THAT Home Automation Topology

Project Progress Report

Chris Miller | Nick Viera

Advisors

Dr. Irwin

Dr. Malinowski

Bradley University
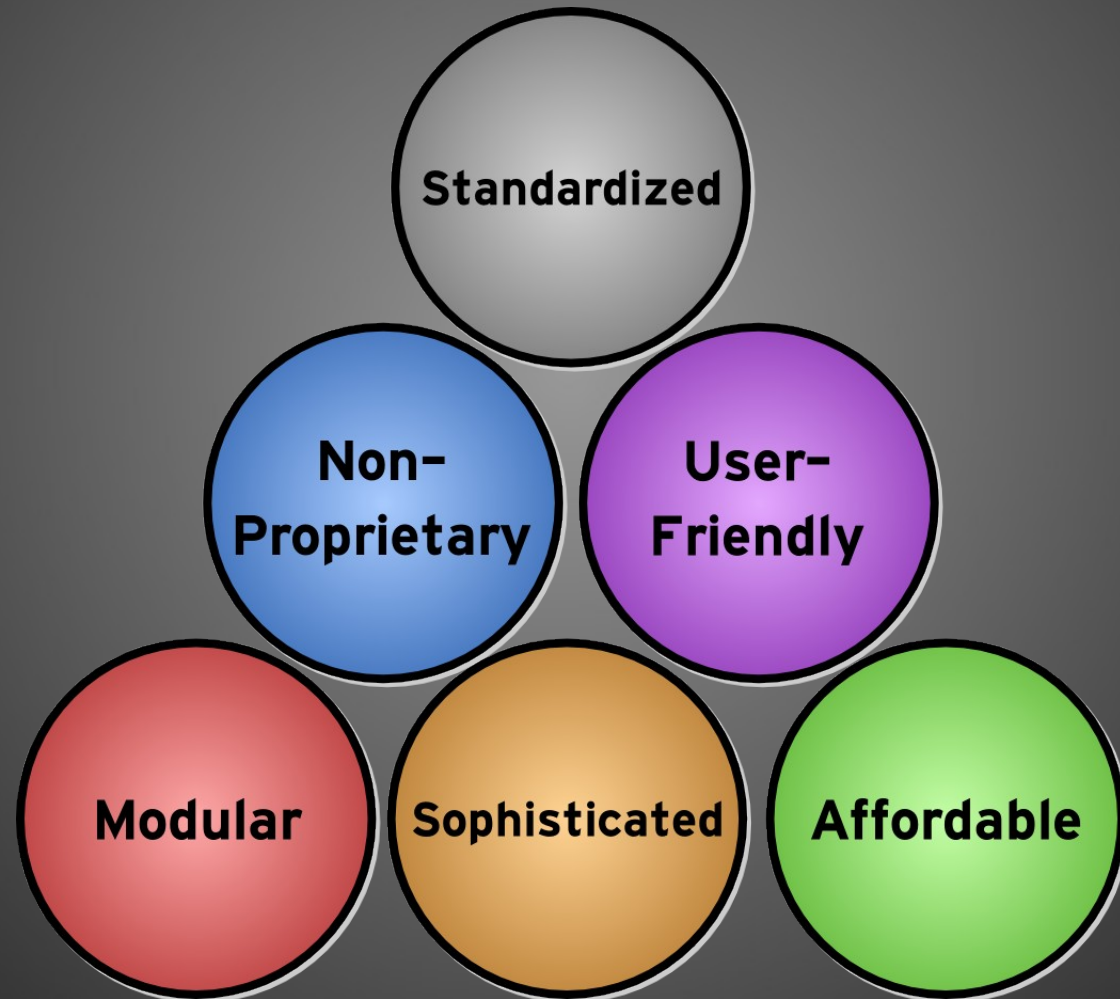
Electrical and Computer
Engineering Department

Significance

<u>Better Living Through Home Automation</u>

- **Convenience …**

- **Safety …**
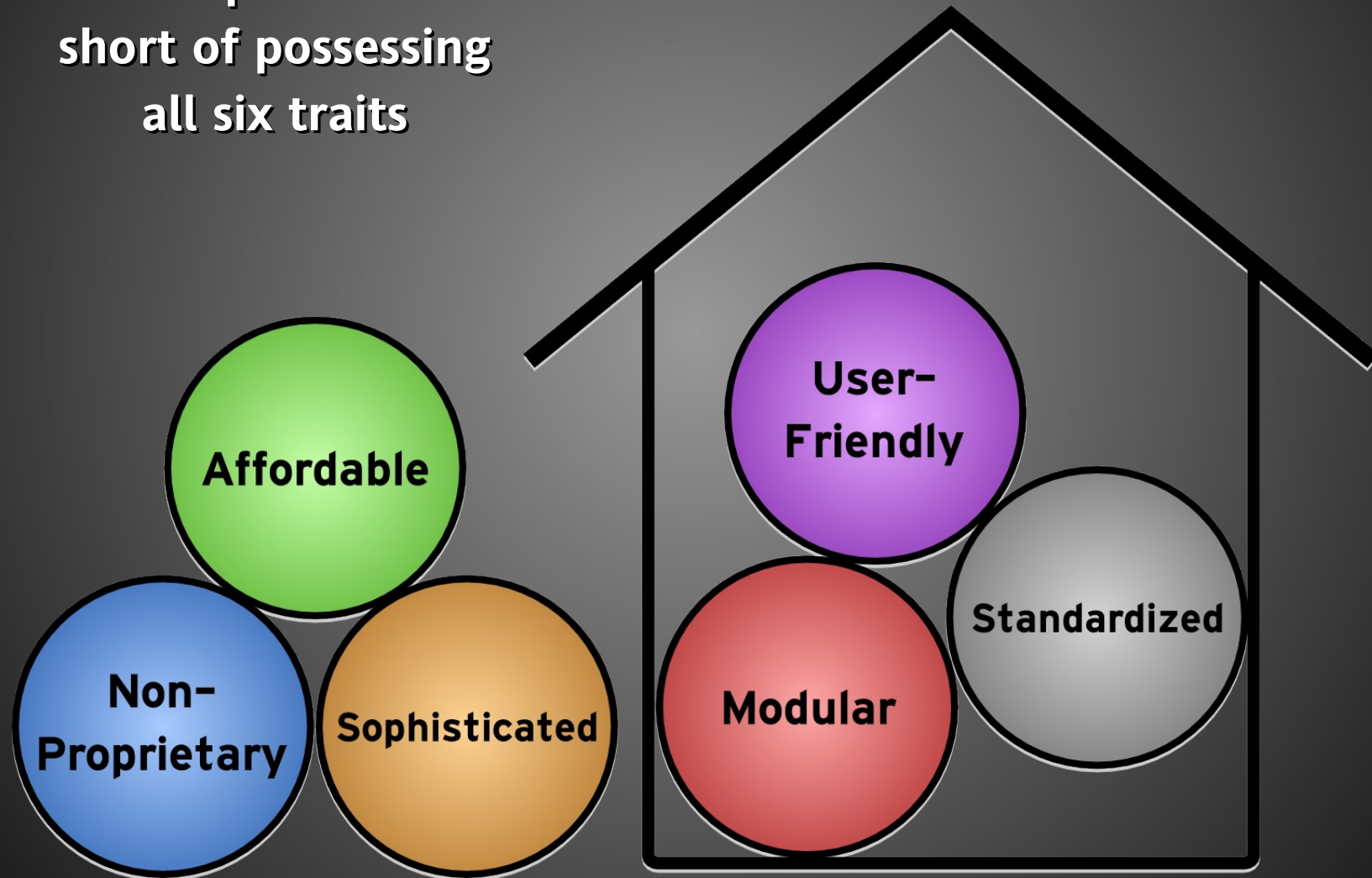
- **Savings …**

- **FUN!**

Motivation

Six Desirable Traits

Motivation

Current products fall short of possessing all six traits

Affordable

Non-Proprietary

Sophisticated

User-Friendly

Modular

Standardized

Motivation

We Intend to achieve a reasonable balance
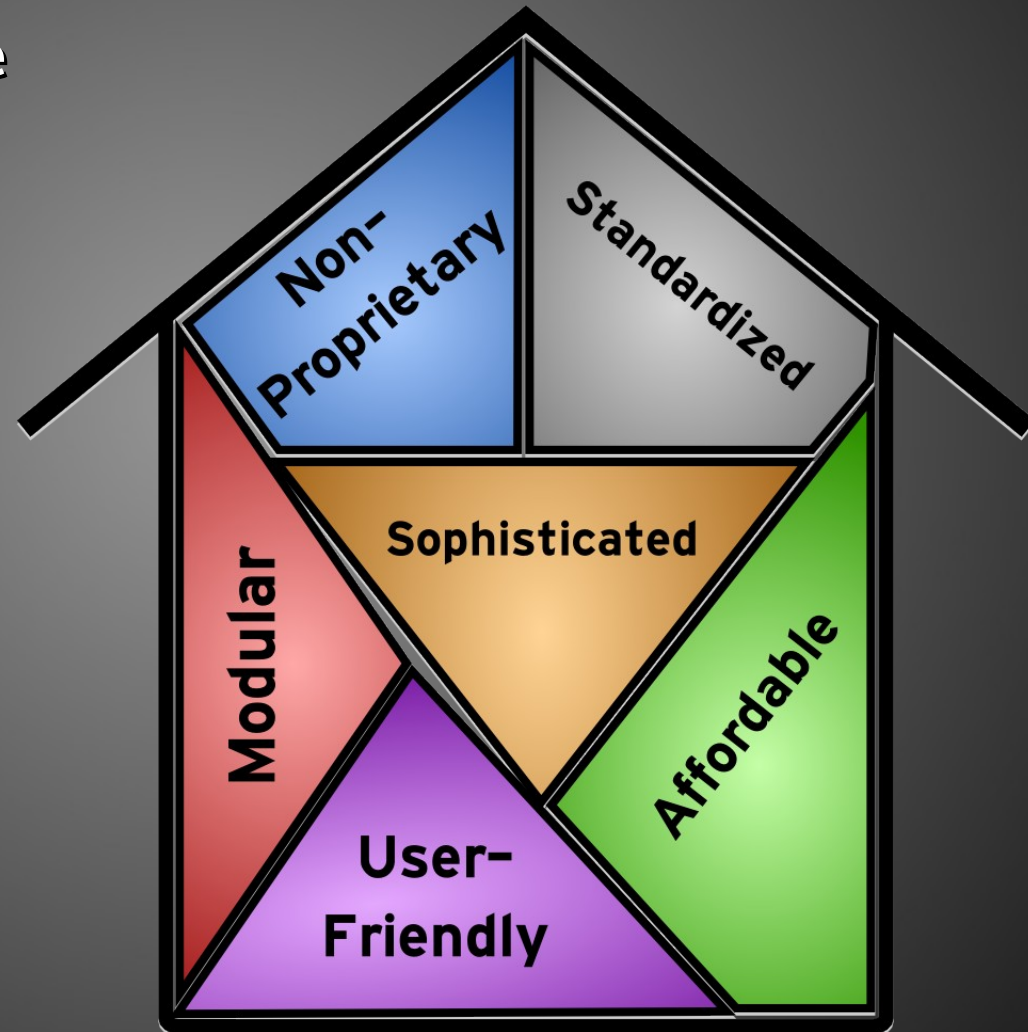
Objectives

Given an Existing System:

→	**Ethernet Link**
→	**PoE Ethernet Link**
→	**Serial Link**
→	**Software Link**

Objectives

To Design and Implement:

▢ **THAT topology and protocol** **(Nick and Chris)**

Electronic Access Module Slave ⟷	Electronic Access Module	THAT System Control Software	Computer (32/64-bit platform)	The Internet

Digital Thermostat Module

PoE Ethernet Switch ⟷ Ethernet Router ⟷ Broadband Modem

THAT Module

THAT Module

Legend:
→ Ethernet Link
→ PoE Ethernet Link
→ Serial Link
→ Software Link

Objectives

To Design and Implement:

⬜ **THAT topology and protocol** **(Nick and Chris)**
🟨 **THAT System Control Software** **(Nick and Chris)**

Objectives

To Design and Implement:

- ⬜ **THAT topology and protocol** (Nick and Chris)
- 🟨 **THAT System Control Software** (Nick and Chris)
- 🟦 **Digital Thermostat Module** (Nick)

```
Electronic          Electronic              THAT System       Computer            The
Access Module  ◄──►  Access        ──►       Control           ( 32/64-bit         Internet
Slave               Module                  Software          platform)

Digital                              PoE                     Ethernet        Broadband
Thermostat   ◄──                     Ethernet   ◄──────►     Router    ◄──►   Modem
Module                               Switch

                                     THAT              THAT
                                     Module            Module
```

