Project Proposal

ECE 445

ECE ILLINOIS

ILLINOIS

General Information

- Due Date
  - **Week 4 of the semester (see calendar for specifics)**
- Grading and Submission
  - Grading scheme and evaluation sheets located on proposal page.
  - Submit PDF to PACE
  - Commented examples on proposal page.

Begin working on your proposal as soon as your project is approved!

What is the project proposal?

THE PLAN

The “plan” contains three sections whose purpose is to articulate:

1. **Introduction:**
   What is your problem? Why is it important? How do you propose to solve it? What is different about your approach?
2. **Design and Requirement**
   How will you implement your proposed solution? What are the acceptable requirement each components need to satisfy? And what are the most difficult/risk part?
3. **Ethics and Safety**

As an example, we will consider the development of a wireless IntraNetwork.

1. Introduction

Title page

- Project title, team number, team members, TA, date, course #

Objective and Background

- *Goals:* What problem is being solved?
- *Functions:* What is the product supposed to do?
- *Benefits: How is it good for the consumer?*
- *Features:* What aspects make it marketable?

High-Level Requirements List

- *What quantitative characteristics must your project exhibit to solve the problem*
- *Maximum of 3 – in complete sentences.*

Example: Wireless IntraNetwork

Objectives and Background

Goals and Benefits

- Bring internet to developing world using new infrastructure
- large number of solar-powered nodes to build a mesh network capable of transmitting data
- Nodes will use Wi-Fi so any device may connect.
- Current solutions using mesh networking cost around $200/node.
- Satellite based solutions suffer bottlenecks and are not easily expanded.

High Level Requirements

- Nodes must be able to connect to each other automatically, allowing data stored on any node in the network to be available from any access point.
- Nodes must be able to operate indefinitely on solar power.
- Nodes must be as low-cost as possible, ideally under $20.

