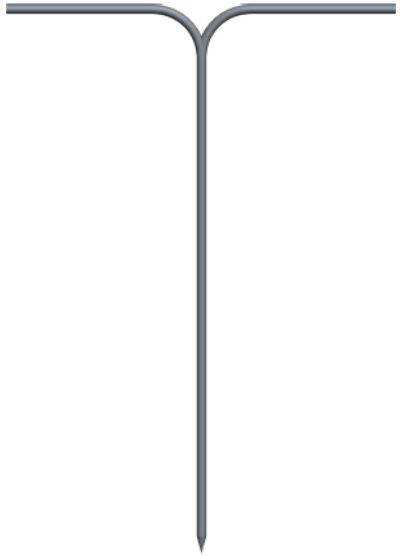
TEAM 18: PENETROMETER

Sponsor: National Park Service - Dr. Russo
Advisor: Dr. Shih
Instructors: Dr. Gupta, Dr. Helzer, Dr. Frank

CARREN BROWN - ME
PETER HETTMANN - ME
SEAN KANE - EE
NATALIE MARINI - ME
MITCHELL ROBINSON - EE
MARITZA WHITTAKER - ME

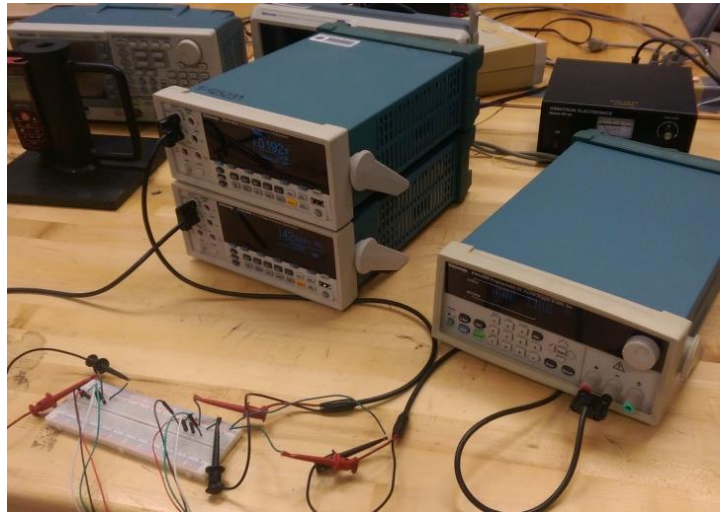
SCOPE OF PROJECT - PENETROMETER

- National Park Service
- Penetrometers current use
- Design use
- Mechanical and Electrical Aspect



