Embedding System

- Clock and Alarm

Members :

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Contents

Contents

Background

- LCD display names
- Joystick control LEDs
- Morse code display with LEDs
- Date and time display
- What we Learned :
  - ✓ Interrupts trigger functions
  - ✓ default Pull-Down

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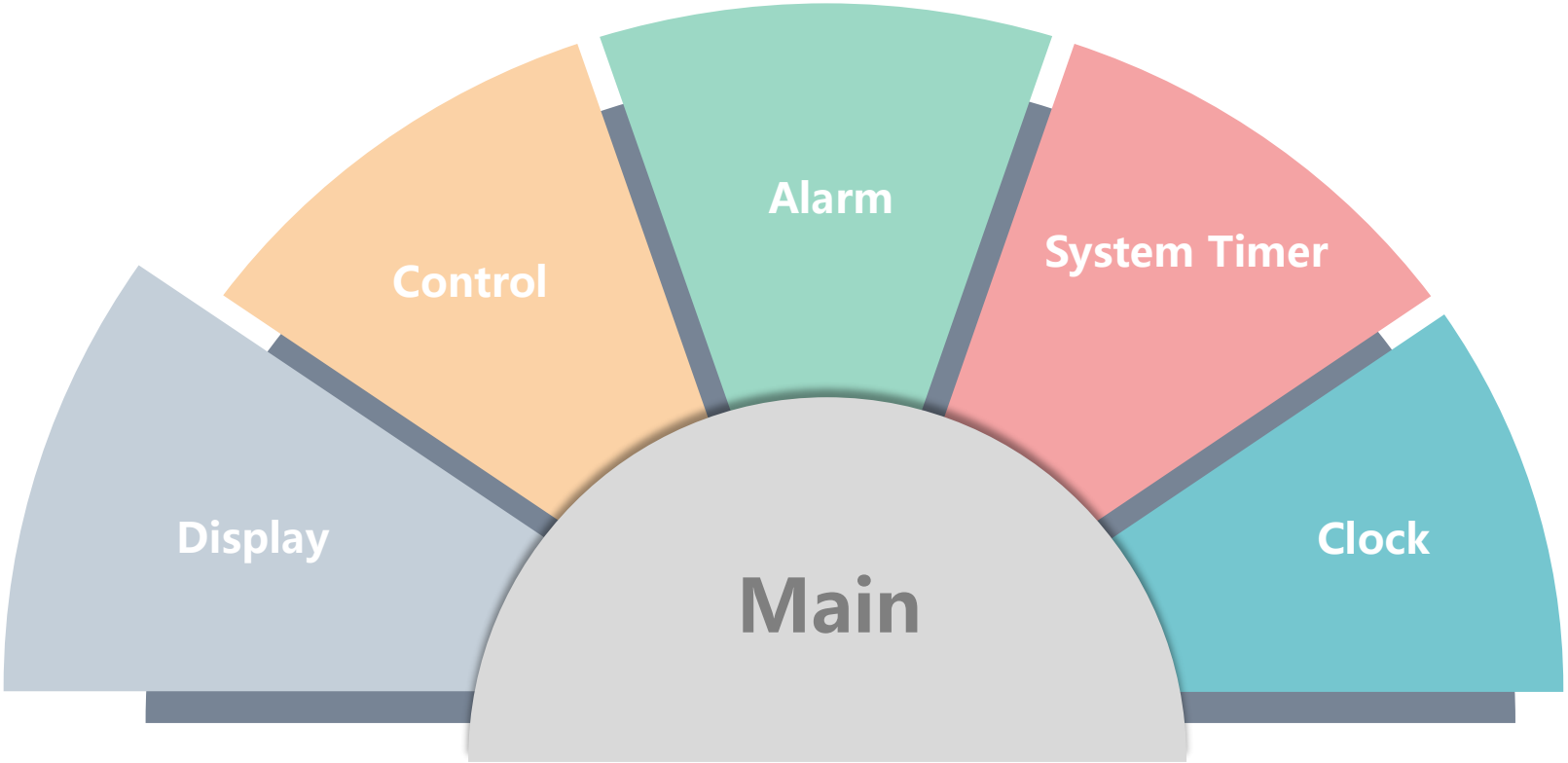
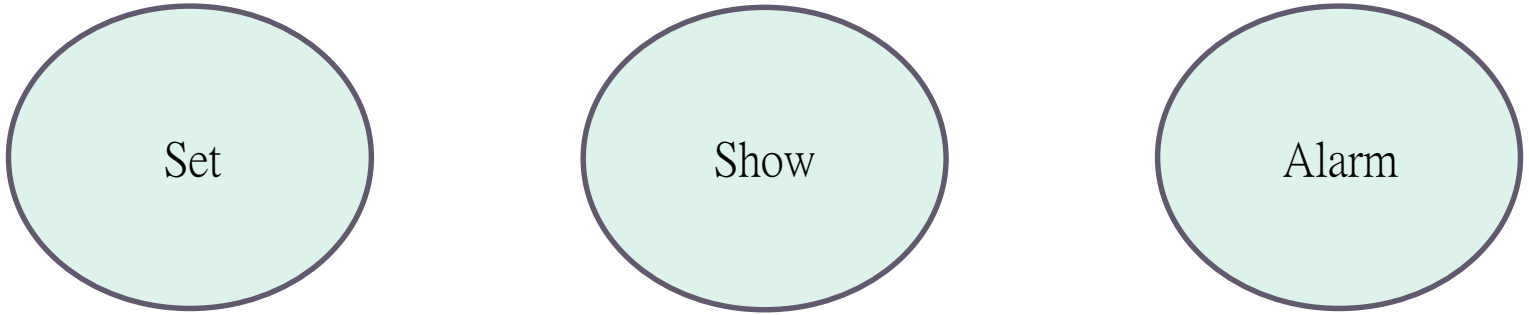
Project Structure



