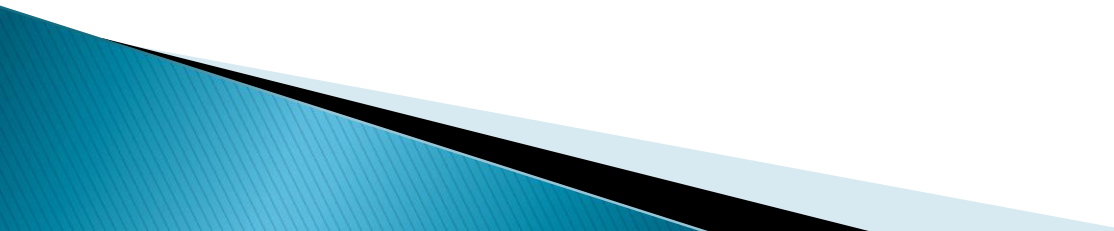


Internet On-Demand for Schools in Tanzania



Introduction

- ▶ Introduction/Background – Ken
 - ▶ Objectives/Specifications – Jeff
 - ▶ Design Concept – Koy
 - ▶ Risk Analysis – Ivan
 - ▶ Management Plan – Drew
- 

Background



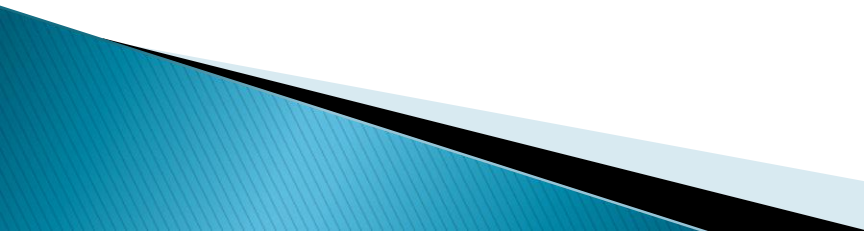
- ▶ Mto wa Mbu, Tanzania
- ▶ Six Schools
- ▶ Solar Powered Systems

Background

- ▶ Current System Setup
- ▶ Internet on Demand
- ▶ Past Challenges
- ▶ Global System for Mobile