Legend:
- → Ethernet Link
- → PoE Ethernet Link
- → Serial Link
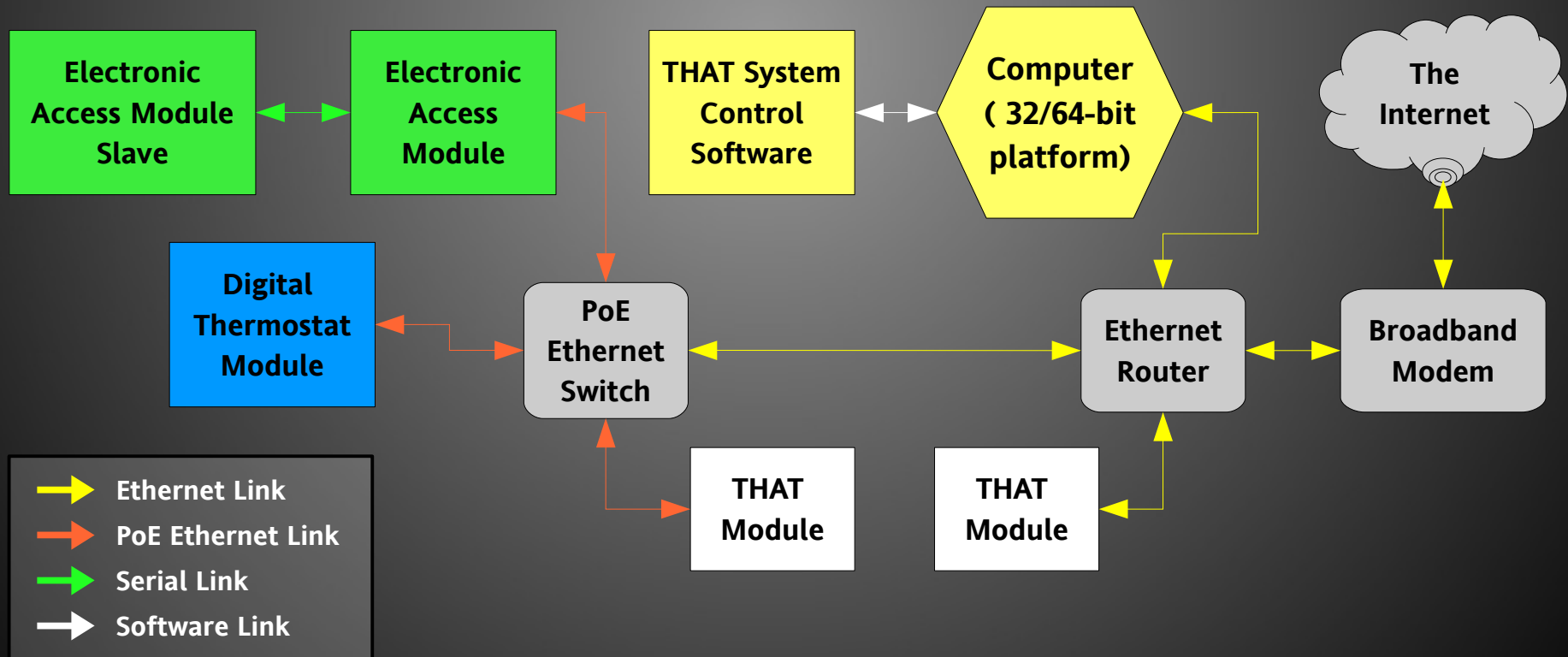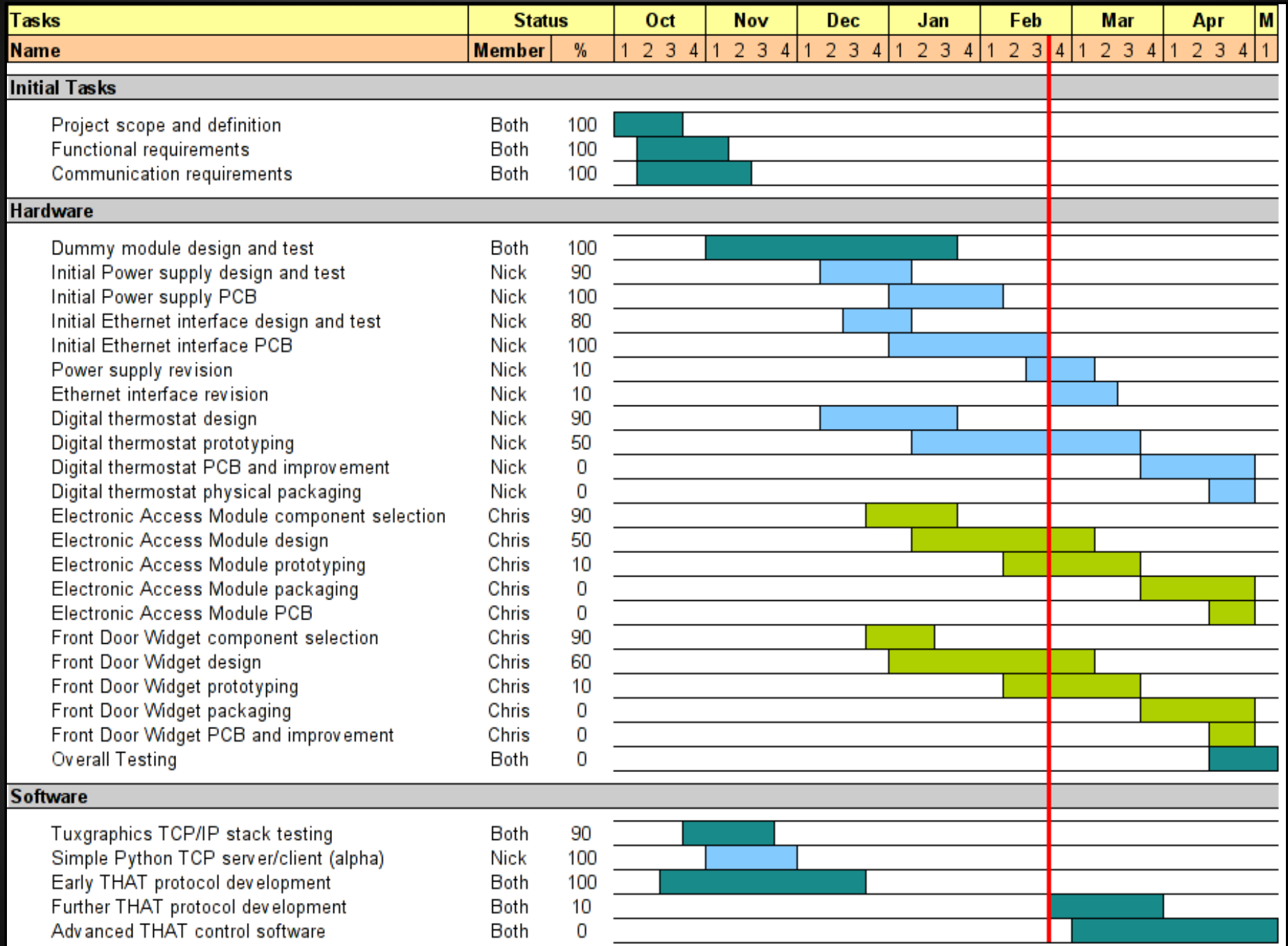- → Software Link
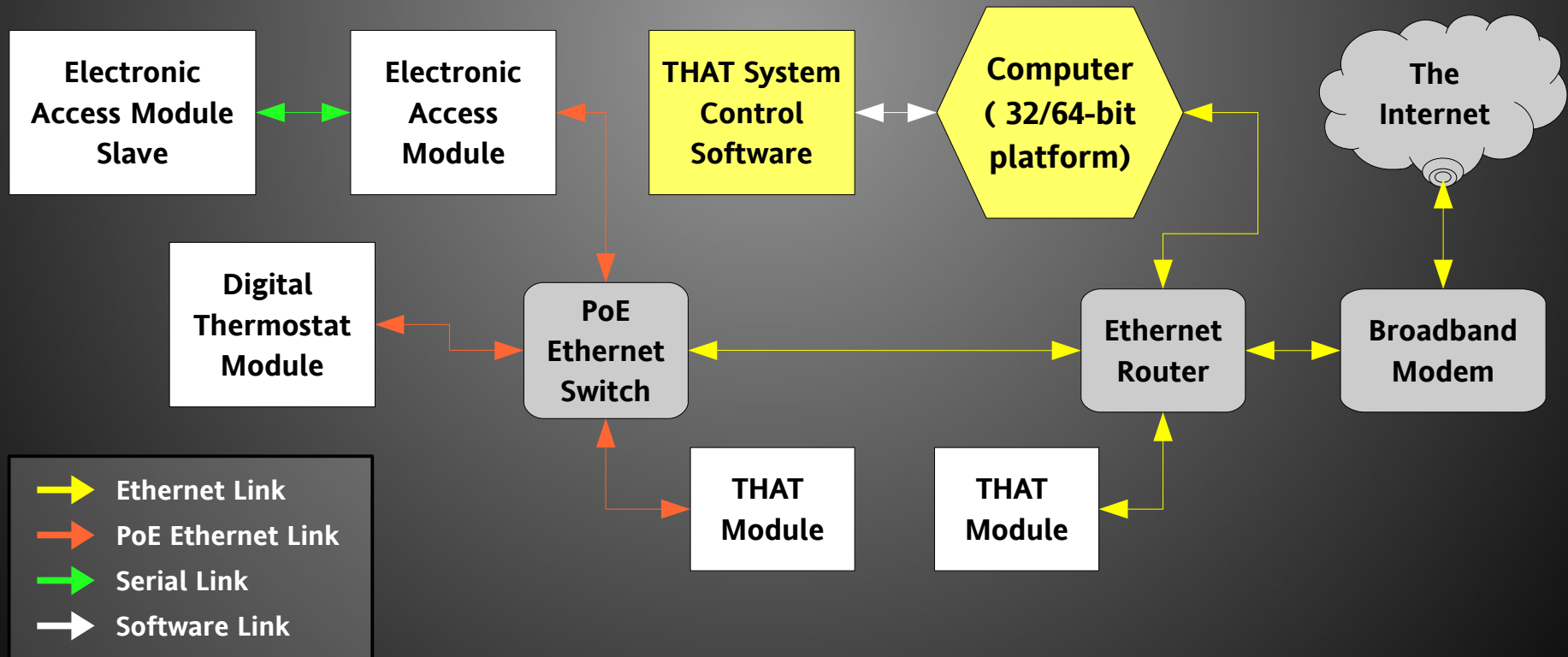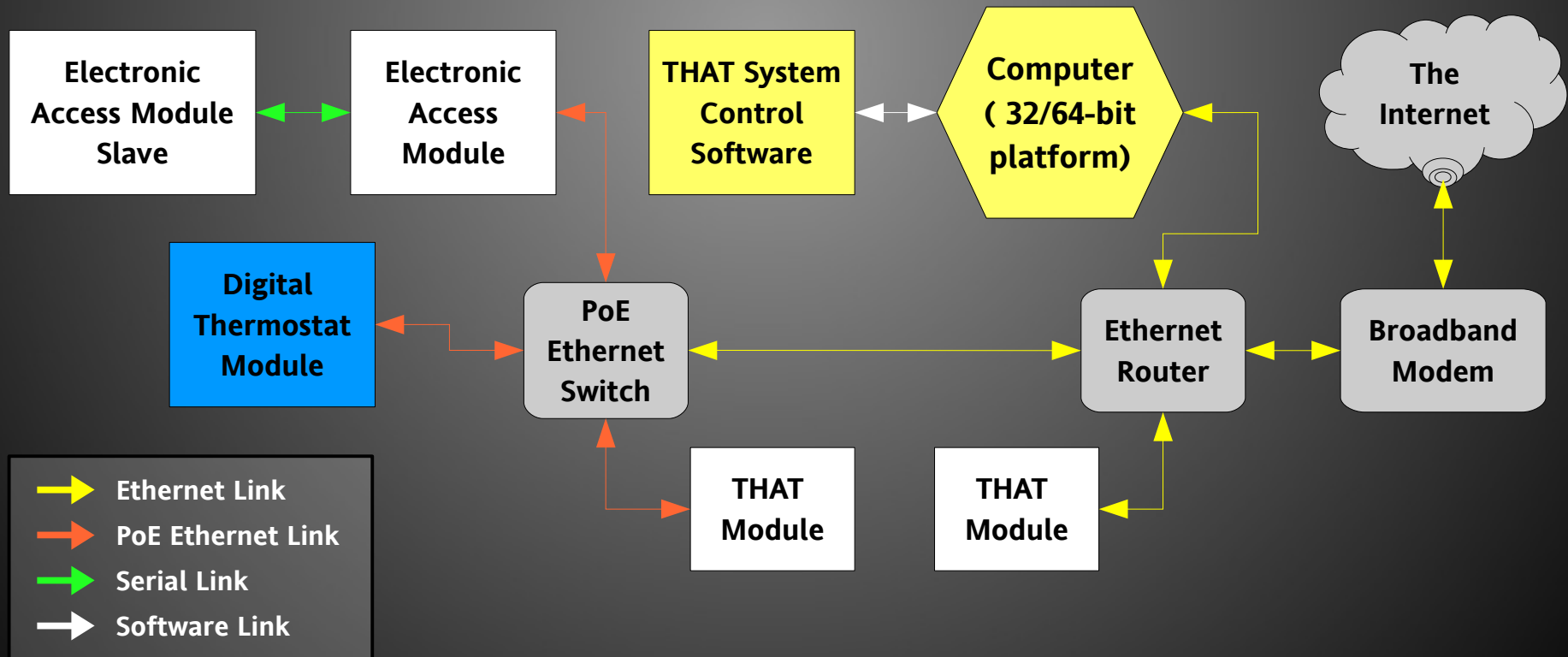
Objectives

To Design and Implement:

- ⬜ THAT topology and protocol (Nick and Chris)
- 🟨 THAT System Control Software (Nick and Chris)
- 🟦 Digital Thermostat Module (Nick)
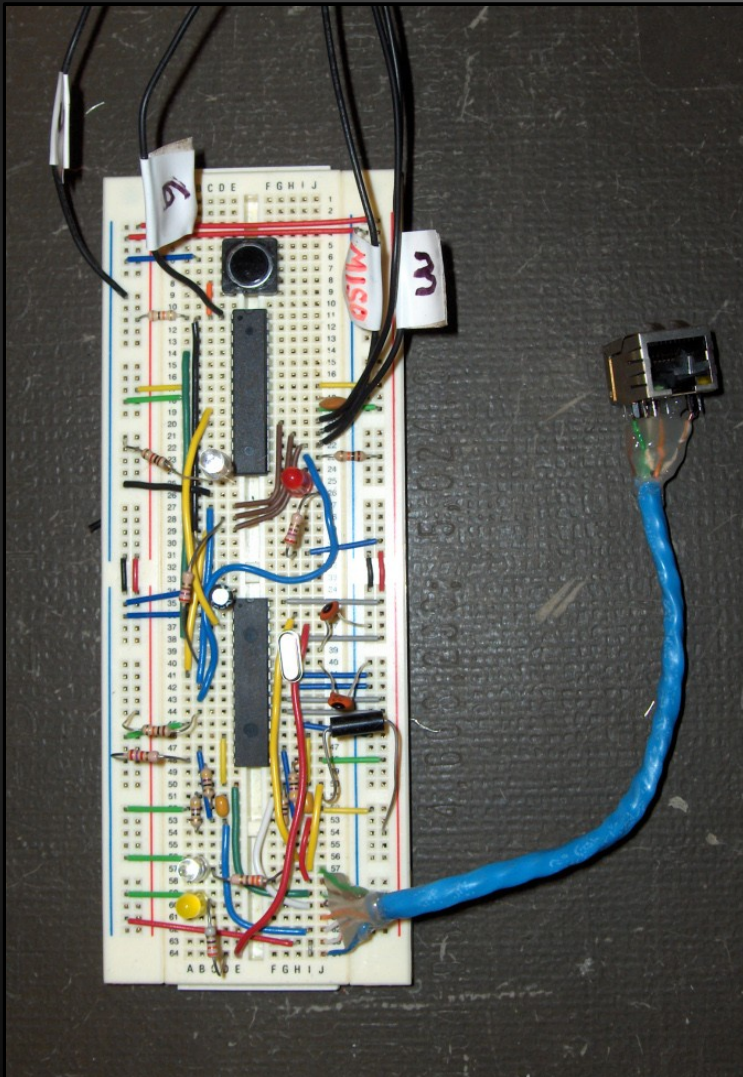- 🟩 Electronic Access Module (Chris)

```
Electronic Access Module Slave  <-->  Electronic Access Module
THAT System Control Software  <-->  Computer ( 32/64-bit platform)
Digital Thermostat Module
PoE Ethernet Switch
THAT Module
THAT Module
Ethernet Router
Broadband Modem
The Internet
```

Legend:
- → Ethernet Link
- → PoE Ethernet Link
- → Serial Link
- → Software Link

Timeline (Gantt Chart)

Tasks / Name	Status Member	%
Initial Tasks		
Project scope and definition	Both	100
Functional requirements	Both	100
Communication requirements	Both	100
Hardware		
Dummy module design and test	Both	100
Initial Power supply design and test	Nick	90
Initial Power supply PCB	Nick	100
Initial Ethernet interface design and test	Nick	80
Initial Ethernet interface PCB	Nick	100
Power supply revision	Nick	10
Ethernet interface revision	Nick	10
Digital thermostat design	Nick	90
Digital thermostat prototyping	Nick	50
Digital thermostat PCB and improvement	Nick	0
Digital thermostat physical packaging	Nick	0
Electronic Access Module component selection	Chris	90
Electronic Access Module design	Chris	50
Electronic Access Module prototyping	Chris	10
Electronic Access Module packaging	Chris	0
Electronic Access Module PCB	Chris	0
Front Door Widget component selection	Chris	90
Front Door Widget design	Chris	60
Front Door Widget prototyping	Chris	10
Front Door Widget packaging	Chris	0
Front Door Widget PCB and improvement	Chris	0
Overall Testing	Both	0
Software		
Tuxgraphics TCP/IP stack testing	Both	90
Simple Python TCP server/client (alpha)	Nick	100
Early THAT protocol development	Both	100
Further THAT protocol development	Both	10
Advanced THAT control software	Both	0

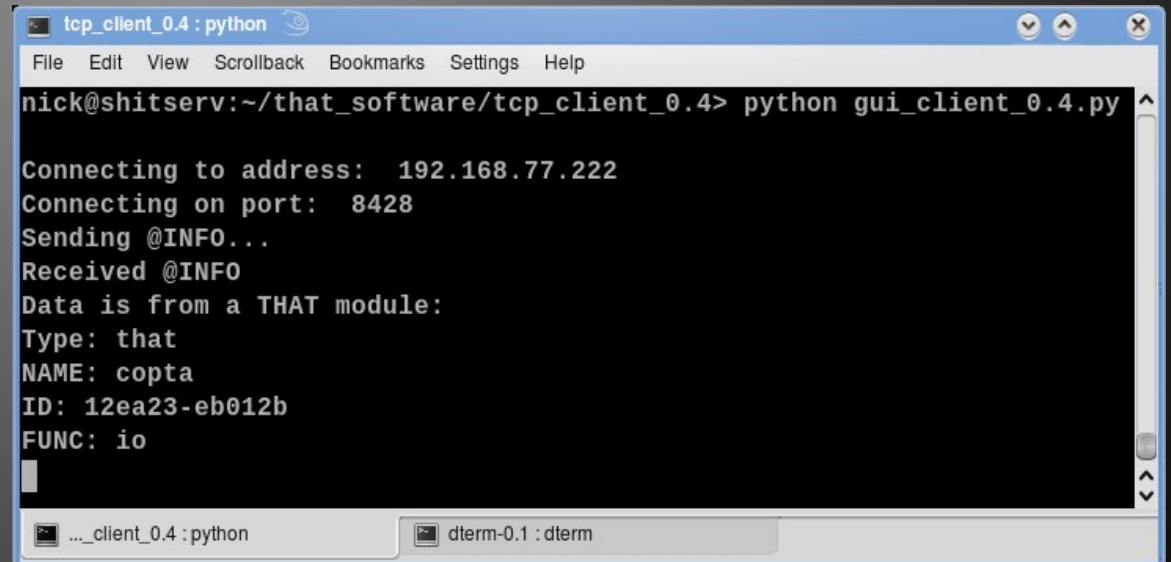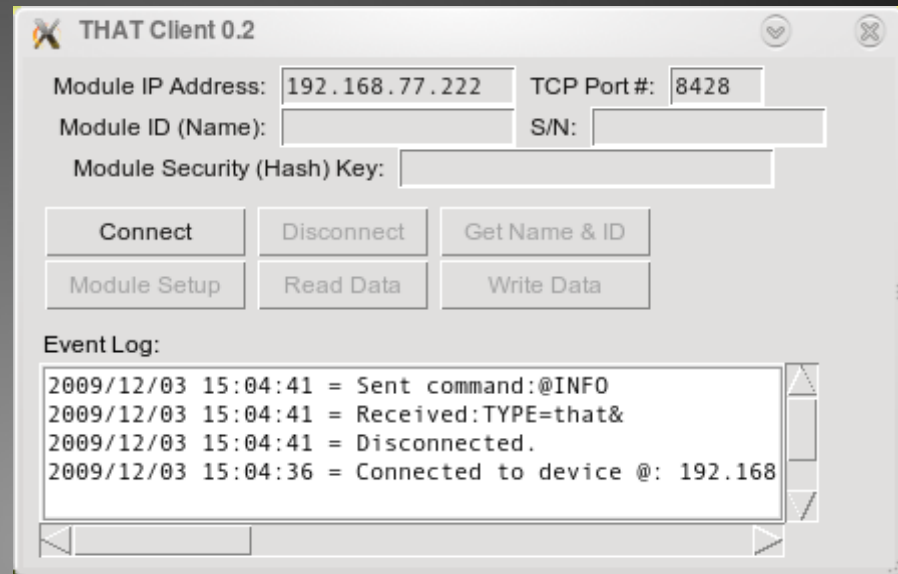Timeline columns: Oct, Nov, Dec, Jan, Feb, Mar, Apr, M (weeks 1 2 3 4)

Completed Work

"Generic" THAT Module Prototype

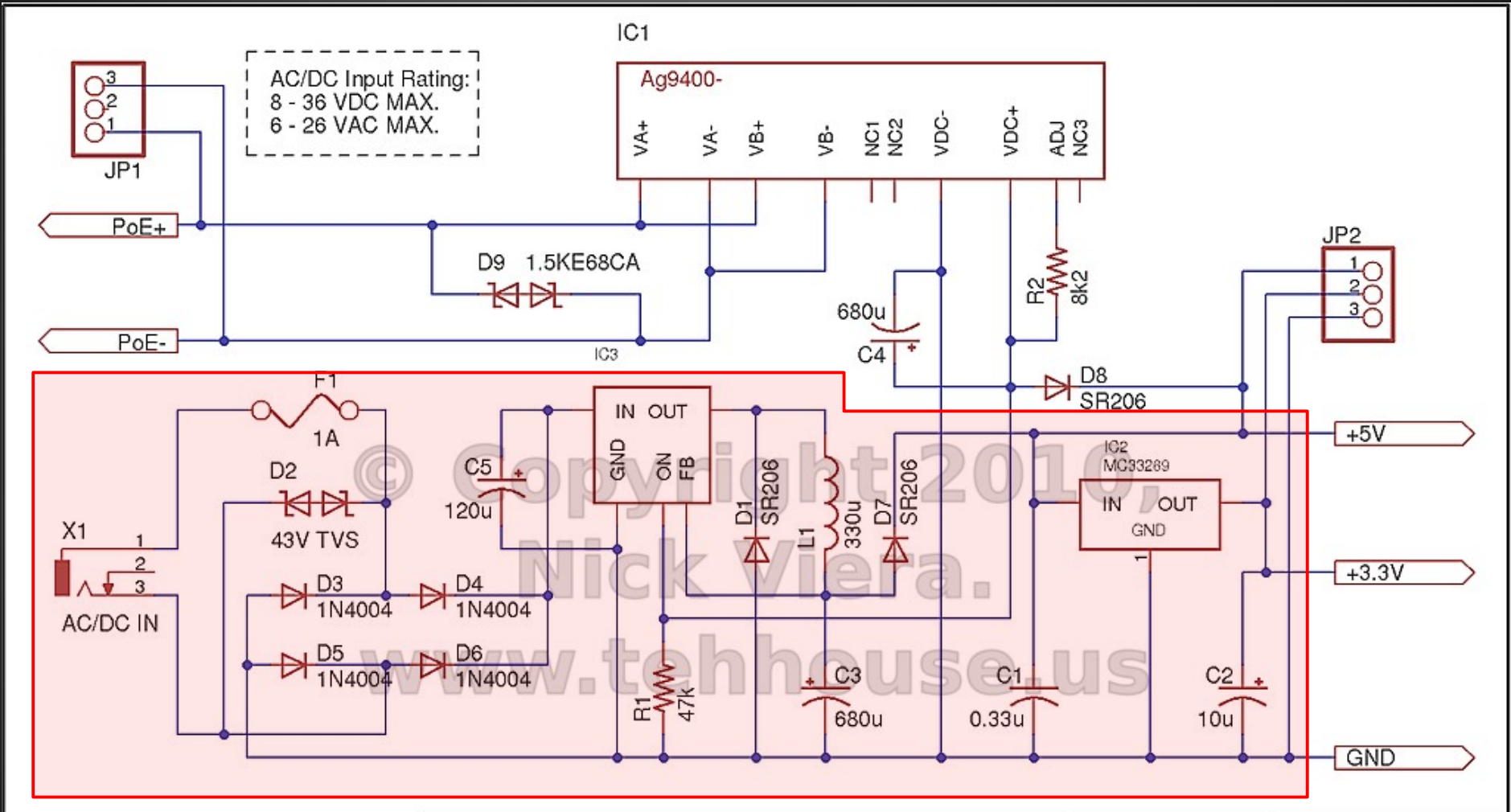## THAT Client Software 0.2 Functional GUI and terminal communications

THAT Client 0.2

Module IP Address: 192.168.77.222   TCP Port #: 8428
Module ID (Name):   S/N:
Module Security (Hash) Key:

[Connect] [Disconnect] [Get Name & ID]
[Module Setup] [Read Data] [Write Data]

Event Log:
```
2009/12/03 15:04:41 = Sent command:@INFO
2009/12/03 15:04:41 = Received:TYPE=that&
2009/12/03 15:04:41 = Disconnected.
2009/12/03 15:04:36 = Connected to device @: 192.168
```

tcp_client_0.4 : python

File Edit View Scrollback Bookmarks Settings Help

```
nick@shitserv:~/that_software/tcp_client_0.4> python gui_client_0.4.py

Connecting to address:  192.168.77.222
Connecting on port:  8428
Sending @INFO...
Received @INFO
Data is from a THAT module:
Type: that
NAME: copta
ID: 12ea23-eb012b
FUNC: io
```

