

DISTRIBUTED MONITORING AND CONTROL OF HVAC'S AIR HANDLING UNITS

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Topics of Discussion

- Introduction
- Problem Statement
- System Hardware Design
- System Software Design
- Basic Function
- Software and Hardware overview by node
- Conclusion

Introduction

- Overview
 - Purpose
-

3

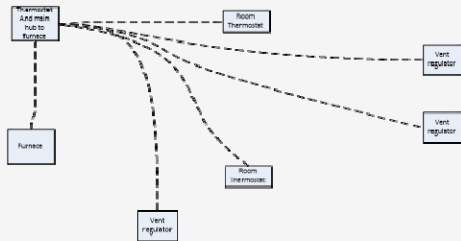
Problem Statement

- Uneven heating and cooling
 - Not energy efficient
 - Cumbersome installs
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4

System Hardware overview

- 1 main thermostat (main node)
- 2 room thermometers (temperature node)
- 2 vent regulators



5

Cost

Arduino Uno	4	\$ 30.00	\$ 120.00
Arduino Mega	1	\$ 45.00	\$ 45.00
RF24 Module	1	\$ 10.00	\$ 10.00
Temperature Sensor	0.01	\$ 100.00	\$ 1.00
Motor	1	\$ 15.00	\$ 15.00
Container	3	\$ 5.00	\$ 15.00
9v Battery	8	\$ 0.75	\$ 6.00
Total Cost			\$ 212.00

- 20 weeks of work
- ~450 hours
- Research
- Programming

6

System Software Overview

- Automatically open and close air supply vents
- What is a node?
- How many nodes?
- Approximate expandability

7

The Main Node

- Arduino 2560
- Role
- Transceiver (2.4 Ghz NRF24)
- Range
- Screen capabilities
- User input
- Constant monitoring
- Furnace/AC Activation

8

Temperature node

- Arduino Uno
- Constant monitoring
- transceiver
- No secondary error checking

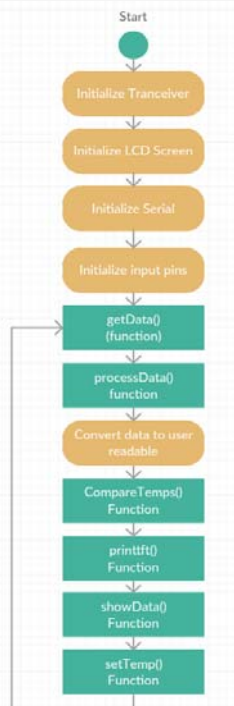
9

Air Vent Node

- Arduino Uno
- Transceiver
- Actuator
- Battery powered
- Receive signal from the main node
- No feedback to main node

