EE 472 – Embedded Systems

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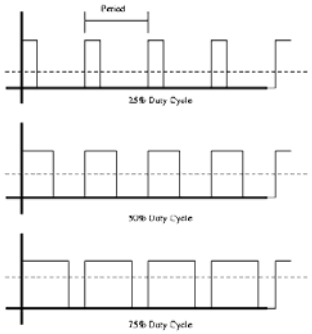
Agenda

- Pulse Width Modulation
- FreeRTOS
- Midterm review
- Lab 3 overview
- Drone tutorial

Pulse Width Modulation (PWM)

- Vary the width of a period pulse
- Can control the voltage to a DC motor
  - I.e. speed control
- Use a timer to create the pulse
- Duty cycle is the percentage the pulse is on for that period

PWM



FreeRTOS

- Open source embedded OS
  - freertos.org
- Features:
  - Preemptive priority scheduler
  - Semaphores

Sleep()

```
void ExampleTask(void *p)
{
      while( 1 )
      {
      Led_SetState( 0 ); // turn the LED off
      Sleep( 900 ); // leave it off for 900 milliseconds
      Led_SetState( 1 ); // turn the LED on
      Sleep( 10 ); // leave it on for 10 milliseconds
      }
}
```


Create tasks

```
void BlinkTask( void* p ); //declare


void Run(){
    TaskCreate( BlinkTask, "Blink", 400, 0, 1 ); //give scheduler the task
    …..
}

void BlinkTask( void* p ) //define the task
{
      Led_SetState( 1 );
      Sleep( 1000 );
      …
}
```


TaskCreate()

```
void* TaskCreate (void(taskCode)(void*) ,
                  char * name,
                  int stackDepth,
                  void* parameters,
                   int priority )
```

Malloc()

Dynamic memory allocation

Midterm

- Closed book, no notes, no cheat sheets
- Concepts covered in class
- Assigned readings: NP, JKP
- Class exercises

Concepts

- C programming
  - what's the output of some code
  - write a short function
  - pointers, arrays
  - structs
  - defines
  - bitwise operators

Concepts (cont.)

- ARM
  - High level questions only
- UML and Structured Design
  - Know what this is
  - UML diagrams shown in class

Concepts (cont.)

- Tasks, threads, and interrupts
- Scheduling algorithms
  - Diagramming, analysis, differences

Lab 3 and Drone Tutorial

Questions?