...._client_0.4 : python   dterm-0.1 : dterm

Power Supply Sub-module Schematic

Power Supply Sub-module Schematic

Power Supply Sub-module Schematic

Power Supply Sub-module PCB Design

Power Supply Sub-module PCB
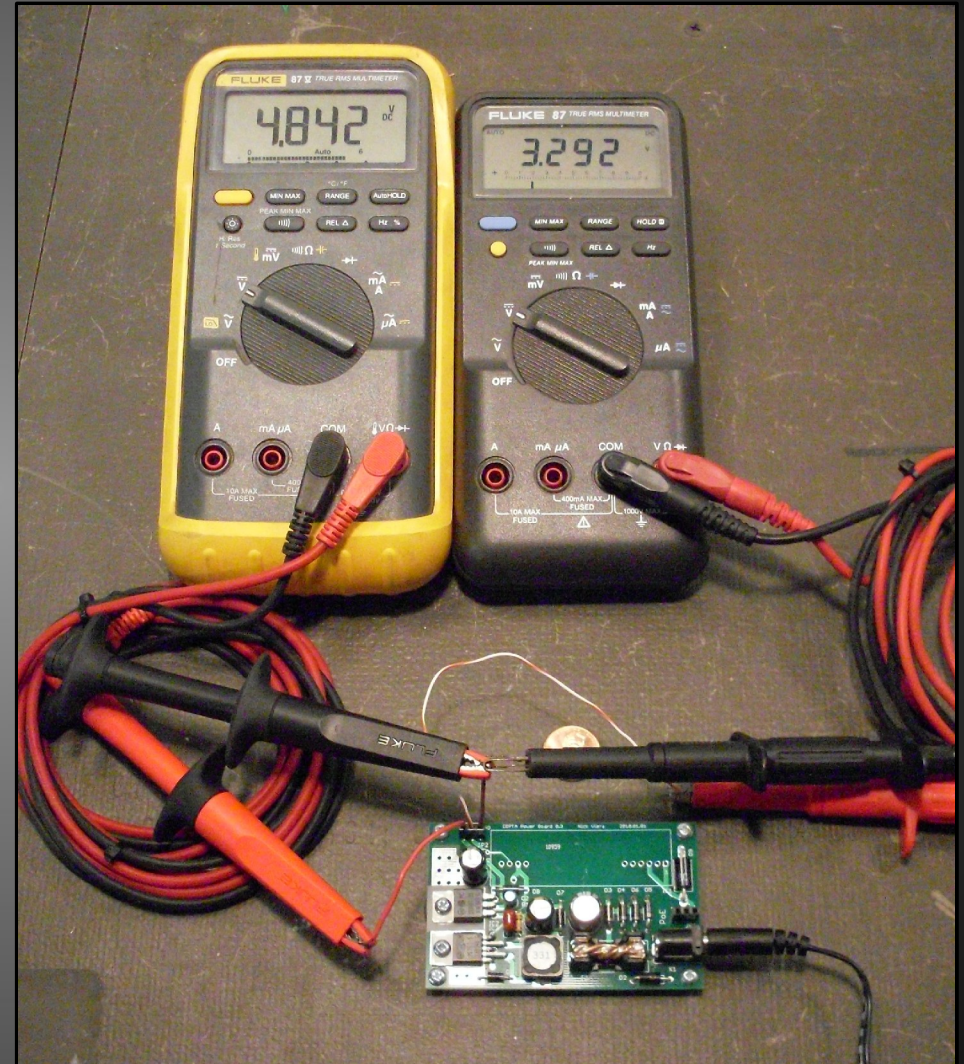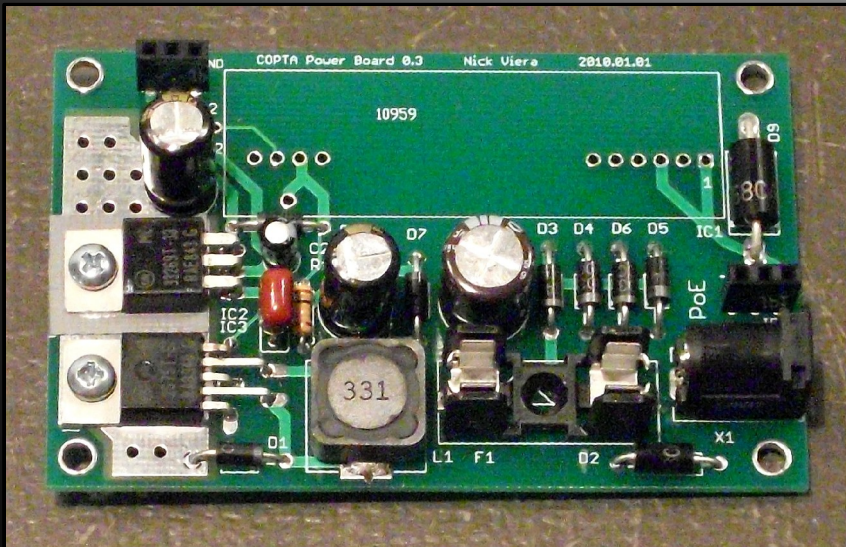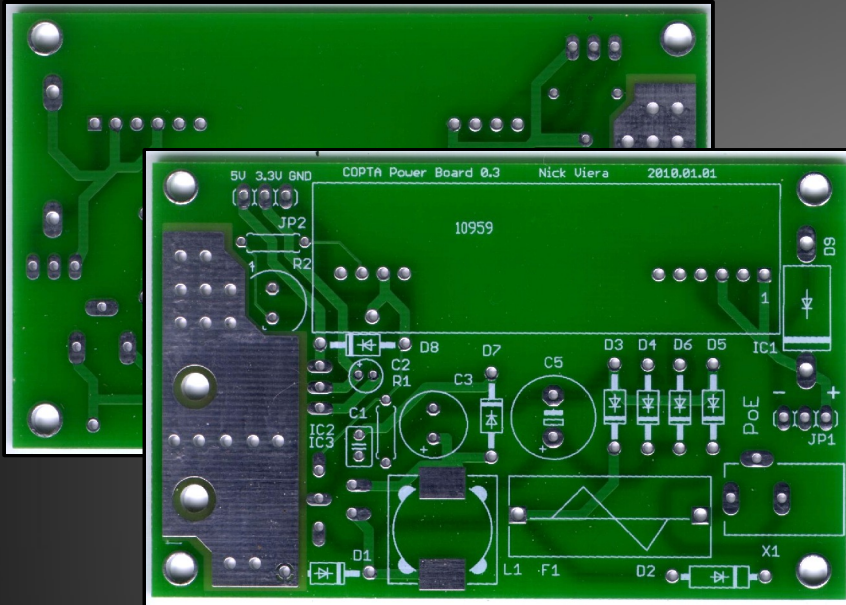
Ethernet Interface Sub-module Schematic
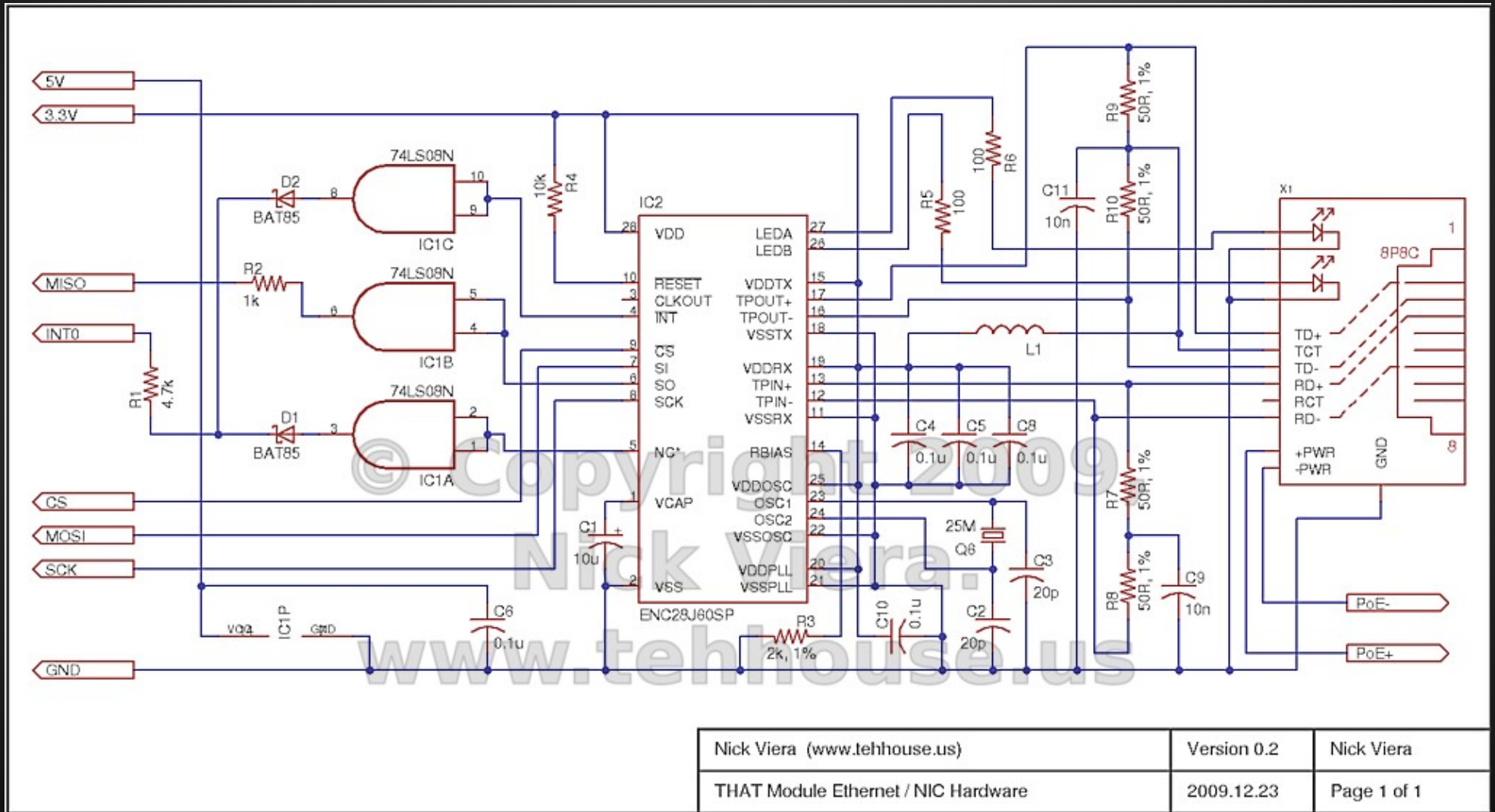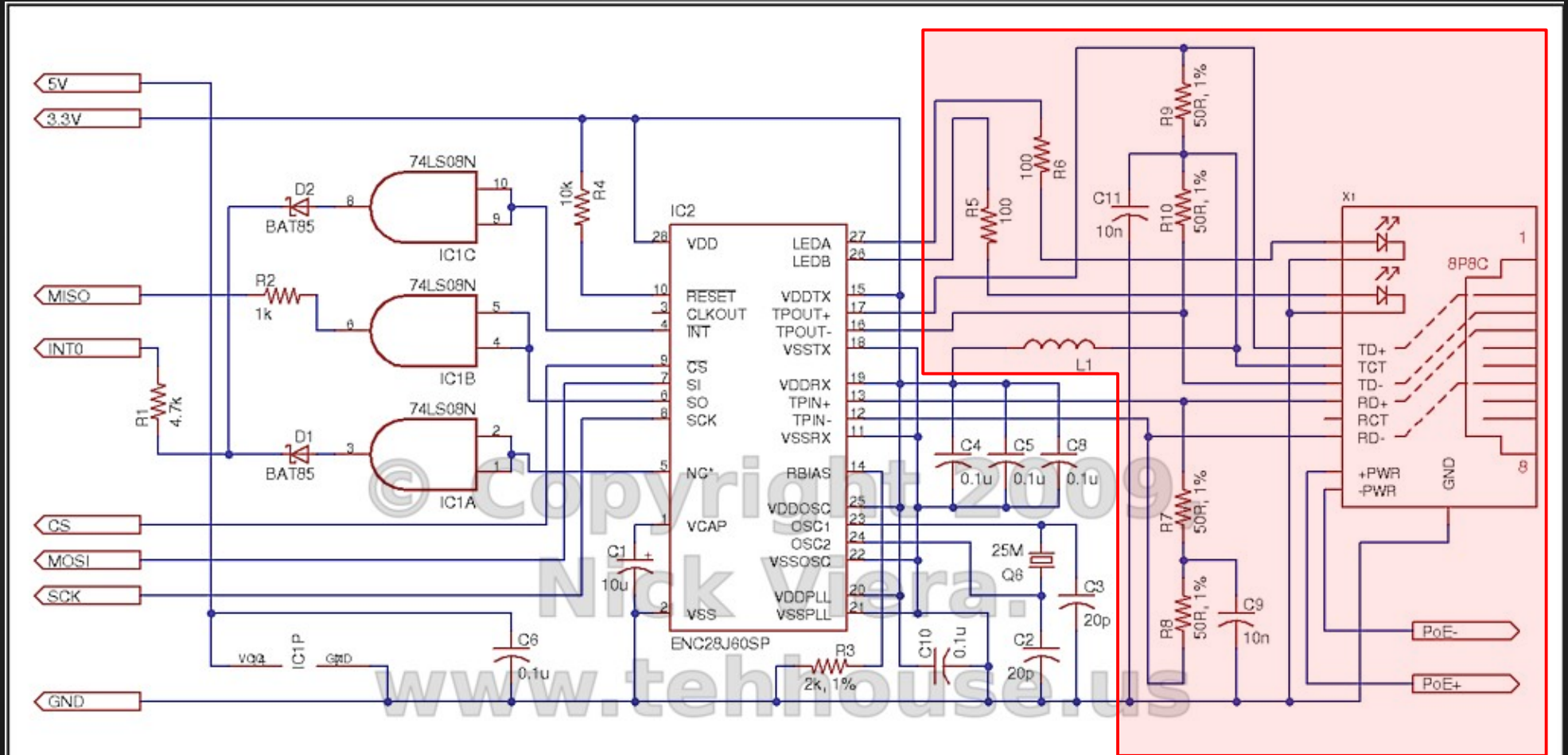
Nick Viera (www.tehhouse.us)	Version 0.2	Nick Viera
THAT Module Ethernet / NIC Hardware	2009.12.23	Page 1 of 1

