Intelligent assistant system
Sopc Based

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Abstract

Based on the phenomenon that disabled people without arms are not convenient to eat and drink,the system of helping armless disabled to eat and drink is designed.

The system receives the image of face from CCD camera and locates the mouth via binary image process of FPGA and image analyze of Nios-II.Using Pulse Width Modulation power,this system can control its mechanical arm to send the drink in front of disabled people.Since this system has ability to classify the user's language,disabled people can just talk to the system to make a order without any moves.Moreover,the system can fill up the drink automatically and scan the temperature of drink.

Why	How
What	Will

Part One

Why

Explain why we design this work and why we choose de2-115.

Part one

Why we do this work

- Help armless people to drink and eat
- applied to smart home

Part one

Why we choose de2-115 to design this work

device

- ✓ Cyclone IV EP4CE115
- ✓ 114,480 Les, 128MB SDRAM, 2MB SRAM

Multimedia function

- ✓ VGA-out connector
- ✓ 24-bit encoder/decoder (CODEC)

Extended fuction

- ✓ Configurable I/O standards (voltage levels:3.3/2.5/1.8/1.5V)
- ✓ DB9 serial connector for RS-232 port with flow control

Part Two

How

How we design and finish this work.

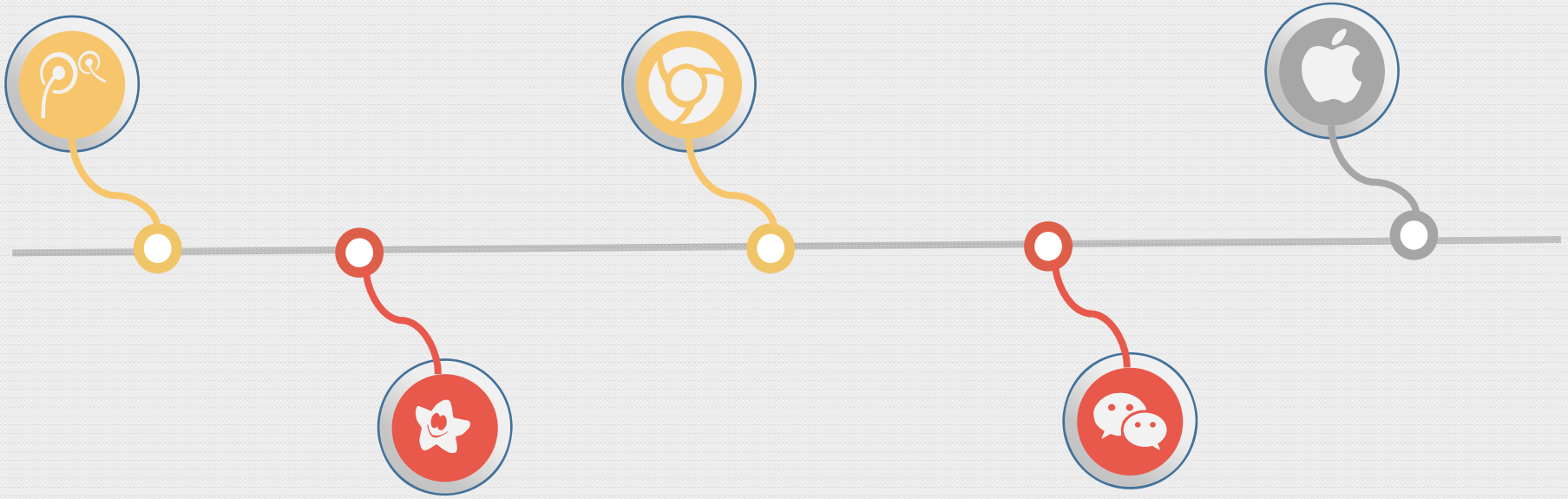
Part two

module

image processing unit

mechanical arm controller

temperature warning system



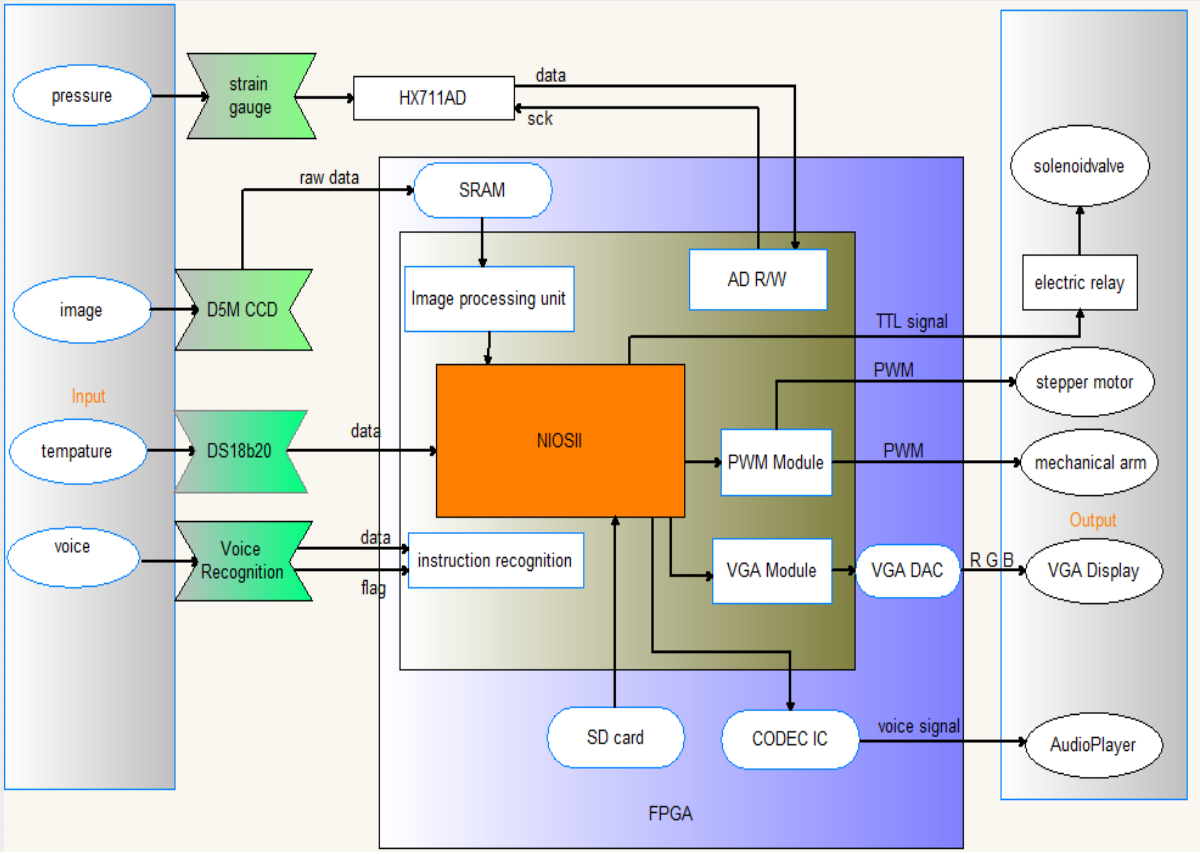
voice recognition &audio player

add water automaticly

2015/7/17

Part two

System Architecture

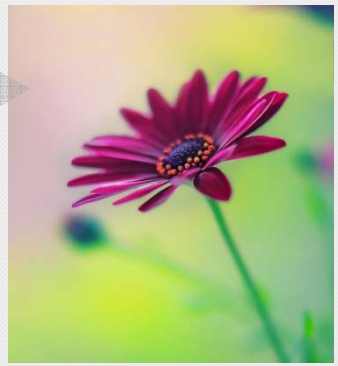


INPUT

FPGA(NiosII)