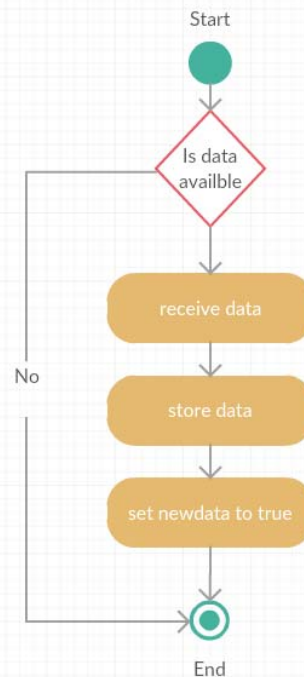
10

The Main Node Software



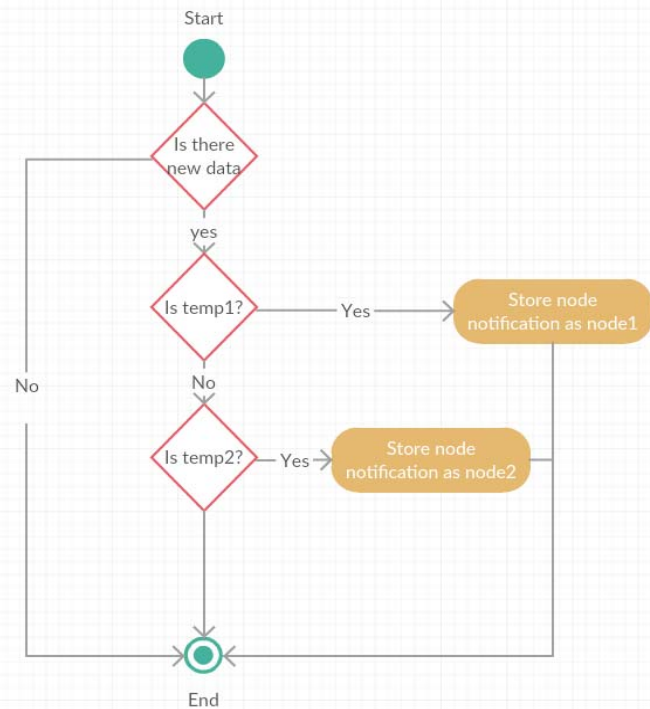
11

Get data function



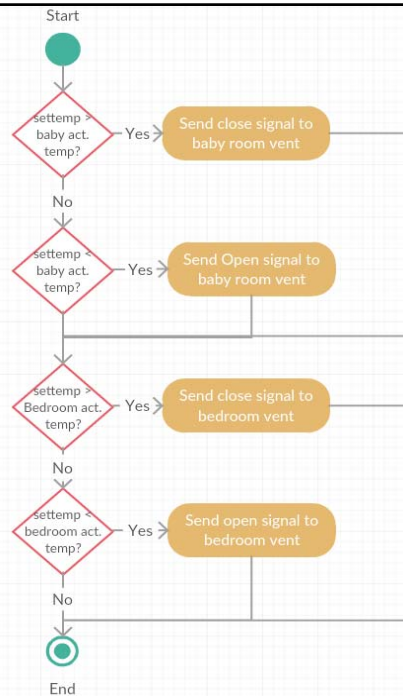
12

Process Data Function



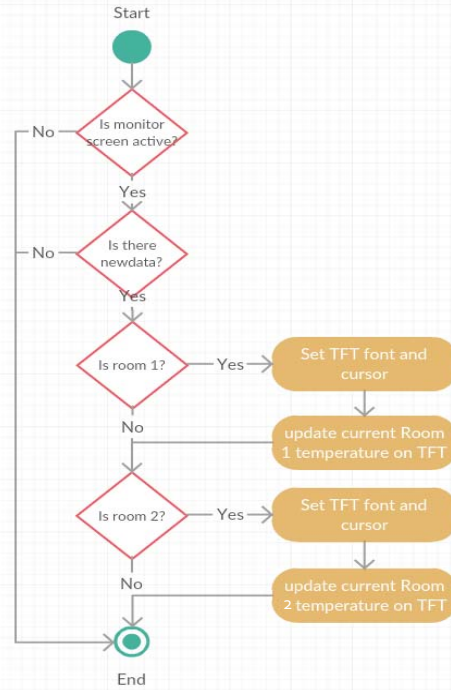
13

Compare Temps Function



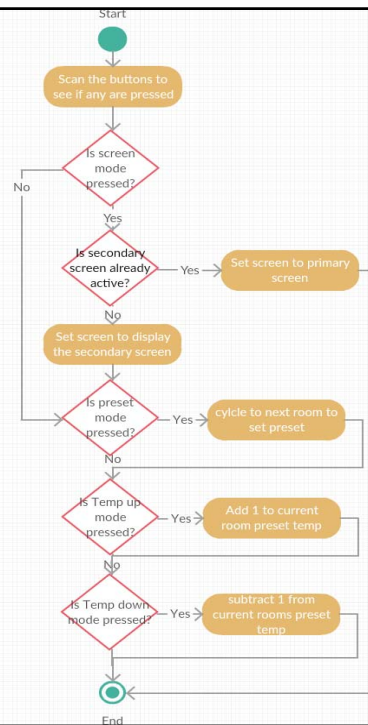
14

Print TFT Function



15

Set Temp Function



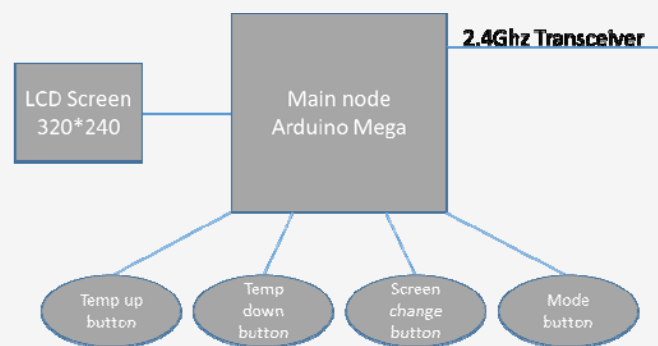
16

Basic Function / Criteria

- Easy install
- Wireless
- Uniform temperature
- User defined temperature for each room