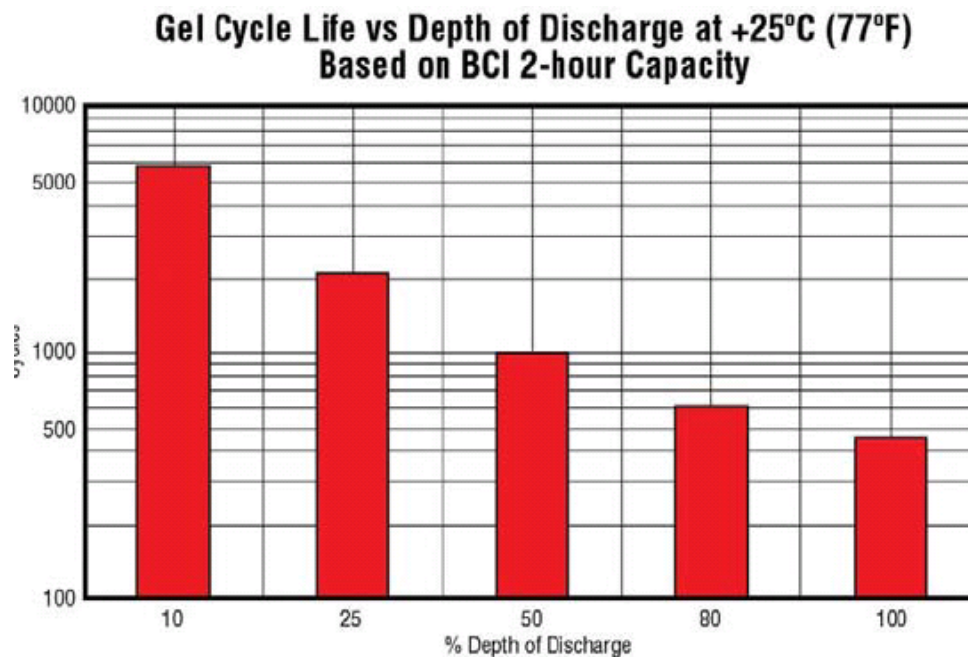


Design Specifications

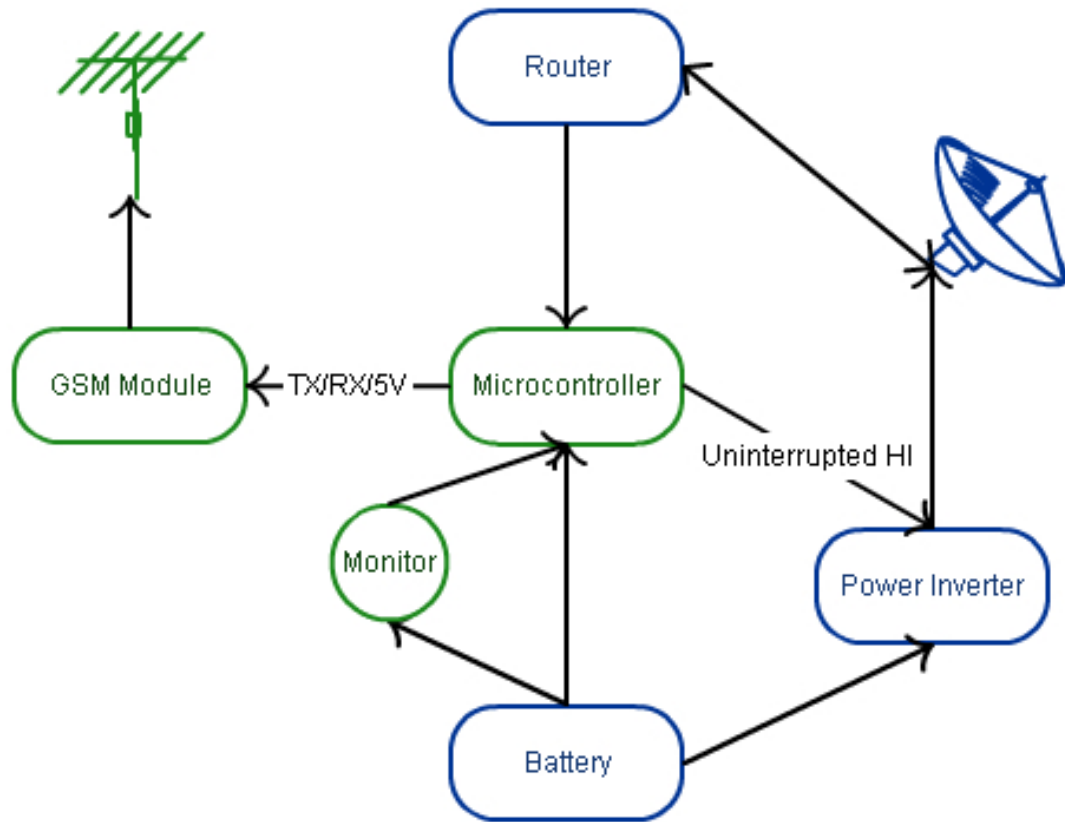
- ▶ Layer Above Previous System
 - ▶ Data Retention
 - ▶ Subsystem Communication
 - Microcontroller
 - GSM Communication System
 - Battery Monitor
 - Automatic Shutdown System
 - ▶ Power Management
 - Usage timing
- 

Power Management

- ▶ Satellite Power
- ▶ Deka Dominator 200Ah Gel Cell



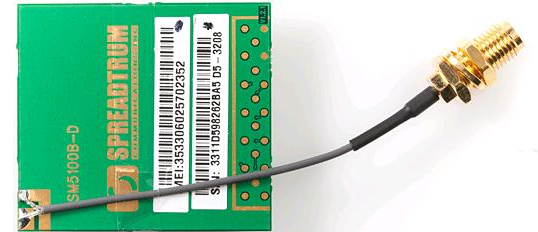
Design Layout



Arduino Uno



SM5100B GSM Module



Conceptual Design

Battery Monitor

- ▶ Assume **Battery Capacity is proportional to Voltage Output**
 - Measure and record past data as reference
 - Advantage: not overly complicated
 - Disadvantage: Voltage output not be linear
- ▶ Measure the output power and input power to calculate the exact Battery Capacity