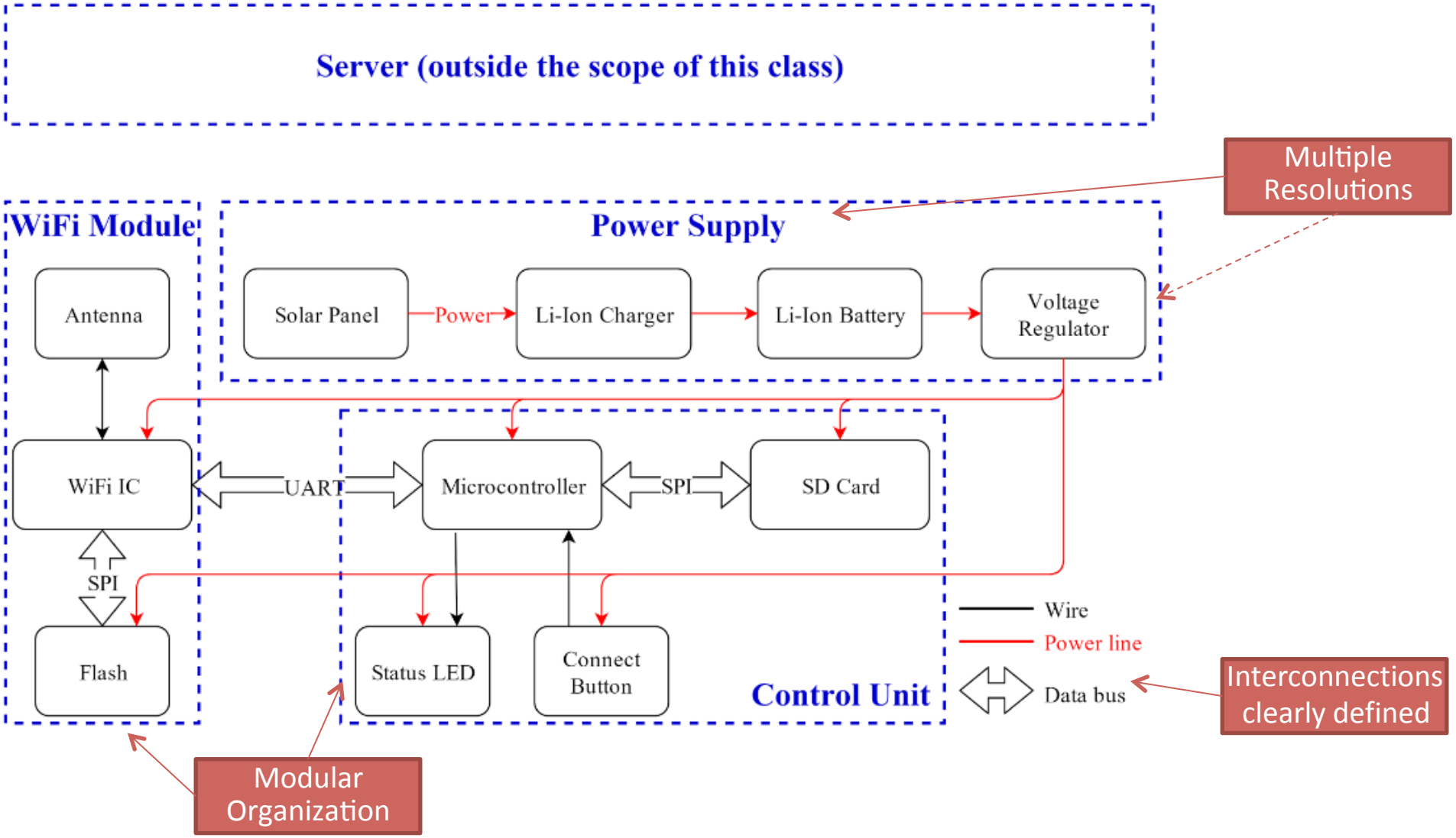
Bulleted list

2. Design

2.1 Block Diagram - what are the individual components?

- Diagram Itself
  - Each block is a subsystem that is connected to other subsystems
  - Consider high-level and detailed-level diagrams (example on website)
- Modularity
  - Each block should be a self contained subsystem with clear inputs and outputs

Example: Wireless IntraNetwork



2. Design

2.2 Block Descriptions – Functionality and Requirements of each component

- Summary of system followed by description of specific components in the block
- Describe the function of each block and component
  - Every block in diagram should have a description.
  - Describe how each block connects to others.
  - Describe how each block contributes to overall functionality.
- Requirement of each component
  - Define functioning behavior
  - Concise and specific
  - If all requirements are met block should work
  - Functionality of each component in block is covered

When writing your block descriptions use quantitative and specific language

Example: Wireless IntraNetwork

2.2 Control Unit

- A control unit manages the flash storage and prepares data to be sent over UART (Universal Asynchronous Receiver/Transmitter) to the WiFi module. A microcontroller controls an SD card and provides a small user interface with an LED and buttons.

2.2.1 Microcontroller

- The microcontroller, chosen to be a PIC32, handles memory allocation for the cache. It communicates with the WiFi chip via UART and reads the SD card cache through SPI (Serial Peripheral Interface).
- *Requirement 1: The microcontroller must be able to communicate over UART and SPI simultaneously at speeds greater than 4.5Mbps (each).*
- *Requirement 2: Must sink or source 10mA +/- 5% on each of two GPIOs at 3.3V +/- 5%.*

2. Design

2.3 Risk Analysis

- Identify the block or interface that you that poses the greatest difficulty or risk to implement.
  - Choose one and justify why.
  - What are acceptable tolerances for the component.
  - Relate back to high level requirements.

Ethics

- Refer to the ethics guideline page
- IEEE/ACM code of ethics
  - Do not just copy/paste this into your paper
  - Know and understand it
  - http://www.ieee.org/about/corporate/governance/p7-8.html
- Discuss ethical concerns as they apply to your project
- Human (IRB) and animal (IACUC) test approval
- If no ethical concerns, justify yourself

Safety

- Refer to Safety Guideline page
- Discuss safety concerns
  - Electrical safety
  - Mechanical safety
  - Lab safety
  - Consider safety of both yourselves and end users
  - Make a safety plan if necessary
  - If few safety concerns, justify yourself

  -- If you have hazardous, or volatile elements of your project, you must create a “Lab Safety Manual”, or if you may use high voltage or certain battery chemistries, finish safe battery usage training.

Citations and References

- List of references formatted using the IEEE standard
  - http://www.ieee.org/documents/ieeecitationref.pdf
- Should include things like…
  - Textbooks or datasheets
  - Informative articles or tutorials used (example codes…)
  - IEEE code of ethics
- Please let us know if you are carrying over projects from other places (classes, startups, student teams…)

Writing Tips

- Writing Resources
  - Resources for writing the proposal can be found in “The Written Report” section here
  - Follow IEEE Citation Guidelines
  - We recommend using a LaTeX template
  - Please label figures, schematics, etc.

- Read your text out loud after you have written it.

Thanks for watching!