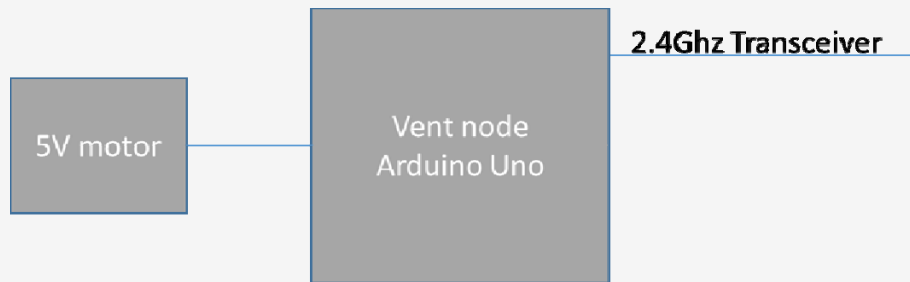
17

The Main Node Hardware



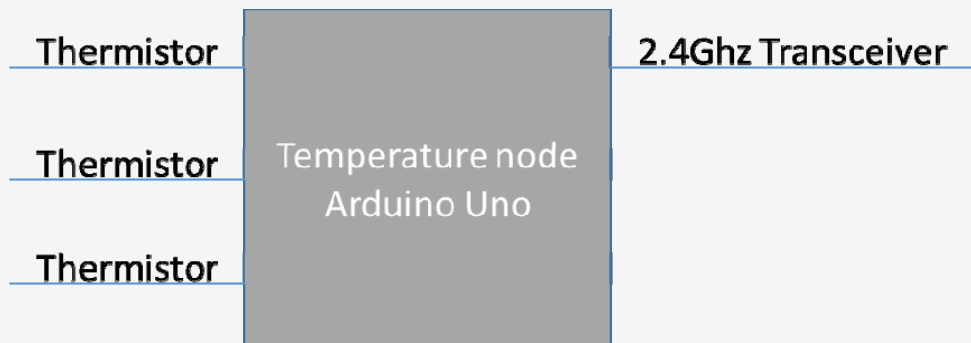
18

Air Vent Node Hardware



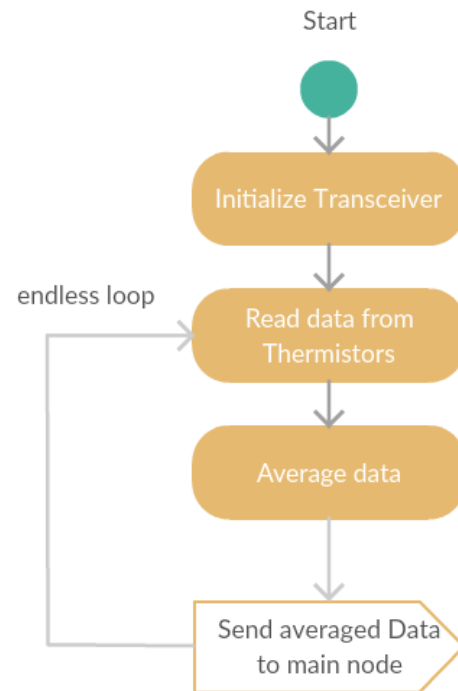
19

Temperature node Hardware



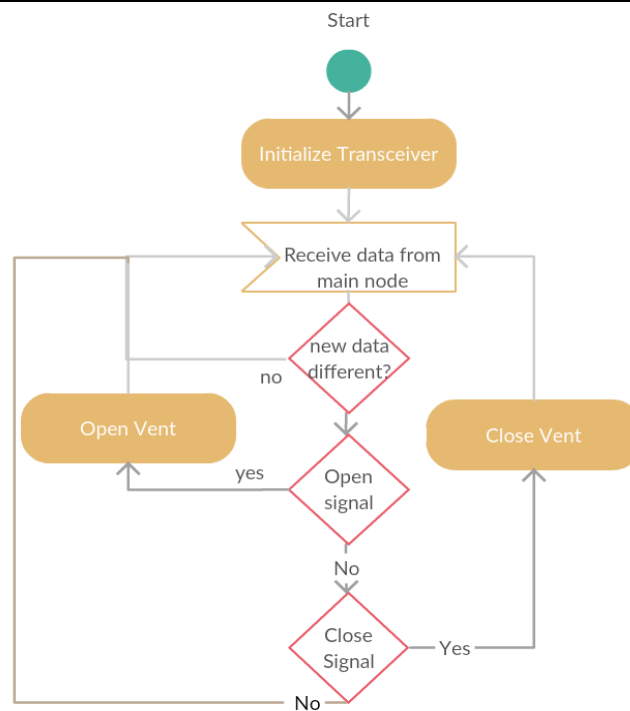