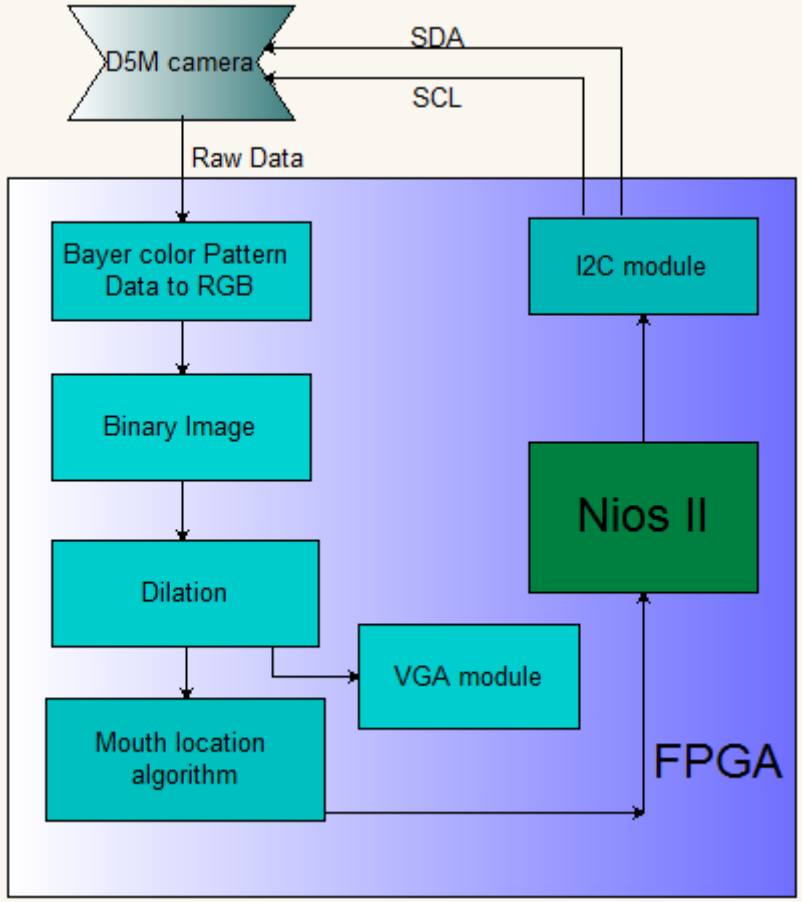
OUTPUT

The main function of the image processing is to calculate the loction of mouth.After taking the image,we transform the image with RGB transformed module and image binaryzation.



Part two

image processing unit



Part two

Image processing unit

FPGA get the data of image binaryzation module and then process the image data for calculating the 2D coordinates of mouth such as X, Y. After the calculation, this system transmits the loction of the month to Niosll.

