University of Idaho

ECE 444 / ECE 544 / CS 444 / CS 544 Supervisory Control and Critical Infrastructure Systems

Session 2

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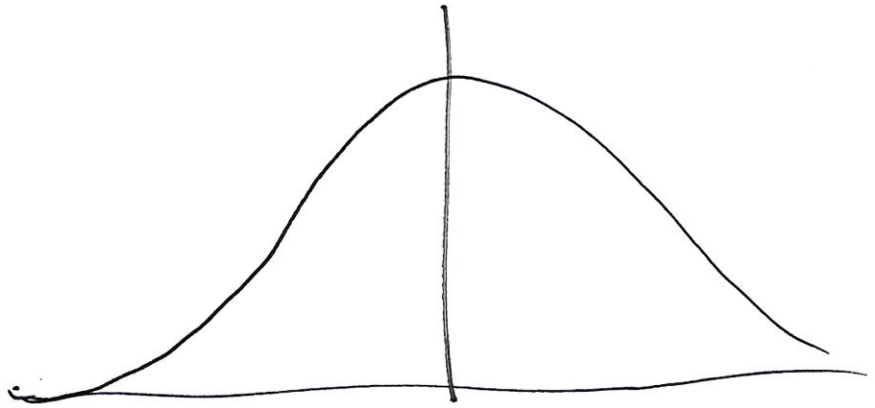


measurements

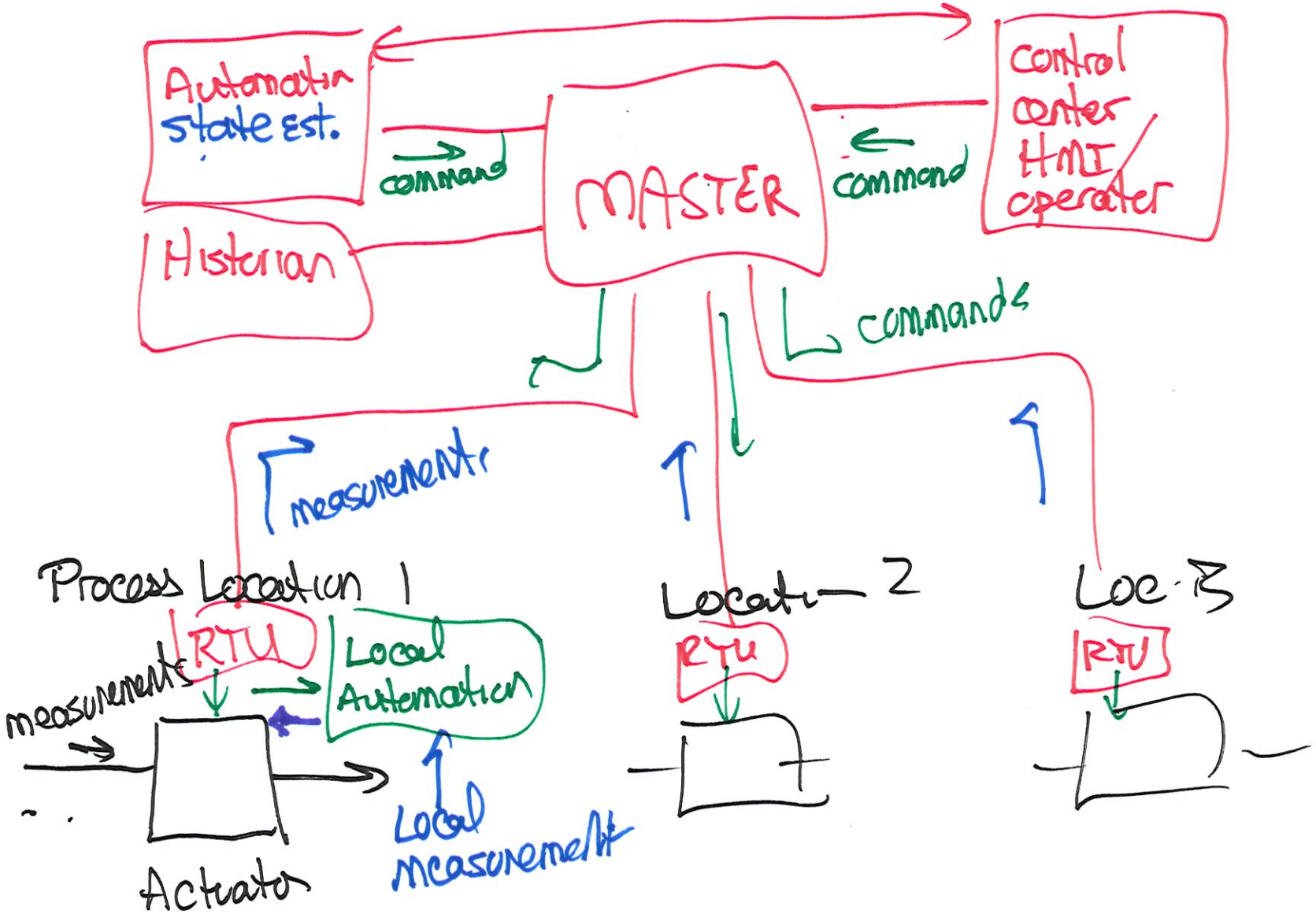
- Analog
  - voltage
  - current
  - temperature
  - flow rate