Ethernet Interface Sub-module Schematic

Nick Viera (www.tehhouse.us)	Version 0.2	Nick Viera
THAT Module Ethernet / NIC Hardware	2009.12.23	Page 1 of 1

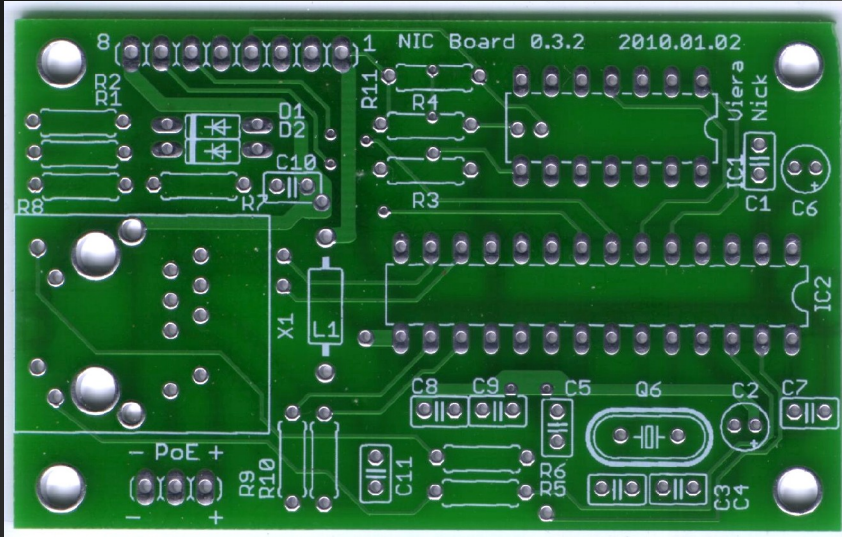# Ethernet Interface Sub-module Schematic

Ethernet Interface Sub-module Schematic

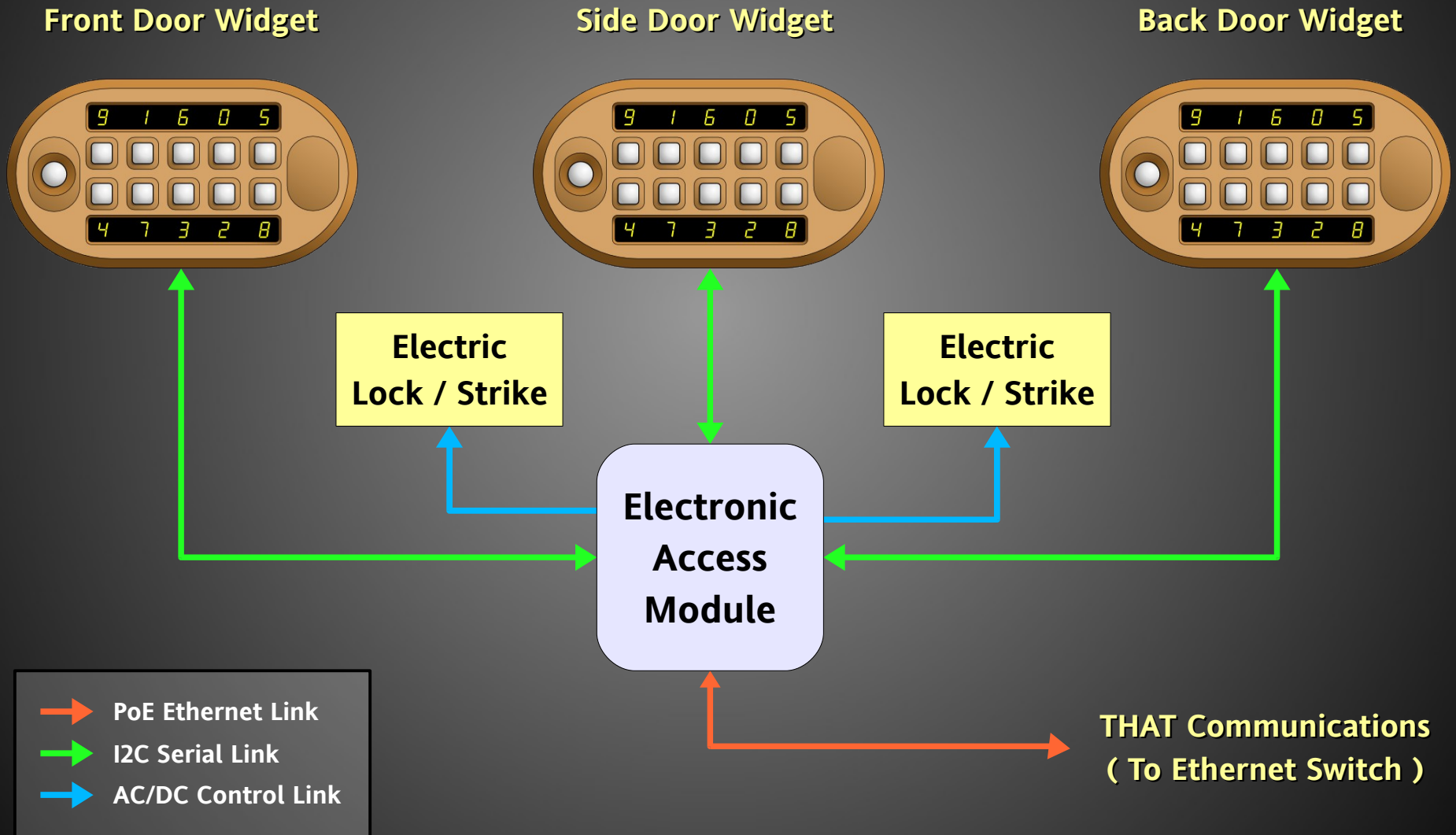# Ethernet Interface Sub-module PCB Design
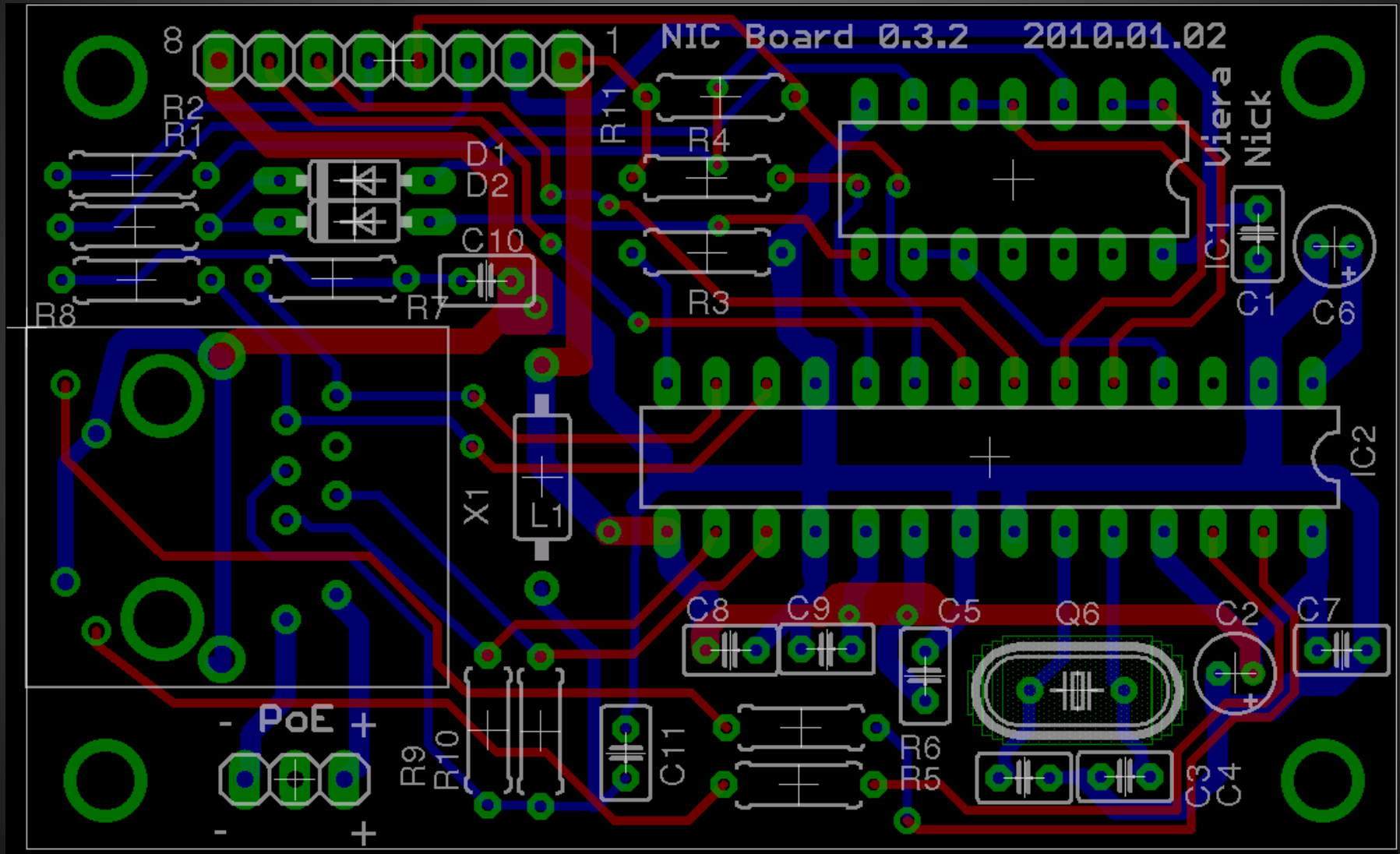
Ethernet Interface Sub-module PCB
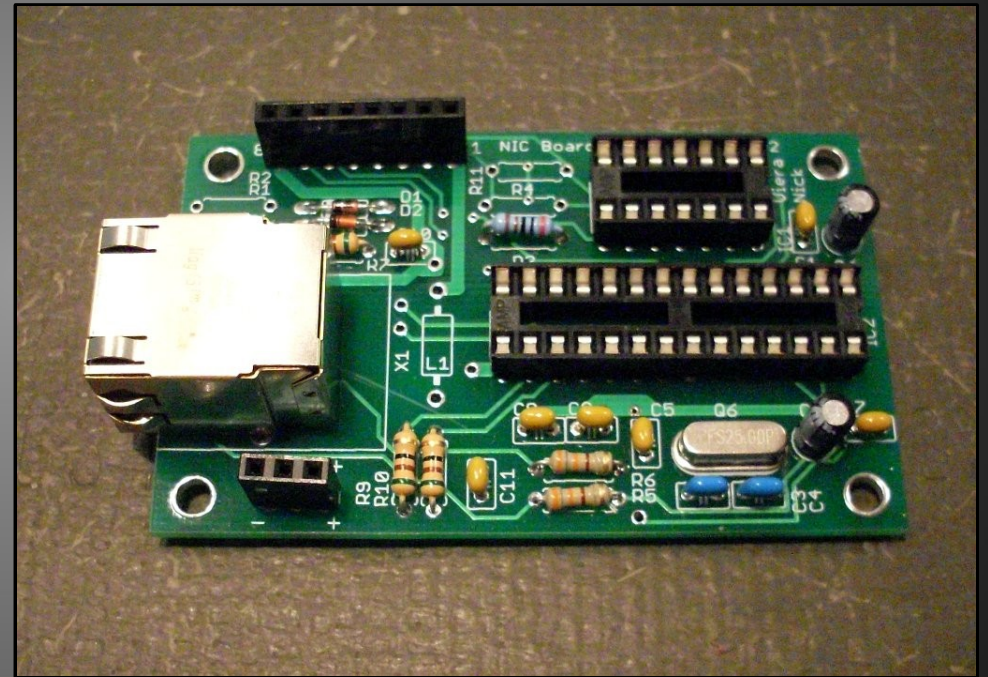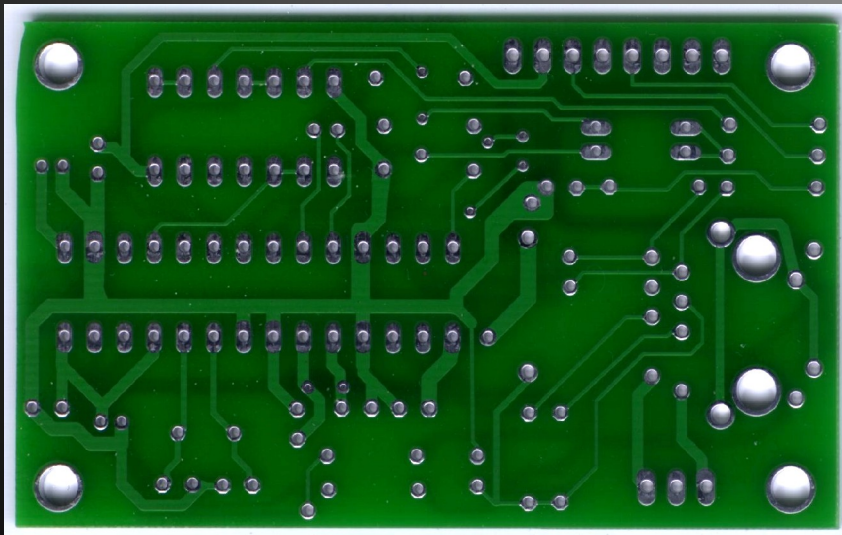
Electronic Access Module Topology
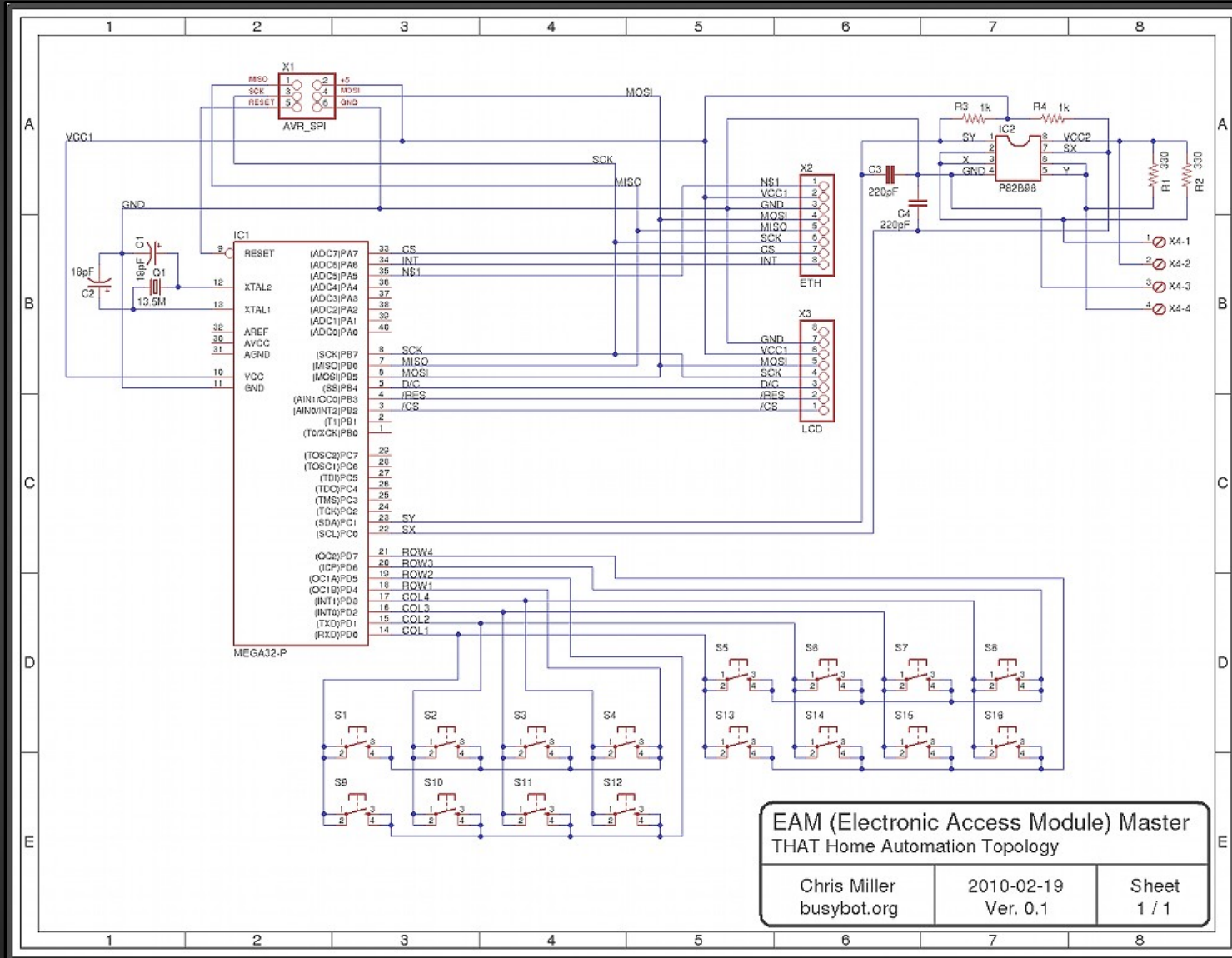
Front Door Widget