Part two

Image processing unit

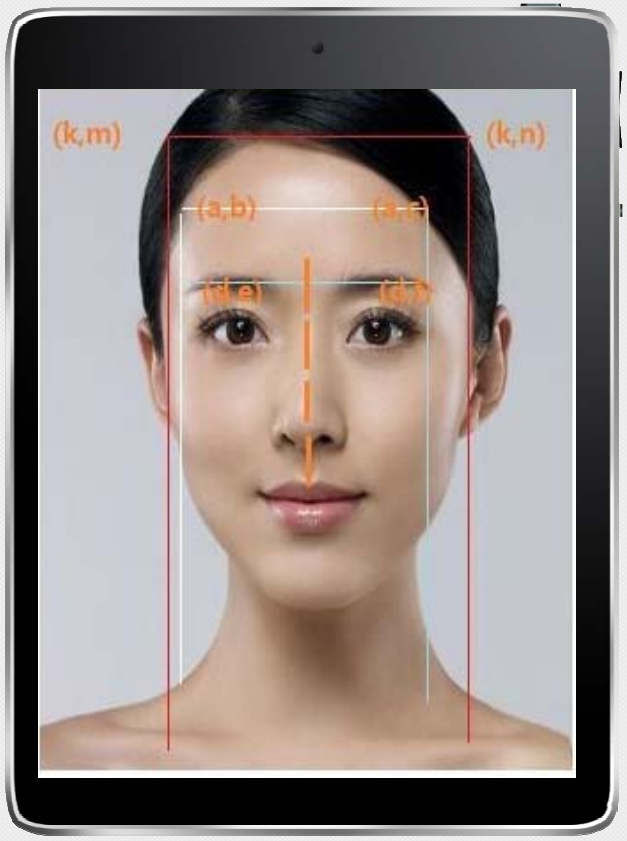
Mouth location algorithm

k (k,m) (k,n) hair edge

(a,b) (a,c) skin edge

d (d,e) (d,f) eyebow edge

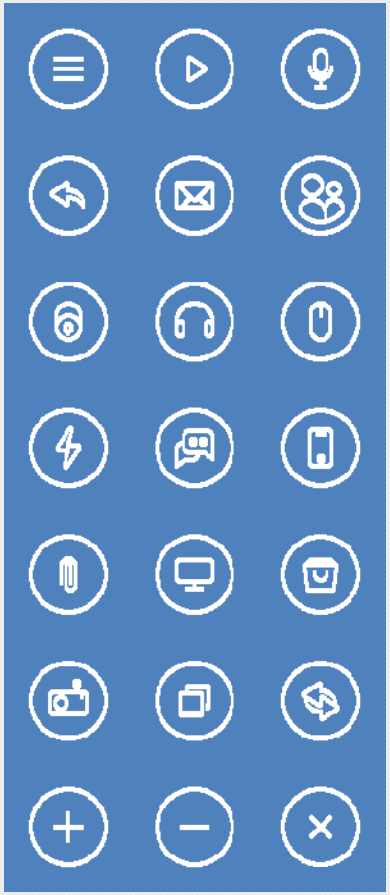
(f-e+d, （f+e)/2) mouth location



Part two

mechanical arm controller

There are six digtial steering engine in mechanical arm which is controlled by Pluse Width Modulation.We control the PWM module via NiosII aimed to change the duty cycle of PWM because the duty cycle is the majoy controller of mechanical arm movement.



Part two

mechanical arm controller

PWM1-MOTOR1

PWM2-MOTOR2

PWM3-MOTOR3

PWM4-MOTOR4

PWM5-MOTOR5

PWM6-MOTOR6

Parallel transmission of PWM enable six digtial steering engine activating at the same time,which make the mechanical arm move flexibly and humanly.

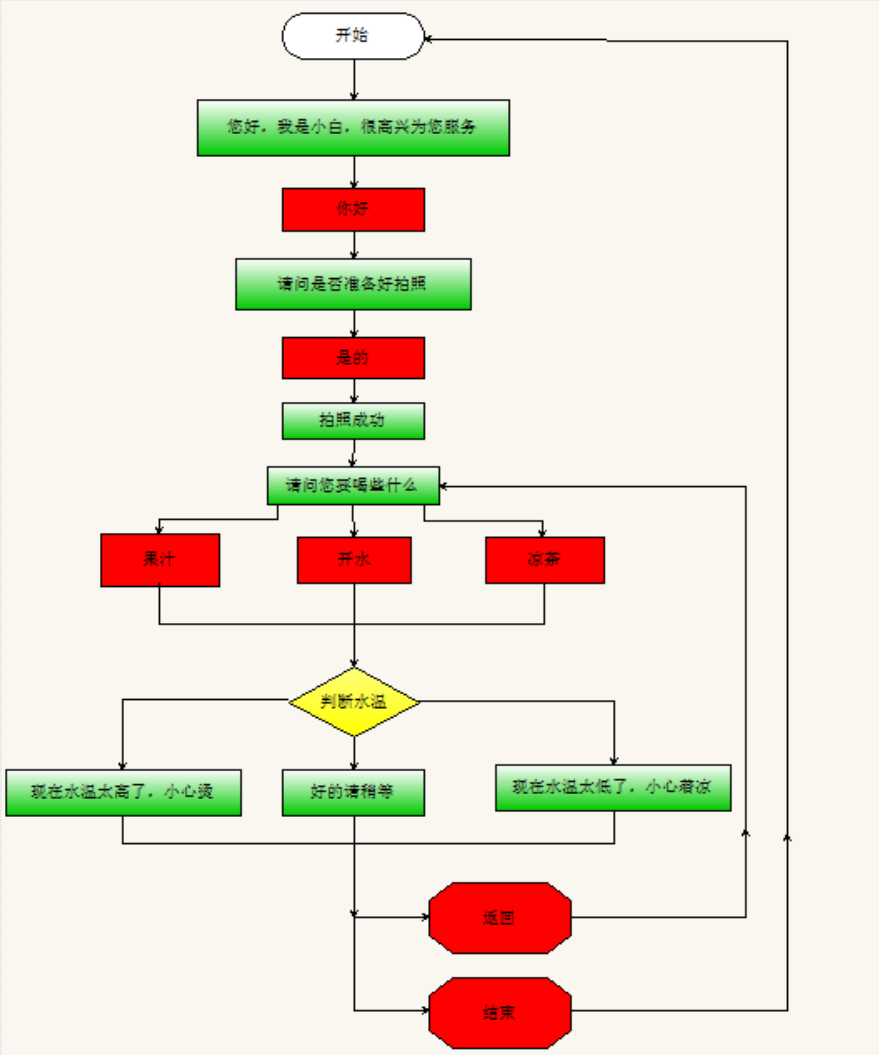
Part two

Voice recognition&audio player

Voice recognition and audio are the basises of the man-machine interaction,which is accord with intelligent system.

