Temperature Measurement of Server Room

Eric Cobbinah  
*Virginia Commonwealth University*

Faida Matabaro  
*Virginia Commonwealth University*

Michael Tu  
*Virginia Commonwealth University*

James McAdams  
*Virginia Commonwealth University*

Follow this and additional works at: [http://scholarscompass.vcu.edu/capstone](http://scholarscompass.vcu.edu/capstone)  
Part of the [Electrical and Computer Engineering Commons](http://scholarscompass.vcu.edu/capstone)

© The Author(s)

Downloaded from  
[http://scholarscompass.vcu.edu/capstone/48](http://scholarscompass.vcu.edu/capstone/48)
Temperature Measurement of Server Room

Team Members: Eric Cobbinah, Faida Matašaro, James McAdams, Micheal Tu
Faculty Advisor: Dr. Michael Cabral
Sponsor: Paraclete
Sponsor Advisor: Bill Sneddon

Overview
- Temperature Monitoring System
  - Connect with up to 64 resistive temperature devices (RTD’s).
  - Read and store the temperature measurement.
  - Allow the measurements to be accessed remotely through a network.

Temperature Reading
- Temperature changes the resistance of the RTD’s
- The MAX31865 integrated circuit (IC) reads the resistance of the connected RTD.
- The IC converts the resistance, as a percentage of the reference resistance, to a binary code.
- It then sends this data, on request, to the Raspberry Pi.

Control System
- System controlled by a Raspberry Pi computer
  - Selects the current RTD being read.
  - Receives RTD data from the reader (MAX31865) through SPI communication.
  - Calculates temperature from the resistance data.
  - Acts as network server to provide access to the data.

Software
- Changes current RTD number based on the system clock time.
- Sends RTD number to line select circuit
- Activates and reads MAX31865 chip
- Converts RTD readings to temperature
- Tags temperature calculations with RTD number and time
- Establishes Raspberry Pi as server so that the data can be accessed over a network

Line Select Circuit
- Receives current RTD code from Raspberry Pi
- Circuit logic turns on the relay for the current RTD line

Conclusion
- System allows data center temperatures to be monitored more closely.
- Better coverage with more temperature devices.
- Access to data over a network.

Control System
- System controlled by a Raspberry Pi computer
  - Selects the current RTD being read.
  - Receives RTD data from the reader (MAX31865) through SPI communication.
  - Calculates temperature from the resistance data.
  - Acts as network server to provide access to the data.

Temperature Reading
- Temperature changes the resistance of the RTD’s
- The MAX31865 integrated circuit (IC) reads the resistance of the connected RTD.
- The IC converts the resistance, as a percentage of the reference resistance, to a binary code.
- It then sends this data, on request, to the Raspberry Pi.

---

Temperature Monitoring System
- Connect with up to 64 resistive temperature devices (RTD’s).
- Read and store the temperature measurement.
- Allow the measurements to be accessed remotely through a network.

Background
- Data center managers need to carefully monitor the temperature in them. If a server overheats, then the equipment could be damaged and data lost.
- Currently a MAX31865 chip can be used to run up to 8 temperature measurement devices.
- Using more devices would allow more detailed monitoring for isolated hot areas.

Software
- Changes current RTD number based on the system clock time.
- Sends RTD number to line select circuit
- Activates and reads MAX31865 chip
- Converts RTD readings to temperature
- Tags temperature calculations with RTD number and time
- Establishes Raspberry Pi as server so that the data can be accessed over a network

Control System
- System controlled by a Raspberry Pi computer
  - Selects the current RTD being read.
  - Receives RTD data from the reader (MAX31865) through SPI communication.
  - Calculates temperature from the resistance data.
  - Acts as network server to provide access to the data.

Conclusion
- System allows data center temperatures to be monitored more closely.
- Better coverage with more temperature devices.
- Access to data over a network.