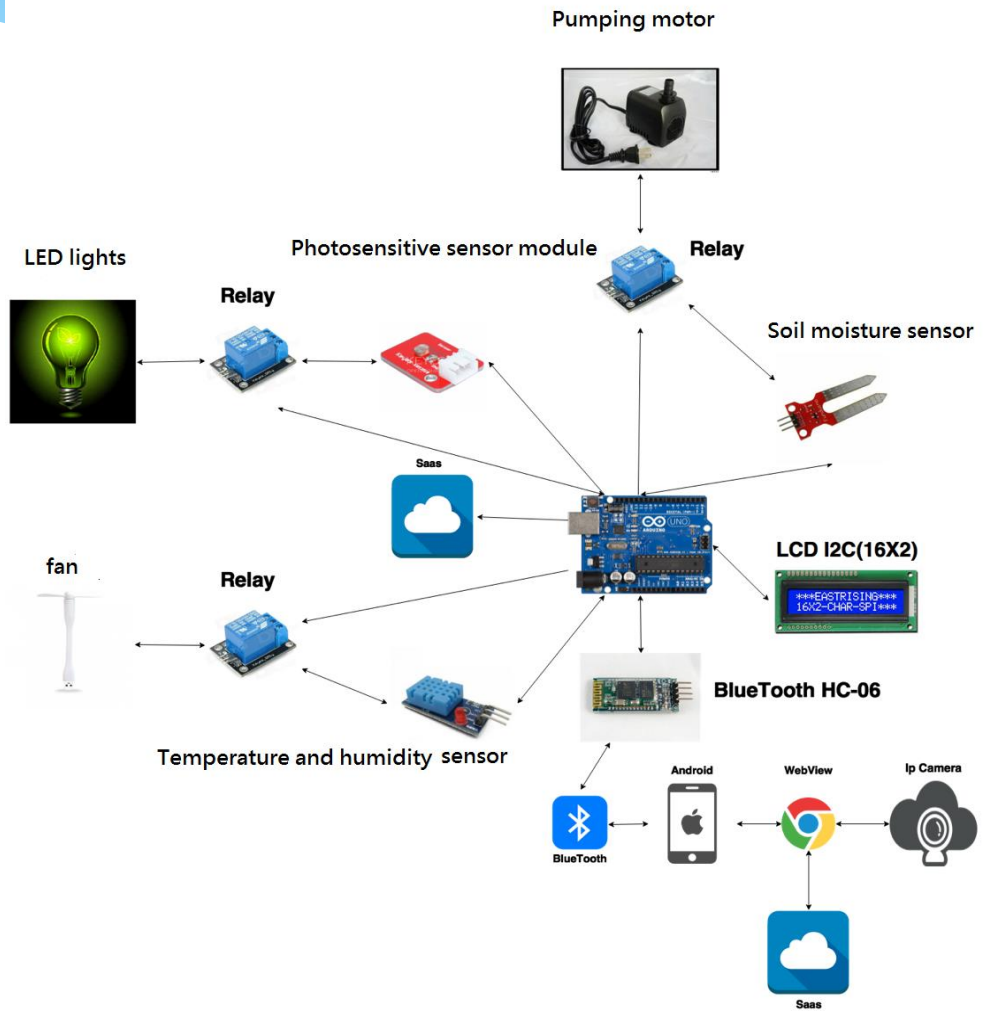
Weather Station Framework

Wen-Tsai Sung*, Hung-Yuan Chung, Kuo-Yi Chang, "Agricultural Monitoring System Based on Ant Colony Algorithm with Center Data Aggregation", IET Communications, Volume 8, Issue 7 2014, pp 1132 - 1140, (SCIE/EI) IF: 0.637.