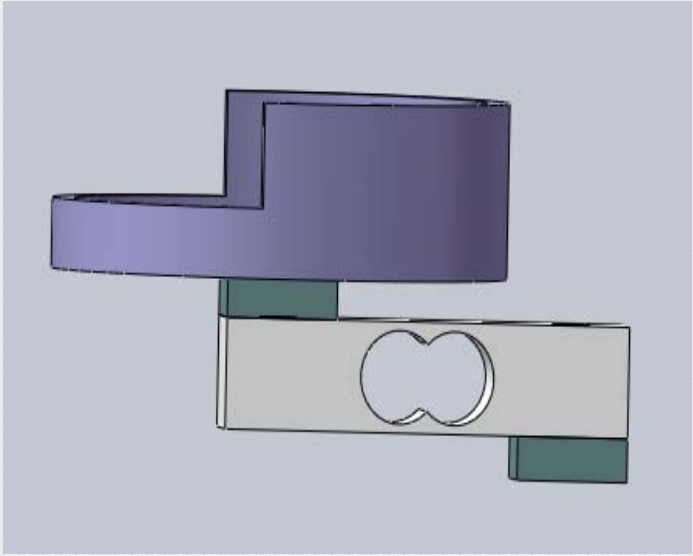
Chip list:

- LD3320
- SD card
- Wolfson WM8731



Part two

we use diplopore- cantilever-balance beam strain sensor(双孔双孔悬臂平衡梁应变式传感器)and HX711 - 24 bit AD converter as weighing module.The accuracy is 0.1g.