Contents

Implementation

- Design interrupt settings for each button
- Determine current condition with “State”



Implementation

The display problems

Implementation

The display problems

```
// Dead loop & program hangs here

// H
for(i = 0; i < 4; ++i) {
    GPIOE->ODR |= 1 << LED_PIN;
    delay_ms(1000);
    GPIOE->ODR &= ~(1 << LED_PIN);
    delay_ms(1000);
}
delay_ms(2000);

// O
for(i = 0; i < 3; ++i) {
    GPIOE->ODR |= 1 << LED_PIN;
    delay_ms(3000);
    GPIOE->ODR &= ~(1 << LED_PIN);
    delay_ms(1000);
}
delay_ms(2000);
```

```
// rudimentary delay millisecond function
void delay_ms(unsigned int t) {
    unsigned int i, j;
    for (i = 0; i < t; i++) {
        for (j = 0; j < 2000; j++);
    }
}
```

Implementation

The display problems

```
// rudimentary delay millisecond function
void delay_s(unsigned int t) {
   uint32_t hour, minute, second;
      RTC_Read_Time(&hour, &minute, &second);
      second += t;
      if(second > 59) {
         second -= 60;
         ++minute;
      }
      if(minute > 59) {
         minute -= 60;
         ++hour;
      }
      if(hour > 23)
         hour -= 23;
      set_alarm(hour, minute, second);
}
```

```
static int digit = 0;
int delay[] = {
   1, 1, 1, 1, 1, 1, 1, 3, 3, 1,
   3, 1, 3, 3, 3, 1, 1, 1, 1, 3,
   3, 1, 1, 1, 1, 3, 1, 1, 1, 3,
   3
};
void display_Hobbit(void) {
   if(!digit)
      Red_LED_Toggle();

   Green_LED_Toggle();
   if(digit < (sizeof(delay) / sizeof(delay[0])))
      delay_s(delay[digit++]);
   else {
      digit = 0;
      Red_LED_Toggle();
   }
```

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void delay_s(unsigned int t) {
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            second -= 60;
            ++minute;
        }
        if(minute > 59) {
            minute -= 60;
            ++hour;
        }
        if(hour > 23)
            hour -= 23;
        set_alarm(hour, minute, second);
}
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Conclusion

- Always forgive basic knowledge
- **Shift** is important in CA
- Team member **cooperation** is essential of project completing
- Others :
  - University of PITT has exquisite buildings
  - Easy to understand what Dr. Jingtong teaches

Thanks for listening