Aquaponics


Pumping motor
LED lights
Photosensitive sensor module
Relay
Relay
Soil moisture sensor
Saas
fan
Relay
LCD I2C(16X2)
BlueTooth HC-06
Temperature and humidity sensor
Android
WebView
Ip Camera
BlueTooth
Saas

燈光：
關閉
風扇：
關閉
灌溉：
關閉
灑肥：
BUTTON
T-H
SoilWet
Light
開啟
感測器數值
Light:908(88%)
AUTO

自動：
開啟
感測器數值
SHumi:894(87%)
AUTO

2018 European Cup Innovation International Invention Exhibition - Aquaponics System based on Internet of Things (IoT) won a Gold Medal and Romania University Special Award

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DIPLOMA OF GOLD MEDAL is awarded to:

Aquaponics System based on Internet of Things(IoT)

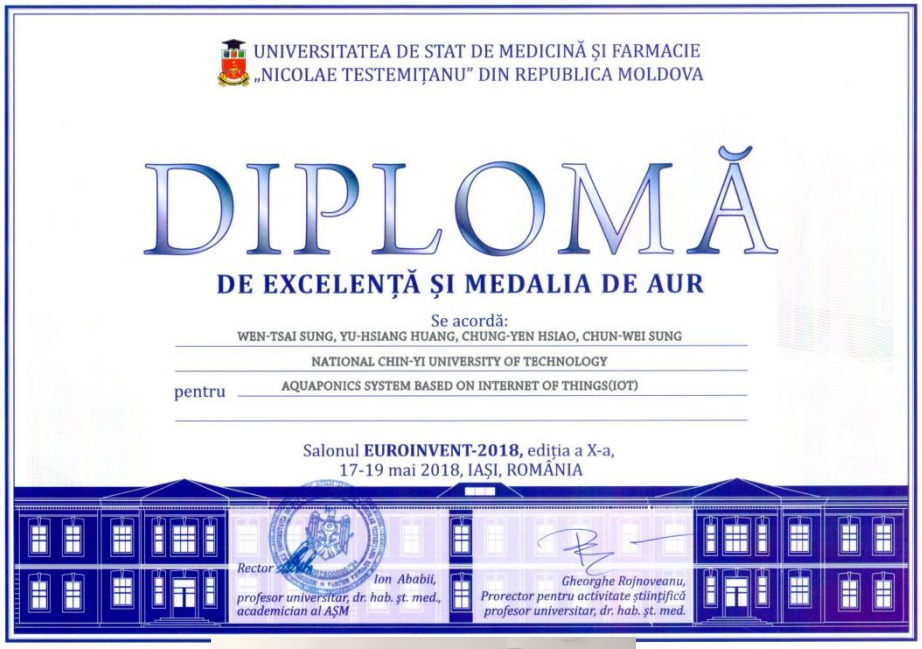
Wen-Tsai Sung, Yu-Hsiang Huang, Chung-Yen Hsiao, Chun-Wei Sung

President of International Jury
Dr.Eng. Mohd Mustafa Al Bakri ABDULLAH

President of Exhibition
Prof. Ion SANDU

May 19, 2018

IFIA INTERNATIONAL FEDERATION OF INVENTORS' ASSOCIATIONS



UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE „NICOLAE TESTEMIȚANU" DIN REPUBLICA MOLDOVA

DIPLOMĂ

DE EXCELENȚĂ ȘI MEDALIA DE AUR

Se acordă:
WEN-TSAI SUNG, YU-HSIANG HUANG, CHUNG-YEN HSIAO, CHUN-WEI SUNG
NATIONAL CHIN-YI UNIVERSITY OF TECHNOLOGY
pentru AQUAPONICS SYSTEM BASED ON INTERNET OF THINGS(IOT)