20

Temperature node Software

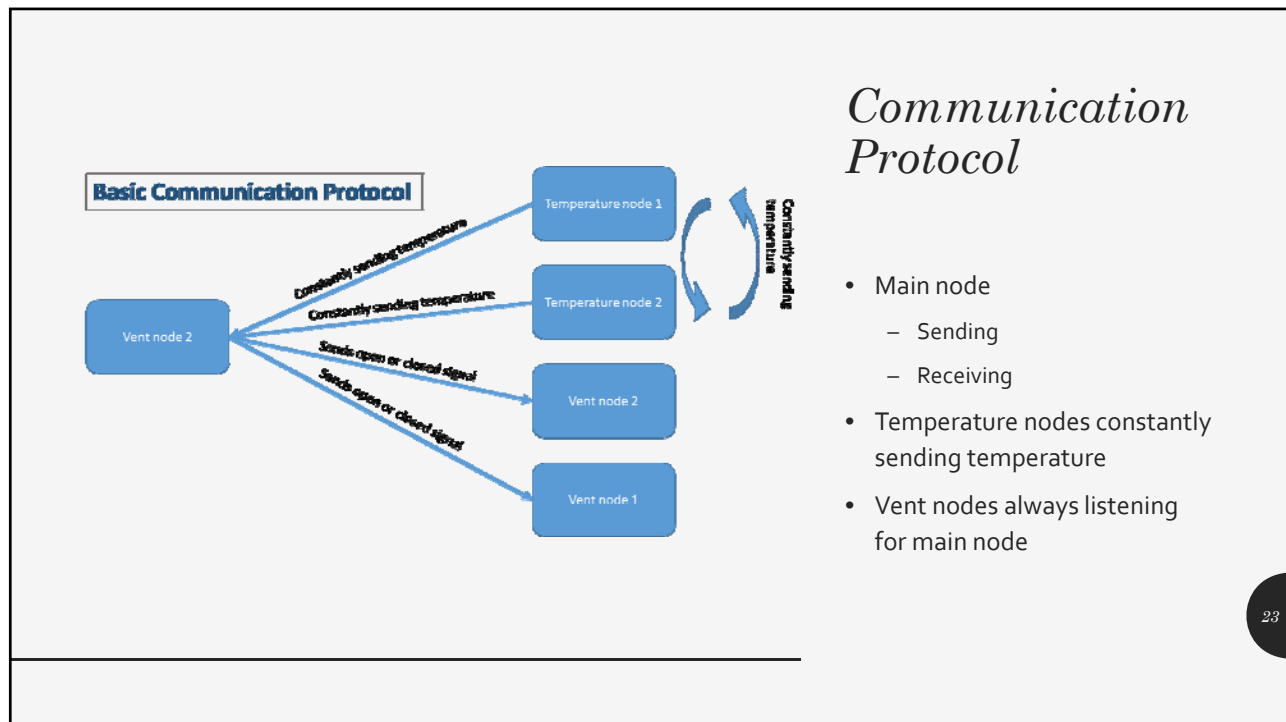


21

Vent Node Software



22



23

*Main node
monitor
screenshot*



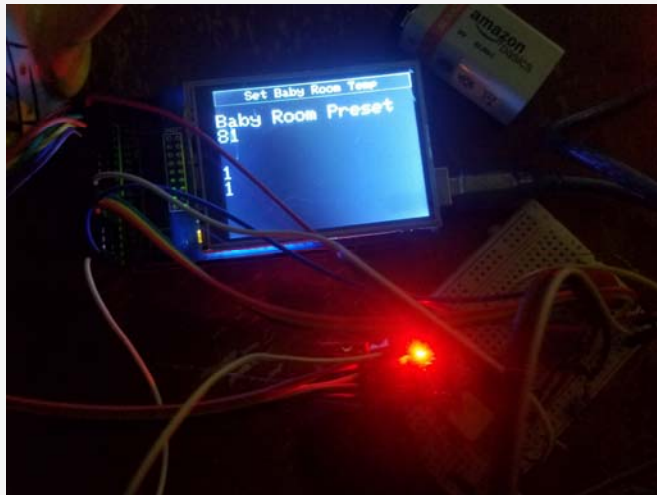
24

Preset Screen