⇓

Digitized
→ Analog to digital conversion
→ processed (digital filters)

- Digital
  - switch position
  - valve state

Distributed control system



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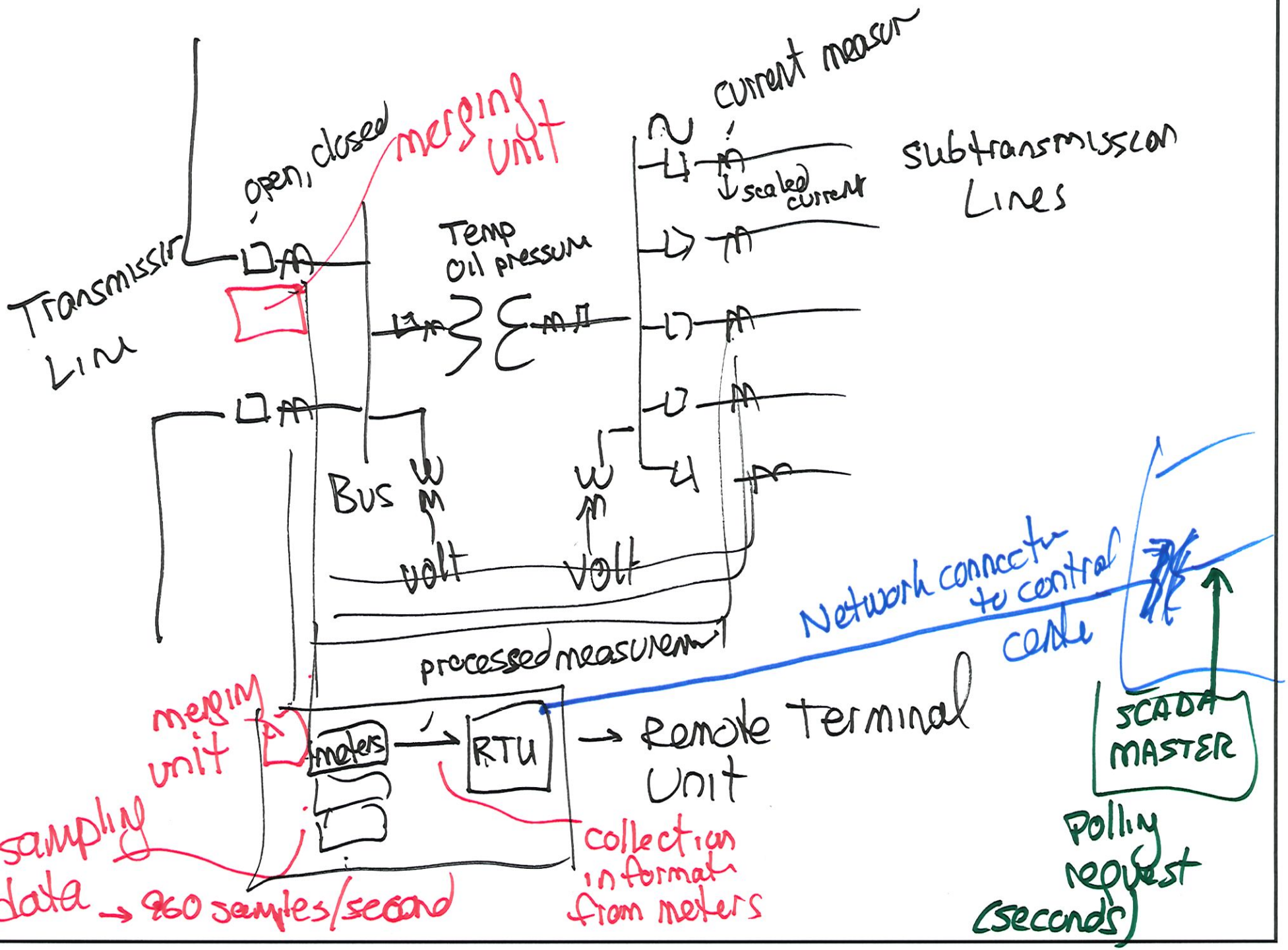
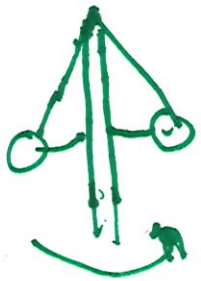

current measur
Subtransmission Lines
scaled current
open, closed
merging unit
Transmissi Lin
Temp
Oil pressum
Bus
volt
volt
processed measurem
Network connecti to central
cente
merging unit
meters
RTU
Remote terminal Unit
SCADA MASTER
sampling data → 960 samples/second
collection information from meters
Polling request (seconds)