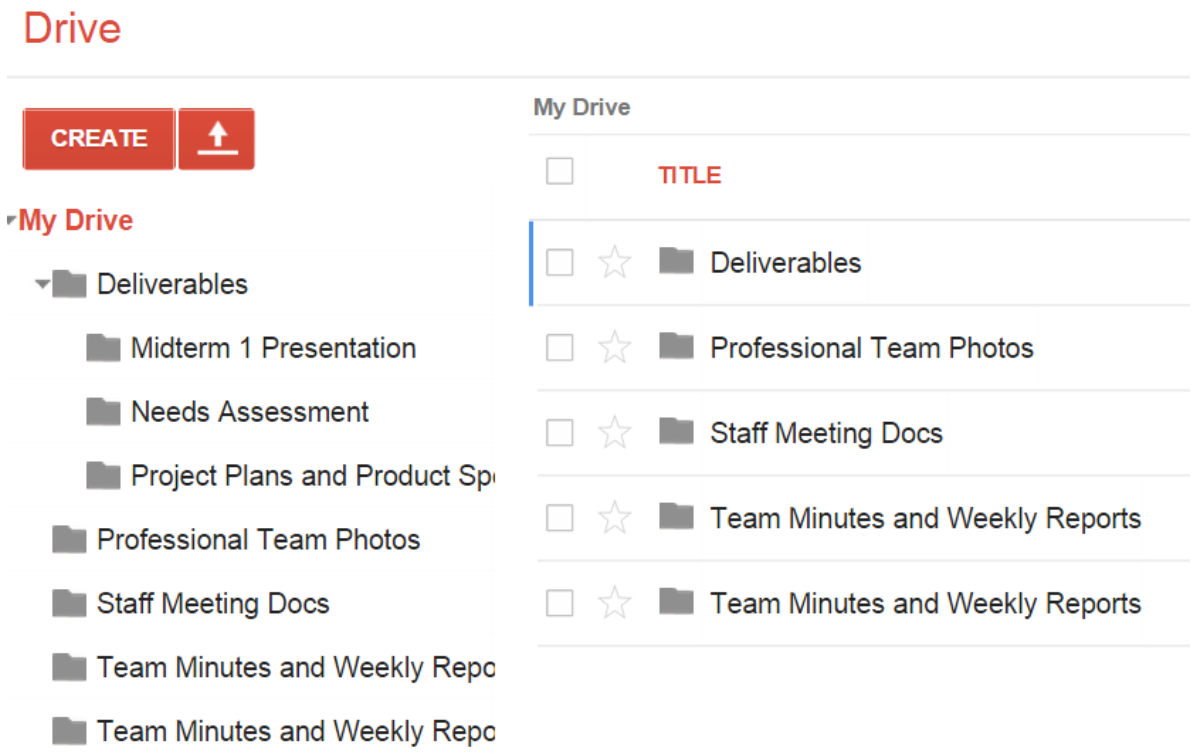
TRANSITIONING FROM LAST YEAR'S DESIGN

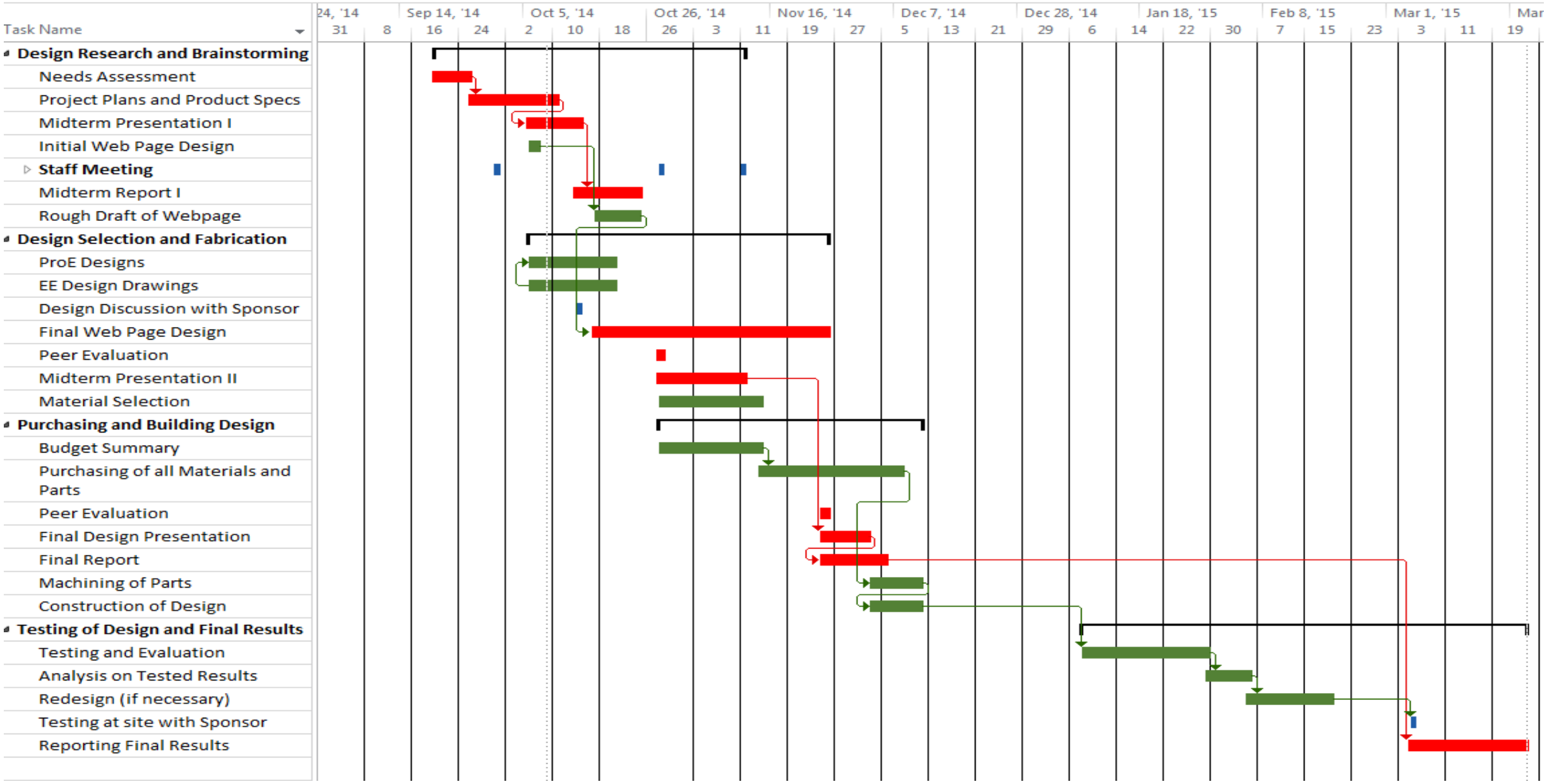
- Previous Design
- Benefits of Previous Design
- Plans to Change
- Team Goals to Ensure Success



