Fundamentals of Embedded and Real Time Systems

MODULE 10

TAMER AWAD

Review Module 09

Module 10

In-Class Project

- User Requirements
- Problem Breakdown
- Work thru the steps

Programming with Embedded & Real-Time Operating Systems:

- Overview by ***Nick Strathy***
- Q&A

User Button Changing LED States

- User Requirements
- Problem Breakdown

User Requirements

1. Pressing the button changes the state of the LED.
2. System starts with LED in OFF state.
3. First button push --> LED turns solid ON.
4. Second button push --> LED blinks at a slow rate (every one or two seconds).
5. Third button push --> LED blinks at a faster rate (every 0.25 or 0.5 seconds).
6. Fourth button push --> LED dims and brightens at a slow rate.
7. Fifth button push --> LED dims and brightens at a faster rate.
8. Sixth button push --> LED turns off.

Problem Breakdown

1. Read from push button and toggle LED inside while loop (15min)
2. Connect button to EXTI interrupt and toggle LED inside interrupt handler (15min)
3. Implement LED states, ignoring PWM for the moment (15min)
4. Implement PWM code to modify LED brightness (15min)
5. Enable LED output to switch between GPIO & PWM functionality (15min)

Read from push button and toggle LED inside while loop (15min)

Connect button to **EXTI** interrupt and toggle LED inside interrupt handler (15min)

Implement LED States (15min)

BREAK 1

Use PWM to change LED brightness (15min)

Problem

After enabling the PWM functionality, we can no longer control the LED as a GPIO “output’ pin!

Switching between GPIO and PWM (15min)

Other possible features

- Detect a long press of several seconds (3 seconds)
- If the LED is already ON, a long press will cause the LED to dim over two seconds all the way down to the OFF state.
- If the LED is OFF, a long press will cause the LED to increase the brightness over two seconds all the way back to the fully ON state.
- Add more…

BREAK 2

SECOND COURSE OVERVIEW

BY NICK STRATHY

Programming with Embedded & Real-Time Operating Systems