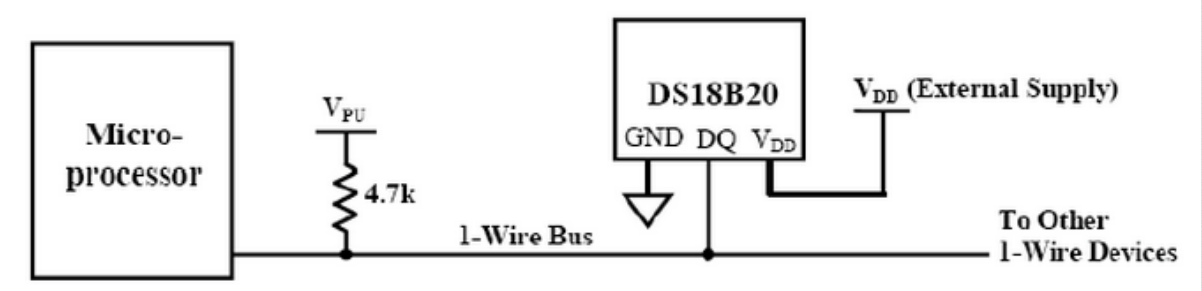


add water automaticly

Part two

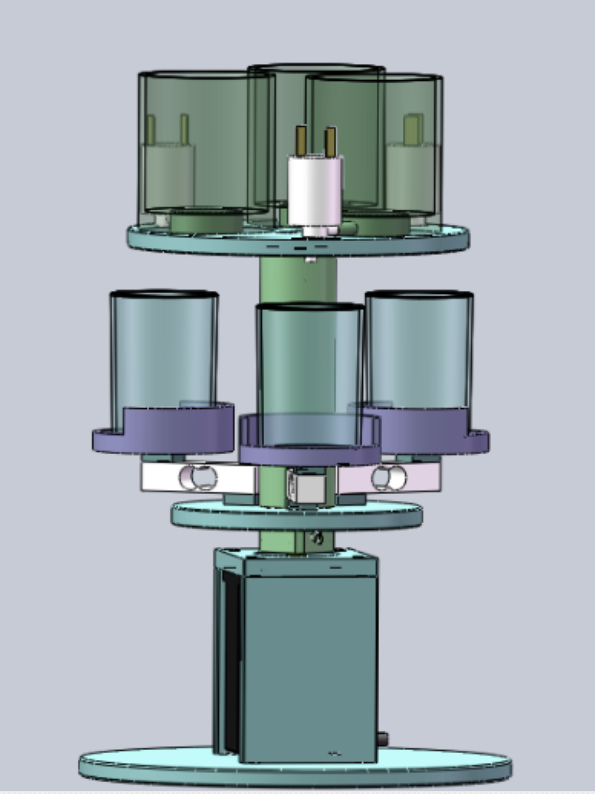
temperature warning system

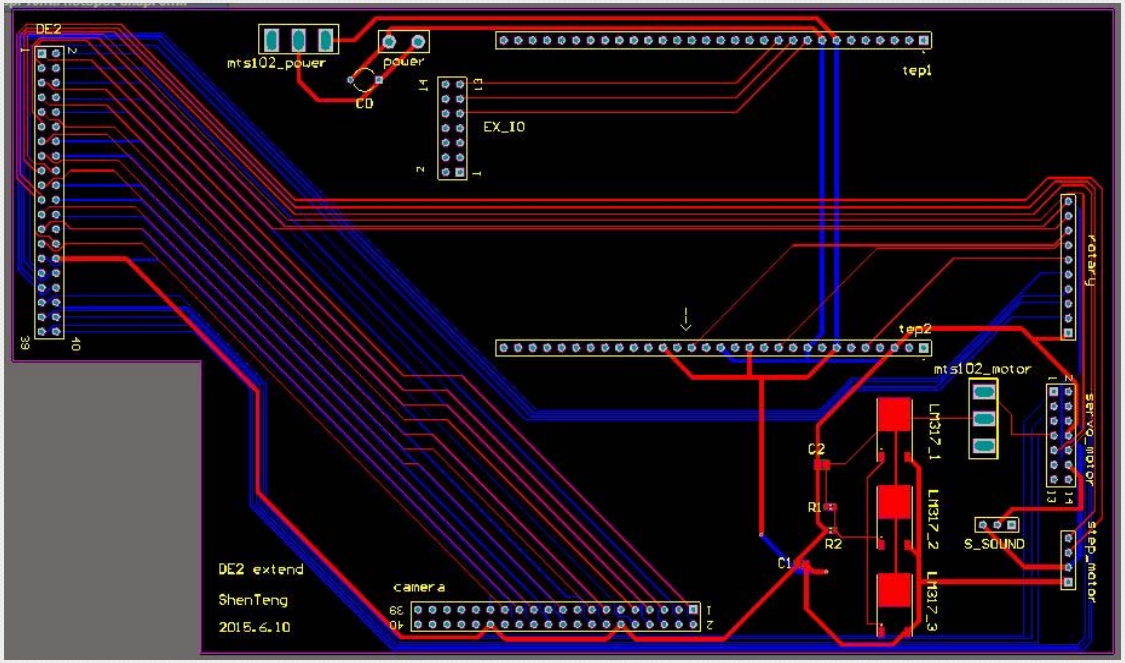
The temperature sensor is DS18B20 chip.By using the circuit as below,we could control DS18B20 with specific sequence signal.



Part two

Mechanical platform&PCB





Part Three

What

Show what this work can do.

Part three

Result

- drink different beverages by user's voice control
- mechanical arm can hold glass to user's mouth exactly
- Add water automaticly
- Temperature early warning

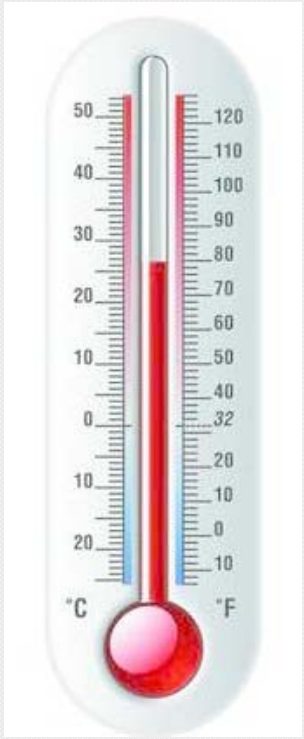
Part Four

Will

Will it more useful in the future

Part four

Looking ahead the future



FUTURE

This work can be promoted in the future,
It will have more fuction

- Use Brain Wave
- wireless communication
- Self-heating


THANK YOU