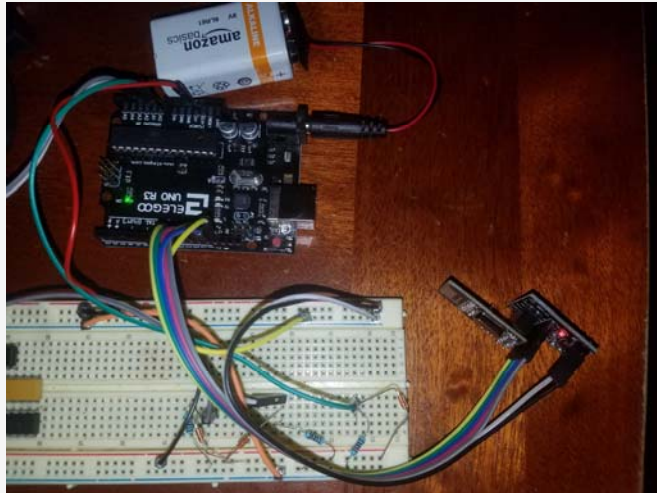
25

Main node overview screenshot



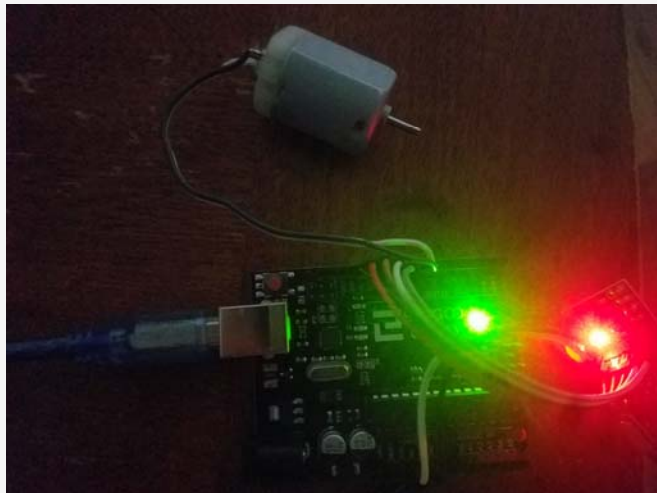
26

Temperature node



27

Vent node Screen Shot



28

Conclusion

- Schedule
- Wireless communication
- Research

29

Questions?

30