Design of Mission-Critical Apps & Systems:

Expanding to RT Theory for RTES Design

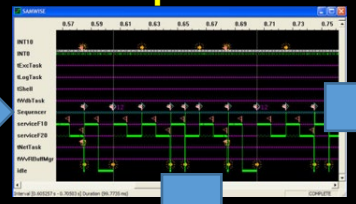
Dr. Sam Siewert

Electrical, Computer and Energy Engineering

Embedded Systems Engineering Program

RTES Concepts and Practices

Recommended start
(new to RTES)
Proficient C



RMA basics

RTES Theory and Analysis

Know some RMA & Linux
(Jump in)
More RMA depth

RMA practitioner

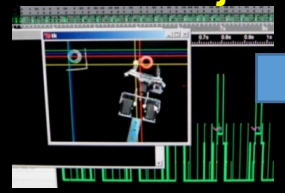
Mission Critical Design

Advanced Course
- Intermediate C/C++
- Know RMA well
- POSIX RT, RTOS, CE

RTES practitioner

RTES Project

Advanced Course
- Solve RT Problem
- Construct a System



RTES designer

Review of Resource Space – CPU, Memory, I/O, and Power

Embedded I/O
- Scaling Embedded Systems – Bus and Network Methods
- Device Interfaces and Drivers

Profiling and Tracing Methods

Embedded Memory
- Shared Memory Multi-Service RT Systems
  - Message Queues, Ring Buffers
  - Avoiding Priority Inversion
  - RAM disks
- SECDED Memory Protection
  - Hamming Code
  - ECC RAM interfaces
- Persistent Memory
  - Nand flash devices, SSD
  - Write Amplification and Wear Leveling
  - Simple Software RAID systems

Mission Critical - No SPOF (Single Point of Failure) RTES
- Design for HA, Design for HR
- Design for Both

Integration of RMA with HA/HR Applications and Systems
- Example Designs
- Applications – Digital Media (Audio, Video, Computer Vision)
- Systems – UAS/UAV, Small Satellites, Avionics, and Robotics