Team 18: Penetrometer for the National Park Services

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Purpose: “Design an instrument that can identify midden and differentiate soil types at various depths.”

Objectives

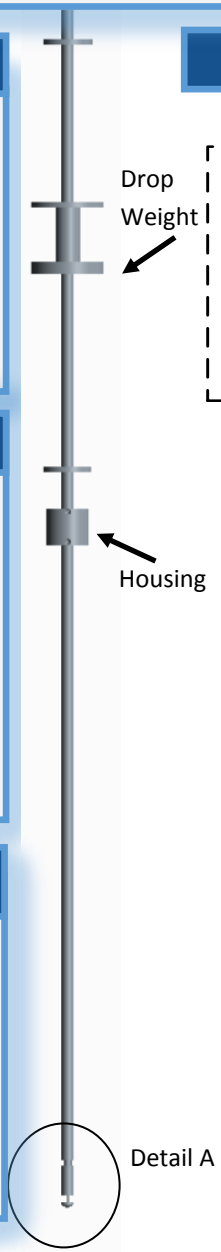
- Identify midden easily
- Portable and lightweight
- Bluetooth capable
- User-friendly GUI

Design Features

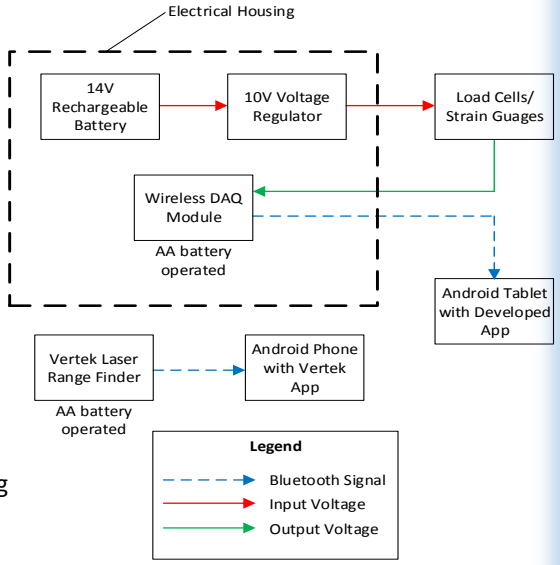
- Drop weight design
- Load cells in the upper housing to minimize the shaft diameter
- Results shown on an android application

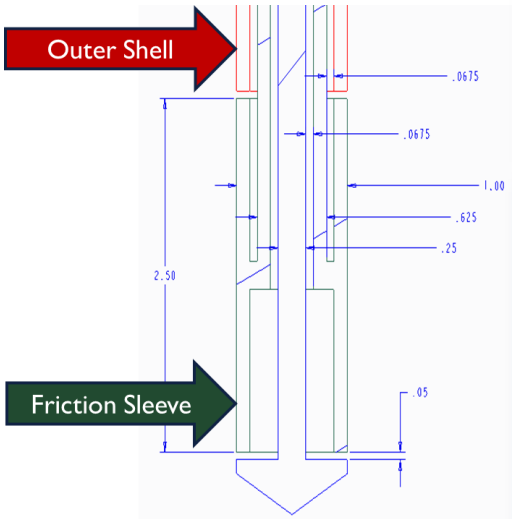
Testing Methods

- Test penetrometer in buckets with different soils
- Create a soil classification chart
- Field test the penetrometer with NPS



Electrical Block Diagram





Detailed View of Shaft (Detail A)

Electrical Specs

- Li-ion Battery Pack
  - 22.V
  - 7.8Ah Capacity
- Op-amp
  - +/-5 V Output
  - 10kHz Bandwidth
- Voltage Regulator
  - 15 V Output
- DAQ

  -4 12-bit DE analog inputs
  -Transmits Data through BT

Future Recommendation

- Testing accuracy after weather conditions vary in the field
- Further minimizing the shaft diameter
- Automate the drop weight