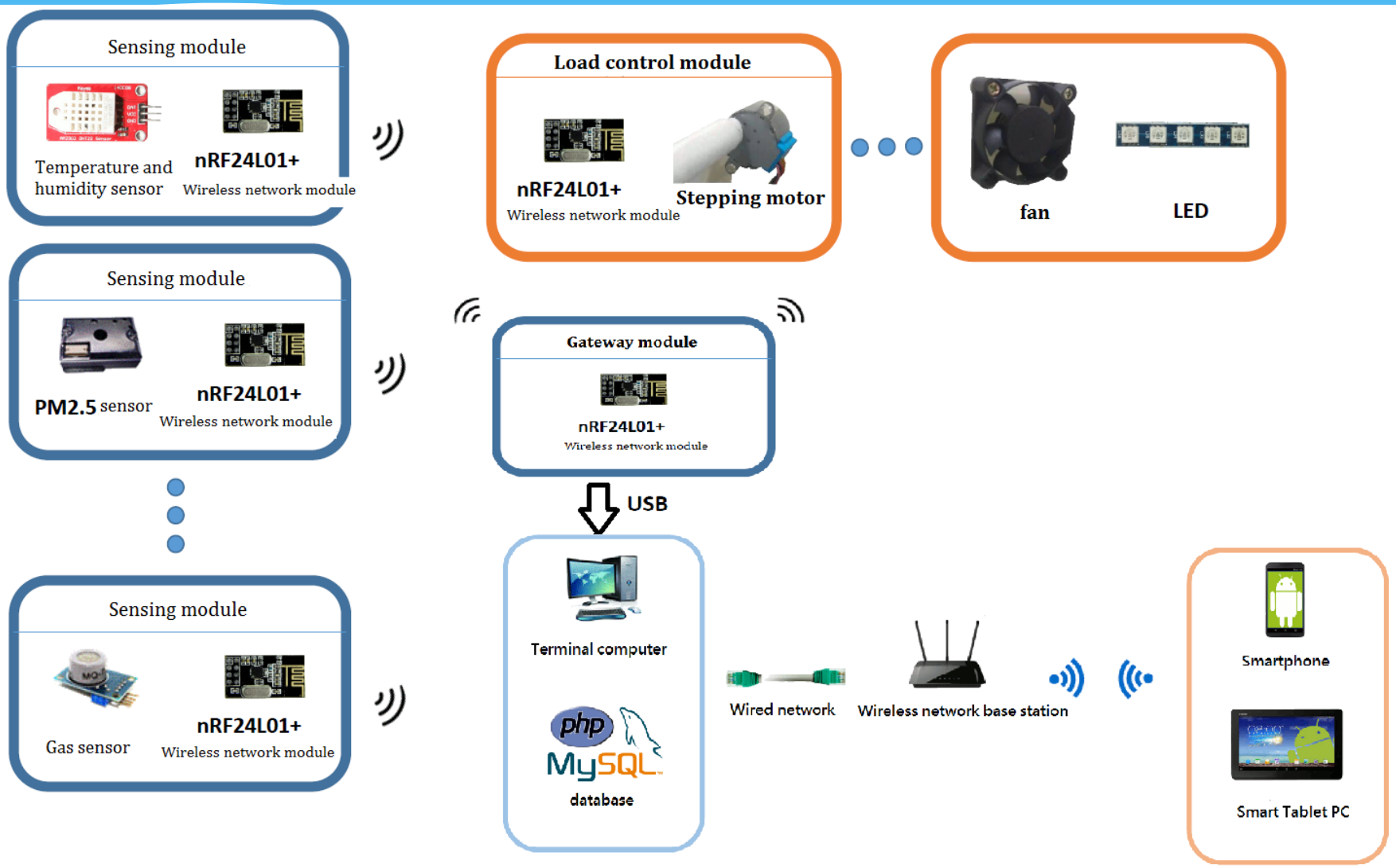
Salonul **EUROINVENT-2018**, ediția a X-a,
17-19 mai 2018, IAȘI, ROMÂNIA

Rector ... Ion Ababii, profesor universitar, dr. hab. șt. med., academician al AȘM

Gheorghe Rojnoveanu, Prorector pentru activitate științifică profesor universitar, dr. hab. șt. med.

Environment Monitoring System Based on Architecture of IoT by Wireless Sensor Network

Environment Monitoring System Based on Architecture of IoT by Wireless Sensor Network



2017 European Cup Innovation International Invention Exhibition - Environment Monitoring System Based on Architecture of IoT by Wireless Sensor Network won a Gold Medal and Thailand Special Award

Q&A

* **Thank you for your listening**
* **E-mail:songchen@ncut.edu.tw**