Side Door Widget

Back Door Widget

Electric Lock / Strike

Electric Lock / Strike

Electronic Access Module

THAT Communications (To Ethernet Switch)

→ PoE Ethernet Link
→ I2C Serial Link
→ AC/DC Control Link

Electronic Access Module Schematic

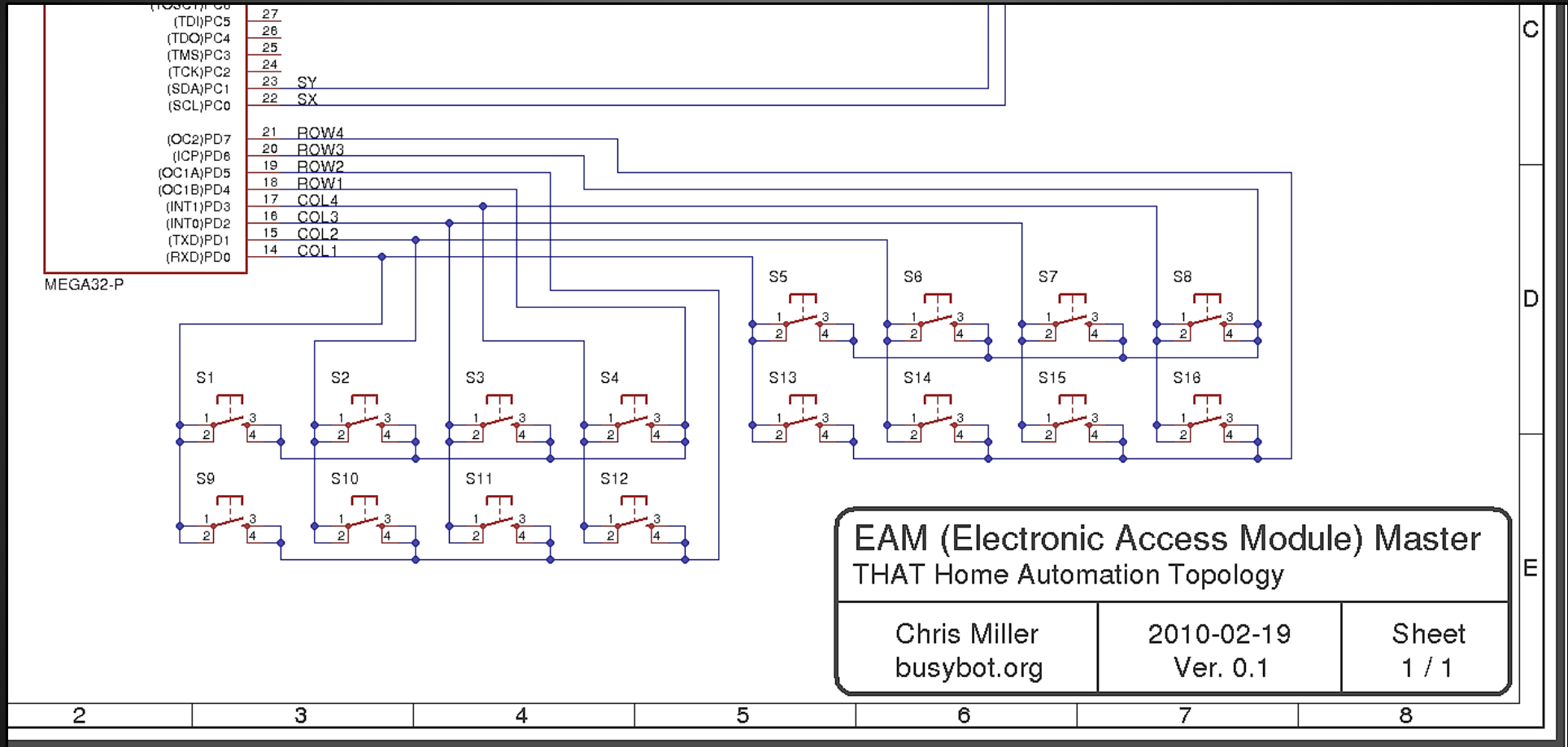# Electronic Access Module Schematic

