Lesson 3 Buzzer Control

1. Project Purpose

Realized that the buzzer on the controller makes sound when the input voltage of the controller is low.

2. Project Principle

Timer is a hardware device used to calculate time on microcontroller. It can be used to allow the microcontroller to execute the specified operation at the specified interval or calculate the exact interval between events.

Timer on microcontroller generally consists of a time-base generator and a counter. Time base is the basic unit of time.

The time base generator generates a signal with the time base as the period, and the counter counts the number of signals generated by the time-base generator. For example, if the time base is 1 second, the time base generator generates a signal per second, and the counter value is added by 1 per second. When the counter value is equal to the value we set, the microcontroller performs the operation we set.

All in all, If want to make buzzer sound, the microcontroller has to detect the button status once after a period of time. We need to set the time base of the timer first, and then set the count value. Finally, set the action to be executed when the specified time is reached.

3. Program Analyst

This program in App.cpp as the figure shown below.

```
void Buzzer(void)
{// Put it in the 100us timer interrupt
  static bool fBuzzer = FALSE;
  static uint32 t1 = 0;
  static uint32 t2 = 0;
  if(fBuzzer)
  {
    t1++;
    if(t1 <= 2)
    {
      digitalWrite(BUZZER, LOW);//2.5KHz
    }
    else if(t1 <= 4)
    {
      digitalWrite(BUZZER, HIGH);//2.5KHz
    }
    if(t1 == 4)
    {
      t1 = 0;
    }
  }
```

```
if(BuzzerState == 0)
{
  fBuzzer = FALSE;
  t2 = 0;
}
else if(BuzzerState == 1)
{
  t2++;
  if(t2 < 5000)
  {
    fBuzzer = TRUE;
  }
  else if(t2 < 10000)
  {
    fBuzzer = FALSE;
  }
  else
  {
    t2 = 0;
  }
}
}
```

1) The program starts with setting to fBuzzer = FLASE、BuzzerState = 0 so these programs will be skipped directly. The runtime of this program can be be viewed in the following program:

```
TCNT2=206; // Timer 3 interrupt 100us
  Buzzer();
  if(++time >= 10)
  {
    time = 0;
    gSystemTickCount++;
//    Ps2TimeCount++;
     if (GetBatteryVoltage() < 5500) // Alarm when
                                     less than 5.5V
    {
      timeBattery++;
      if (timeBattery > 5000) // Last 5 seconds
      {
        BuzzerState = 1;
      }
    }
    else
    {
      timeBattery = 0;
      if (manual == TRUE)
      {
        BuzzerState  = 1;
        mytime++;
        if (mytime > 80 && mytime < 130)
```

2) It is the interrupt of time 3 and will respond once every 100μs. Then call Buzzer function, but its two judgement values do not match, so it is skipped directly.
3) Go on looking at the next part. Delay 100x10μs, that is, 1ms enter if to get battery voltage and judge. If less than 5500, detection after 5s. if still less than 5500 after 5s, set BuzzerState to 1, otherwise it will be cleared to 0 and then judge again.
4) When the battery voltage is less than 5.5V, BuzzerState is set to 1 and Buzzer is called to enter the corresponding judgement. The buzzer pin to high or low level according to the judgement result to make the buzzer sound. After a period of time, turn off the buzzer, and the judge the battery voltage again, and so on.