TEAM ORGANIZATION

- Weekly Team Meetings
- Biweekly Staff Meetings
- Gantt Chart and Scheduling
- Team Task Breakdown
- Resource Allocation




Task Name
Design Research and Brainstorming
Needs Assessment
Project Plans and Product Specs
Midterm Presentation I
Initial Web Page Design
Staff Meeting
Midterm Report I
Rough Draft of Webpage
Design Selection and Fabrication
ProE Designs
EE Design Drawings
Design Discussion with Sponsor
Final Web Page Design
Peer Evaluation
Midterm Presentation II
Material Selection
Purchasing and Building Design
Budget Summary
Purchasing of all Materials and Parts
Peer Evaluation
Final Design Presentation
Final Report
Machining of Parts
Construction of Design
Testing of Design and Final Results
Testing and Evaluation
Analysis on Tested Results
Redesign (if necessary)
Testing at site with Sponsor
Reporting Final Results
24, '14
Sep 14, '14
Oct 5, '14
Oct 26, '14
Nov 16, '14
Dec 7, '14
Dec 28, '14
Jan 18, '15
Feb 8, '15
Mar 1, '15
Mar
31 8 16 24 2 10 18 26 3 11 19 27 5 13 21 29 6 14 22 30 7 15 23 3 11 19

PROTOTYPING

Objectives

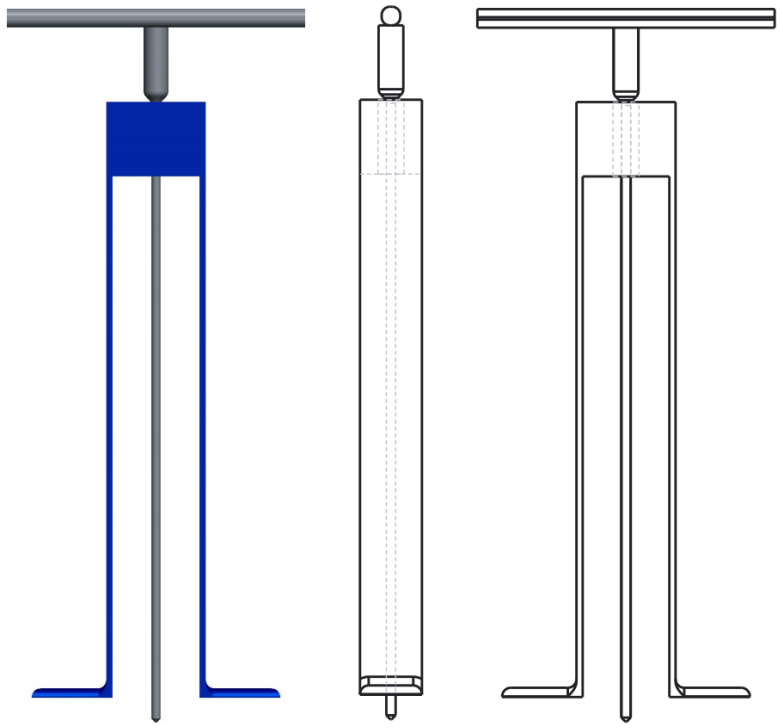
- Identify midden levels
- Weigh no more than 50 lbs
- Reach at least 20 feet into the ground
- Display results on handheld device
- Should be portable