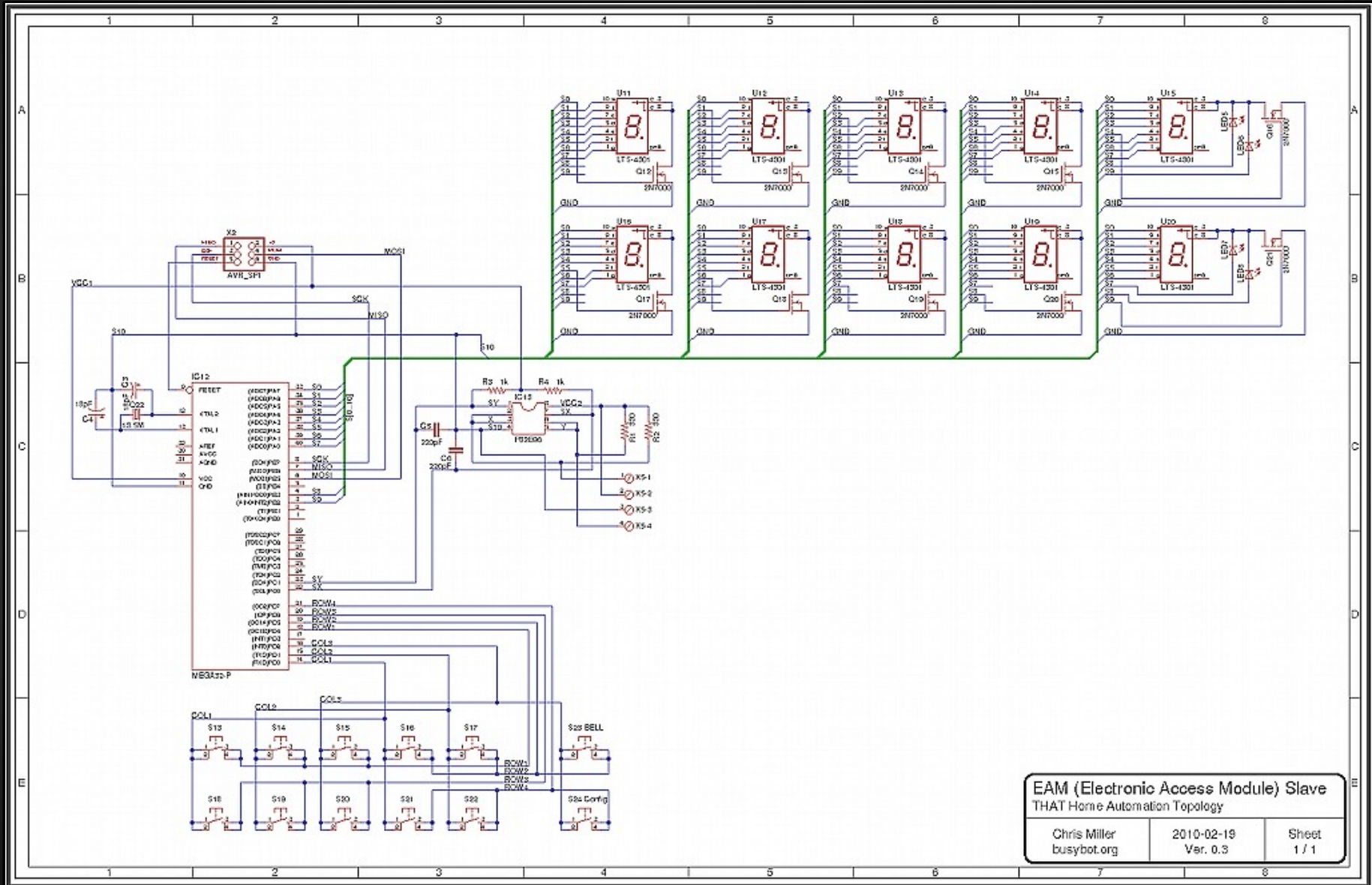# Electronic Access Module Schematic
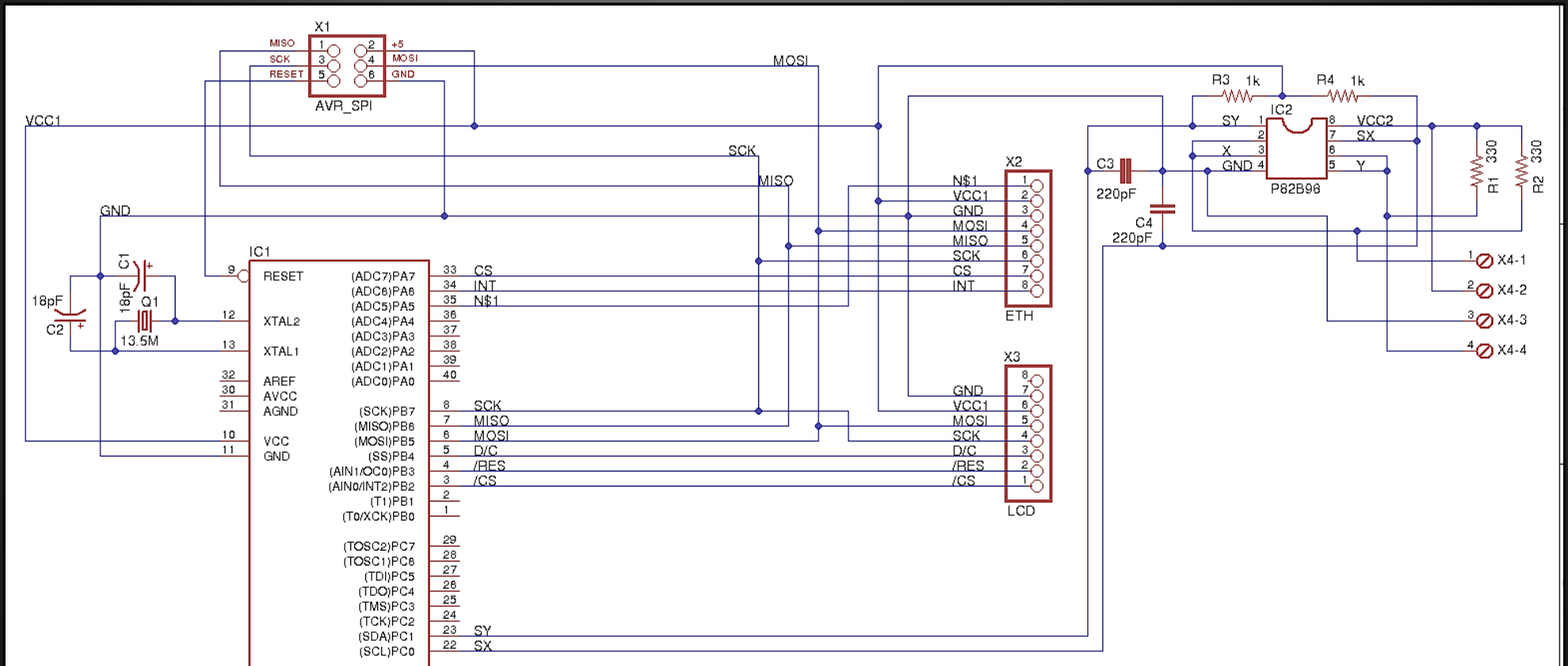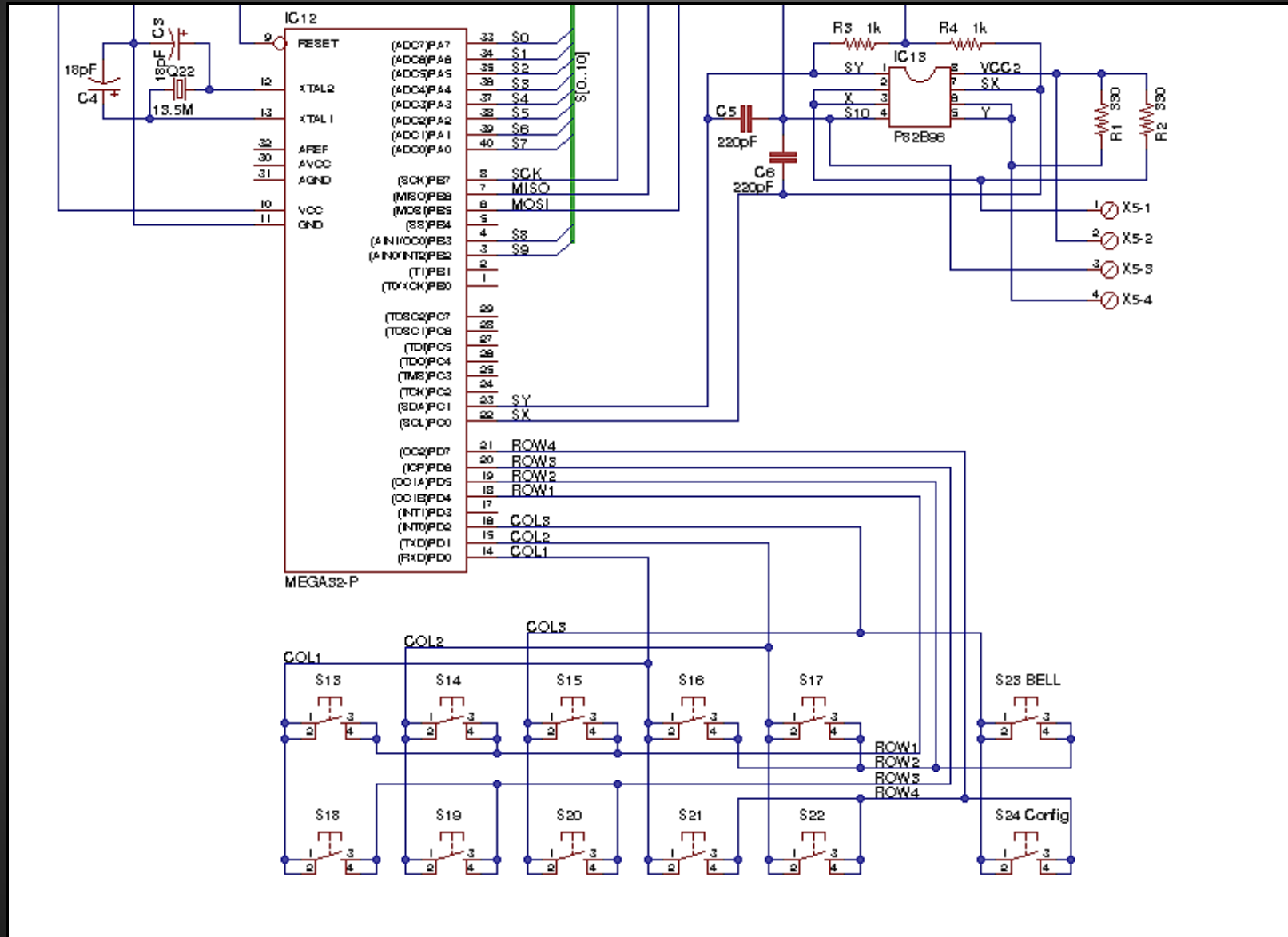
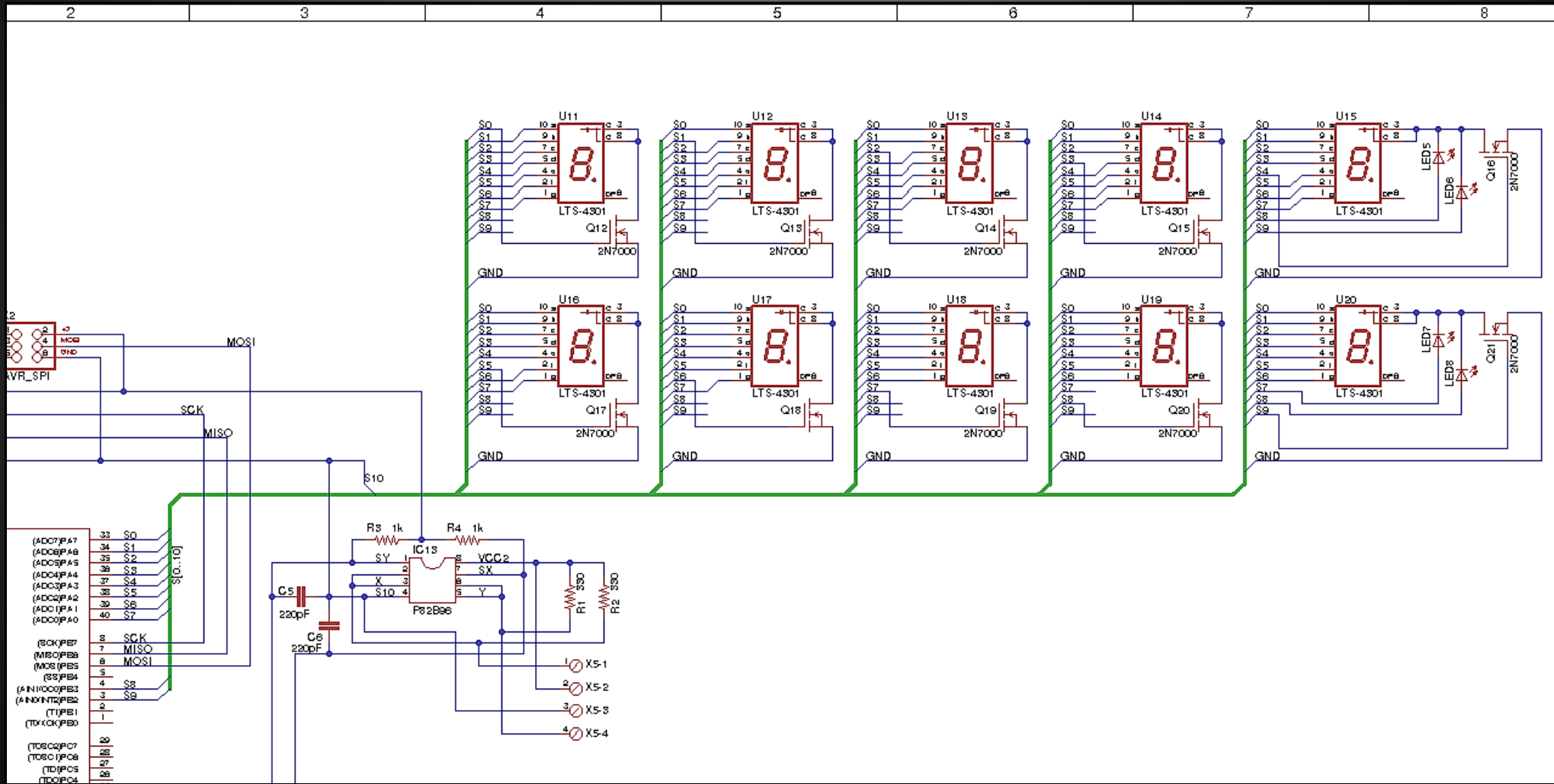# Electronic Access Module Communications
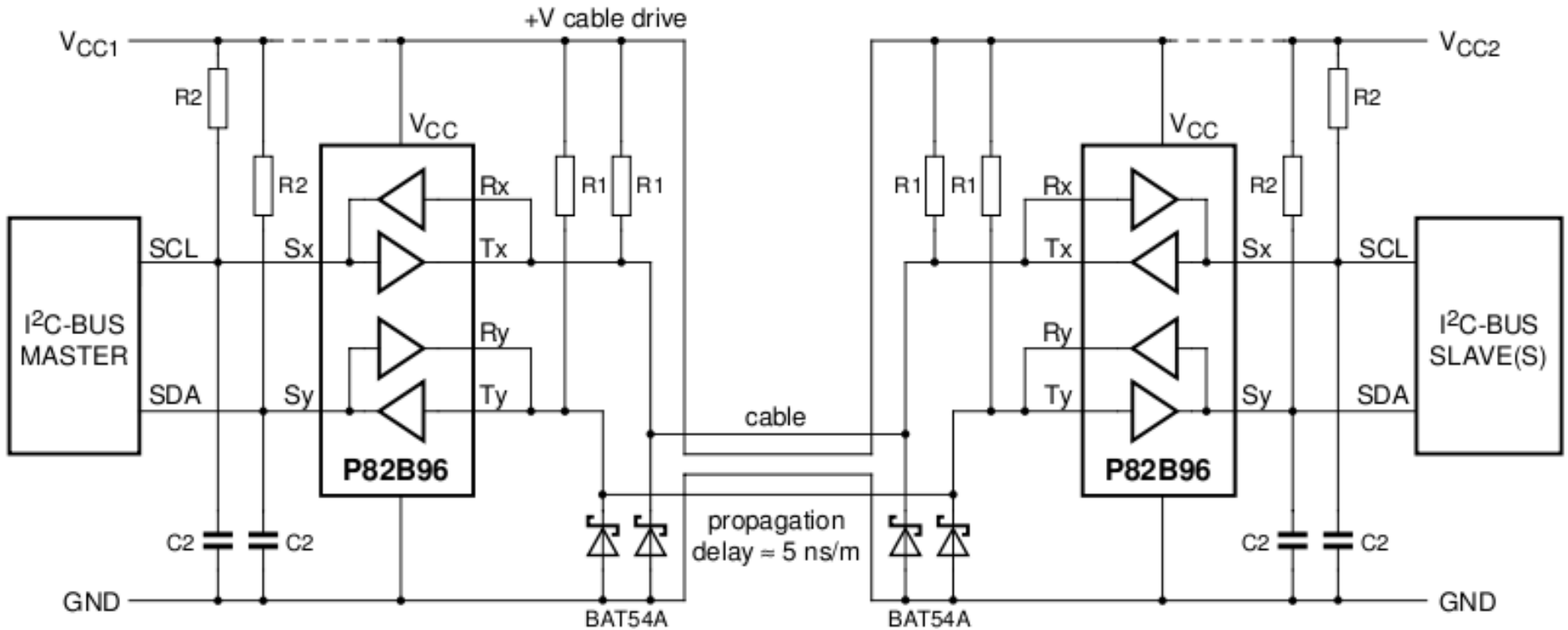
EAM Door Widget Schematic

