System Software Design and Documentation

Western Washington University
ETEC 474
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General System Design

- MC9S12DP256B
- Bus Frequency 24MHz
- Memory
  - 50k Bytes Ram
  - 4k Bytes Rom
Kernel Task Design

- MicroC/OS-II
- Real-time preemptive multitasking kernel
- Tick Period 1 ms
Priority of Tasks

- 4 → StartTask
- 5 → ClockTask
- 6 → UITask
- 7 → KeyTask
- 8 → RelayControl
- 9 → MainTask
Start Task

- Description
  - Initialize System
  - Create other tasks
  - Displays initial startup screen
  - Priority 4

- This runs once at startup and the execution time is 10ms
Clock Task

Description

- Calculates time of day and date
- Period will be one second with an execution time of 40us
- Priority 5
UITask

- **Description**
  - This handles the user inputs
  - Allows user to navigate through different settings options
  - User can set time, date, ideal temp, ideal humidity and watering times
  - Priority six
  - Period → .5s sporadic
  - Execution time → 1ms
KeyTask

- Description
  - Reads the keypad
  - Period $\rightarrow$ 10ms
  - execution time $\rightarrow$ 2us
  - Priority seven
MainControlTask

- Description
  - Reads from inputs and Controls relays and output LEDs
  - Priority eight
  - Period $\rightarrow$ 1s periodic
  - Execution Time $\rightarrow$ 2us
MainTask

- **Description**
  - Updates the LCD
  - Receives the Sensor Data
  - Receives User inputs
  - Priority nine
  - Period = 10ms
  - Execution Time = 2ms
ISR

- Description
  - This will generate a semaphore every one second for the clock task to update the clock and also to check temperature and humidity inputs
  - Period → 1ms periodic
  - Execution Time → 1us
CPU Load

CPU Load = 10ms/2ms + 2us/1s + 2us/10ms + 1ms/.5s + 40us/1s + 1us/1ms

L Max → 20%

L Avg → 10%
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Data Flow Diagrams

KeyFlag

KeyBuffer

KeyTask()

KeyCode

KeyPend()

KeyInit()

Functions

KeyPad