Automation & Supervisory Control

- Implementations for hundreds of years
  - mechanical systems
  - local feedback control



- communication was simple voltage pulses
  - → Analog controls replaced electromechanical
    - very reliable
    - needed maintenance
    - fast

- limited datalogging
  - oscillographs
- digital systems
  - slower initially
    - memory limit
    - difficult to ~~[illegible]~~ program
      - → easier to change
        - than ~~[illegible]~~ analog computers
      - → Datalogging
  - → Developments in Network Comms and Integrated circuits

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Industrial control System

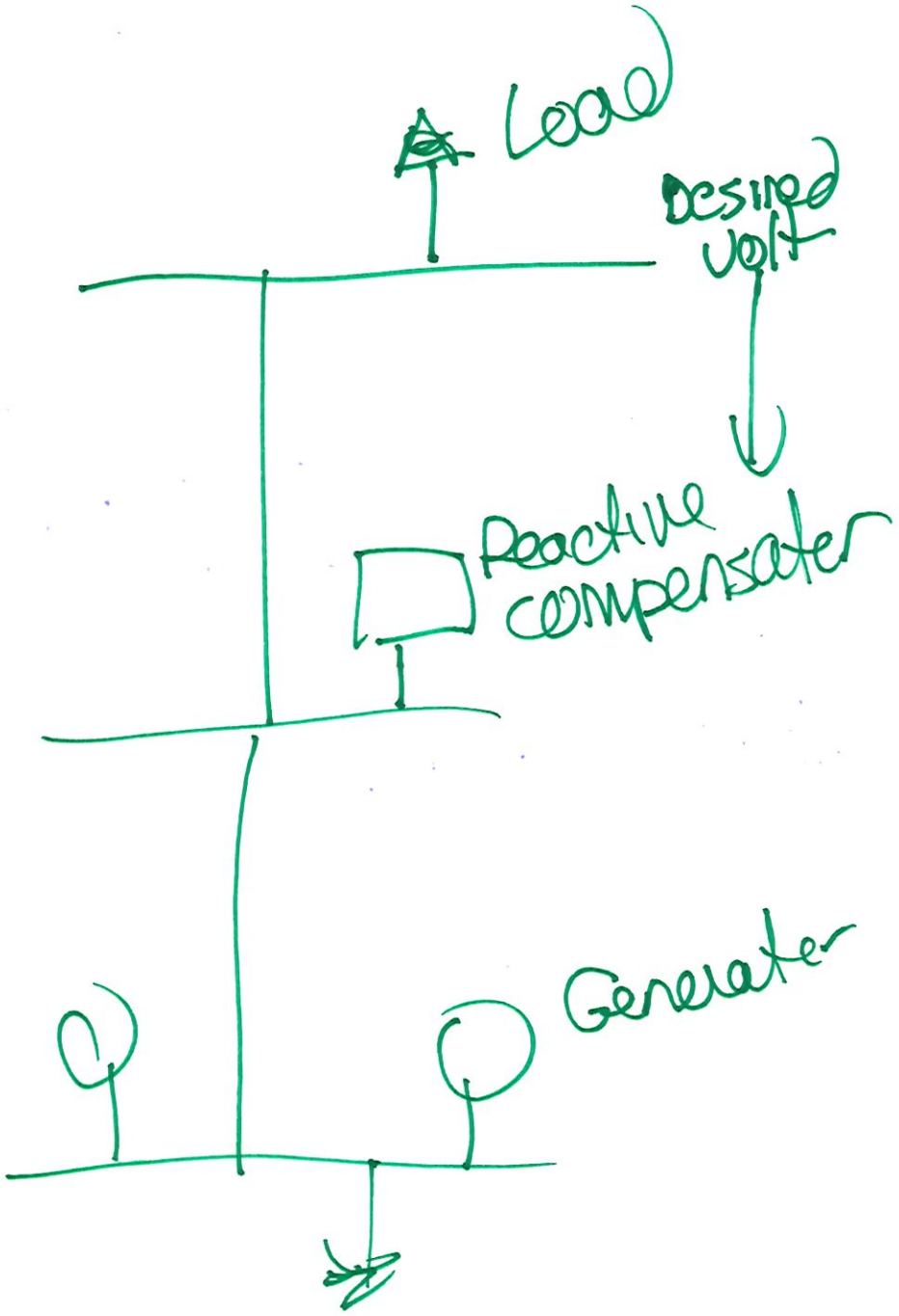
$\Rightarrow$ Real Time System

↑

control

→ Real Time $\neq$

process dependent


Load
Desired volt
Reactive compensater
Generater

Key Components of an Industrial control System

1. Data Aquisition
   - sensors & supporting system
2. Local and Central Data Processing
3. Communication System - standard protocal
4. Display of ~~Data~~ Information - with ability to act
   → Human / Machine Interface