EAM (Electronic Access Module) Slave
THAT Home Automation Topology

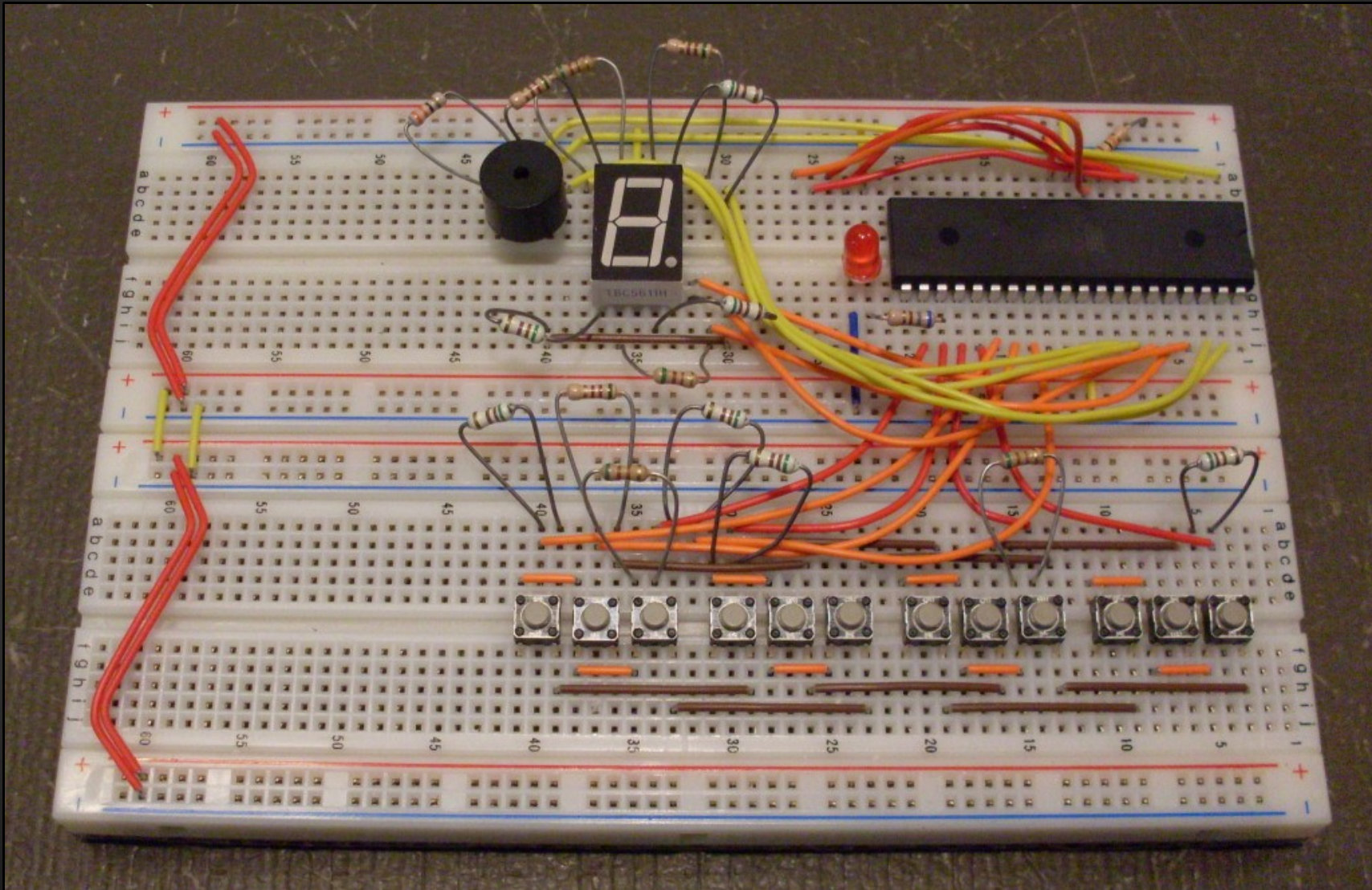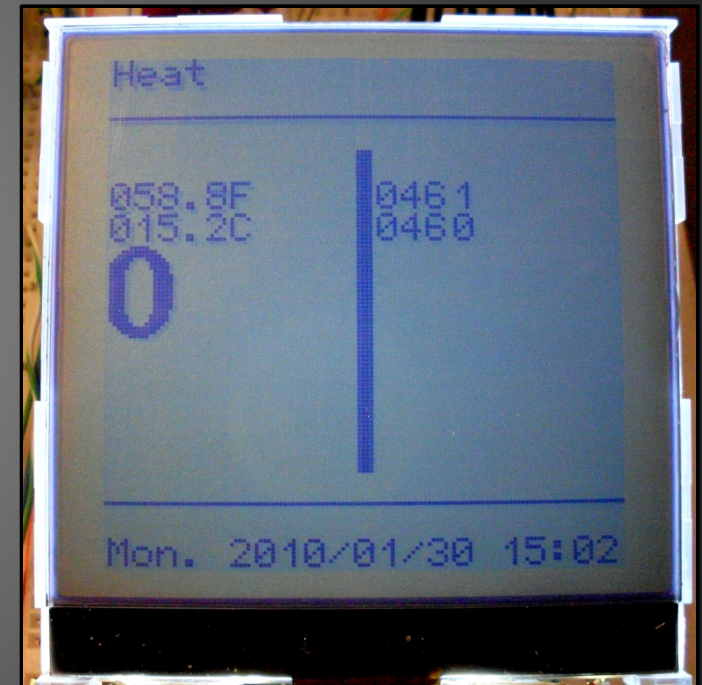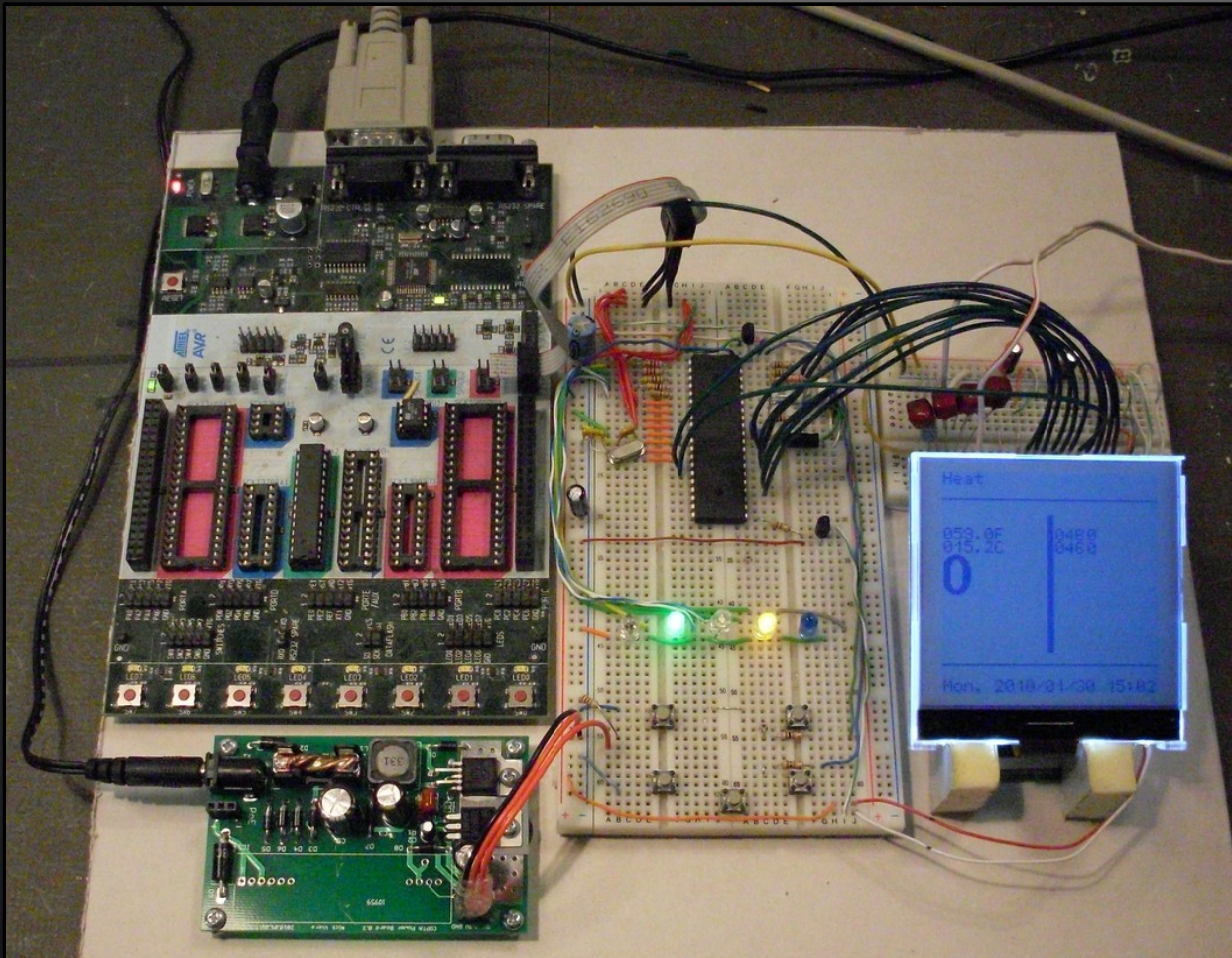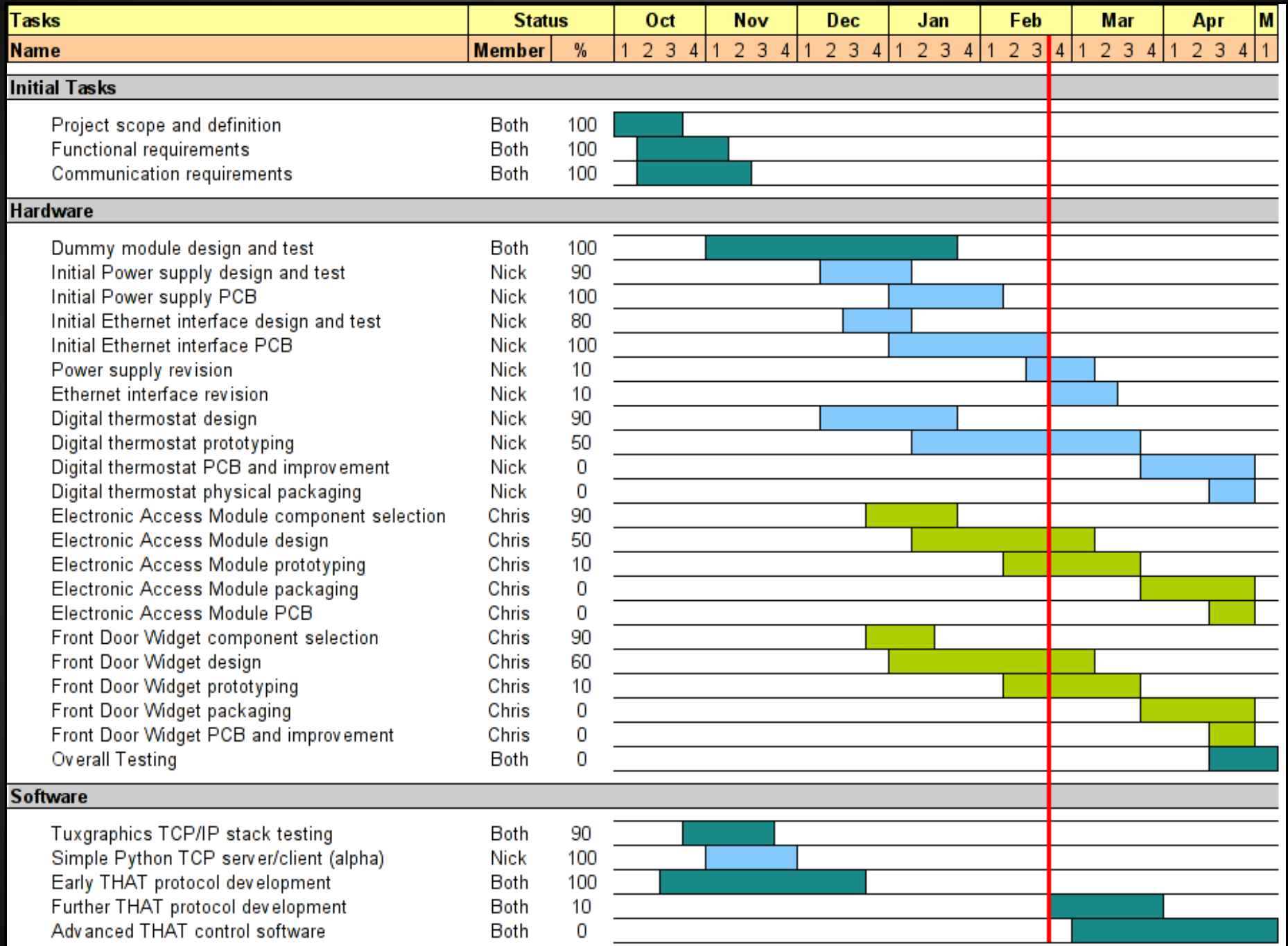| Chris Miller busybot.org	2010-02-19 Ver. 0.3	Sheet 1 / 1

EAM Door Widget Schematic

EAM Door Widget Schematic

Electronic Access Module Prototyping

Digital Thermostat Module Prototyping

Timeline (Gantt Chart)

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Questions?