Conceptual Design

Internet Monitor

- ▶ **Checking Response from secondary schools**
 - Advantage: **feasible** in more conditions
 - Disadvantage: users at each school will shut down both computers and router
- ▶ **Automatically sending offline confirmation to primary microcontroller**
 - Advantage: users at each school only need to shut down computers
 - Disadvantage: Compatibility is a major problem

Risk Analysis

- ▶ **Power Consumption**
 - Solar power batteries
 - Limited Resource and expensive
- ▶ **Risk: Design consuming too much power**
 - Drain batteries
 - Contradicts wanting to save power
- ▶ **Solution: Battery Monitor**
 - Current design consumes little power

Risk Analysis

- ▶ **Cell phone based communication system**
 - Tanzanian cell phone service for system activation
- ▶ **Risk: Cell Service Downtime**
Unwanted calls
 - Downtime in service is system downtime
 - Waste minuets and texts
 - Unintentional activation

Risk Analysis

- ▶ **Environmental and Location Risks**
 - Temperature difference
 - Animals
 - Children in school
 - Sand, dirt, mud
- ▶ **Risks: Instability, decrease lifespan, cease functionality**
 - Overheating
 - Rats chew wiring
 - Child safety



Personnel

Computer Engineering Tasks

▶ Jeff

- Arduino/Shield Programming
- Develop communication methodology

▶ Ivan

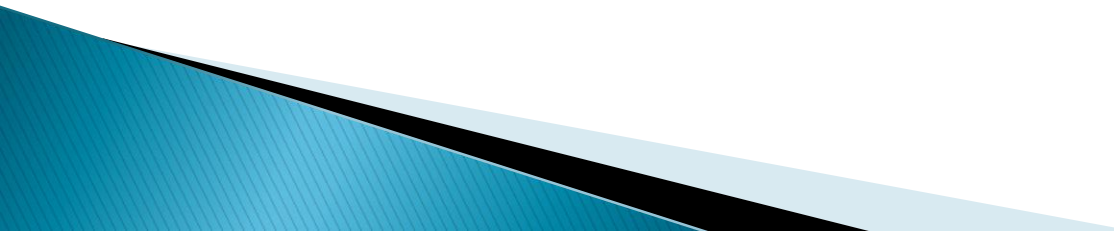
- Reporting mechanism for system health and data logging
- Local technician reporting

Personnel

Electrical Engineering Tasks:

- ▶ Drew:
 - Battery monitoring system
 - DAQ and system integration

 - ▶ Ken:
 - Internet Signaling System and Interface

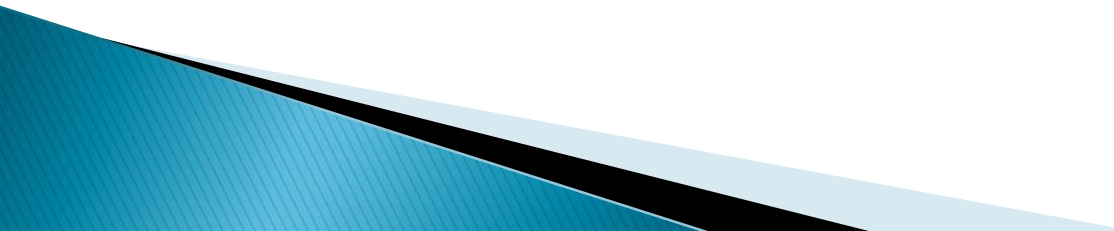
 - ▶ Koy:
 - Design Day presentation development
- 

Timeline

▶ Computer Engineering:

- Arduino Programming and GSM Shield Integration (2/8 – 2/20)
- Arduino Communication (2/21 – 3/13)
- Reporting System and Data Logging (3/5 – 3/28)

▶ Electrical Engineering:

- Battery Monitoring System Integration (3/10 – 3/29)
 - Internet Signaling System (2/28 – 3/30)
 - Design Day Testing and Troubleshooting (4/10 – 4/19)
- 

Budget

Equipment	Number	Cost/Item	Total Cost
Arduino Board	2	29.95	59.9
GSM Shields	2	99.95	199.9
Battery Meter/DAQ	1	100	100
On/Off System	1	50	50
Demonstration Equipment	1	100	100
Antenna Supplies	1	50	50
Total			559.8

Thank you!

Questions?