Constraints

- Must be easy to use
- No bending or fracturing
- Locate the midden
- Must be wireless
- Data should be reliable

CURRENT DESIGN CONCEPTS

- Reduce the size of the rod and friction cone
- Place load cells in housing at the top of the device
- T-bar handle for manual probing
- Have rod extensions available
- Low power consumption



OLD DESIGN VS. NEW DESIGN

Old Design

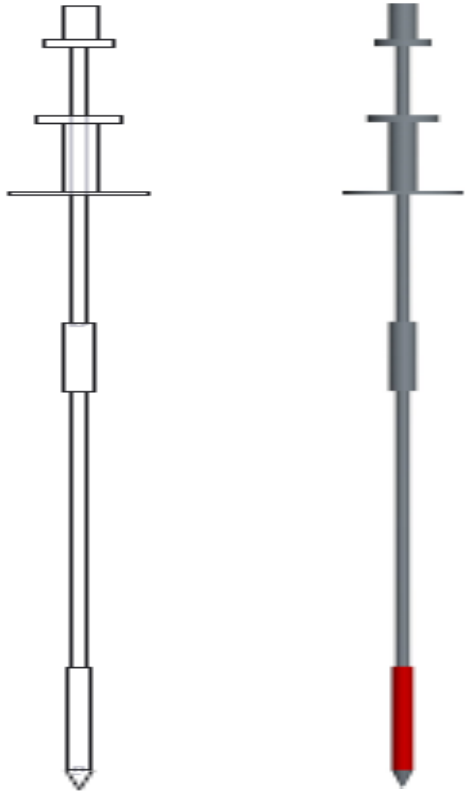
- Not lightweight or portable
- Reached a depth of 1-2 meters
- Data stored on USB, and then transmitted to a computer
- Fractured often

New Design

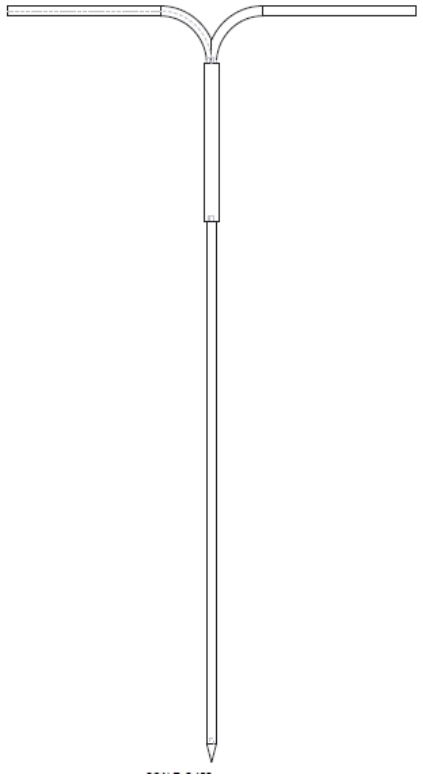
- Wireless and less than 50 lbs, making it portable
- Reach a depth of 20 feet, with extensions
- Wireless transmission of data to handheld device
- Strong in compression

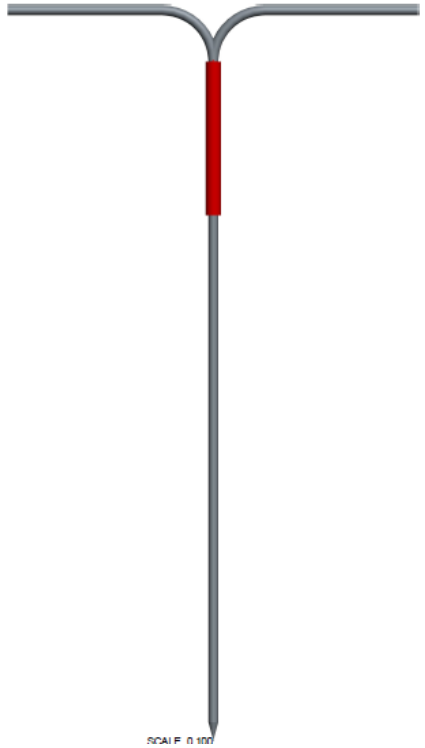
OLD DESIGN VS. NEW DESIGN

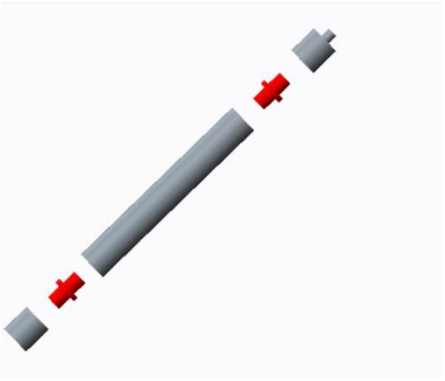
Old Design



New Design

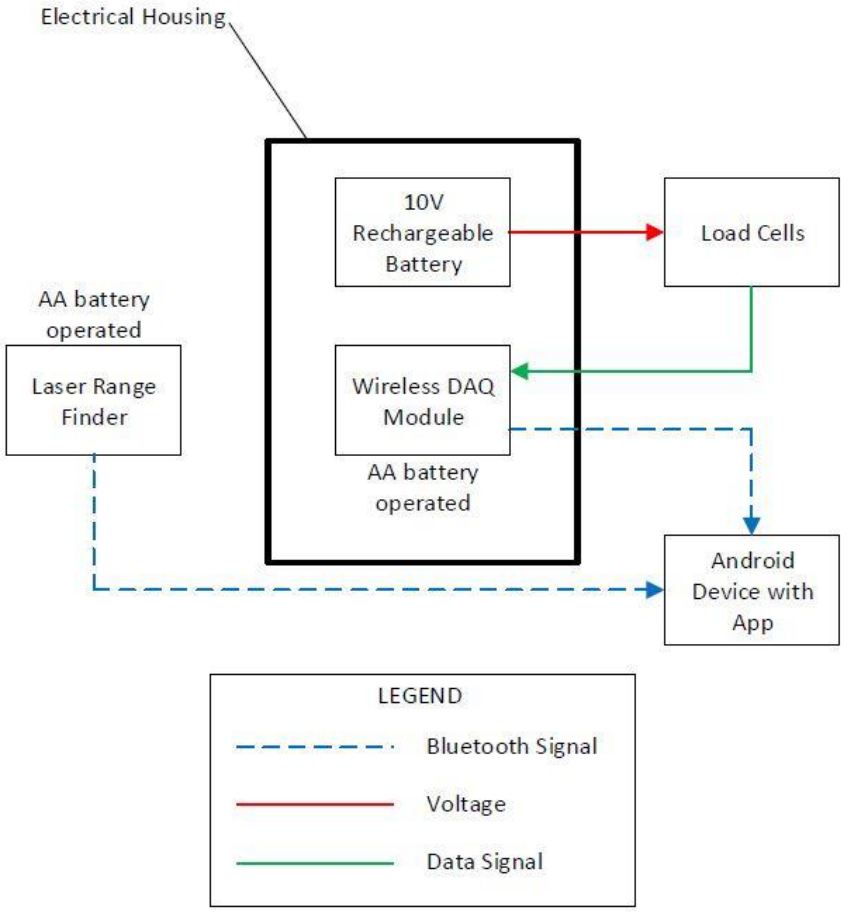






ELECTRICAL ASPECT OF DESIGN

- 10 Volt rechargeable and replaceable battery
- Bluetooth capable data acquisition module
- Bluetooth capable laser range finder
- Data will be displayed on an Android device
- Android App will be created to display and store the data



SUMMARY

- Detect midden levels up to 20 feet deep
- Penetrometer will be easily operated by 1 or 2 people
- Easily portable, wireless and under 50 lbs
- Relocate the load cells to the top of the penetrometer
- Wireless data transfer to an Android device for real time results
- Organized scheduling of tasks and goals
- Maintain communication with the sponsor

ANY QUESTIONS?