SOIL SMART

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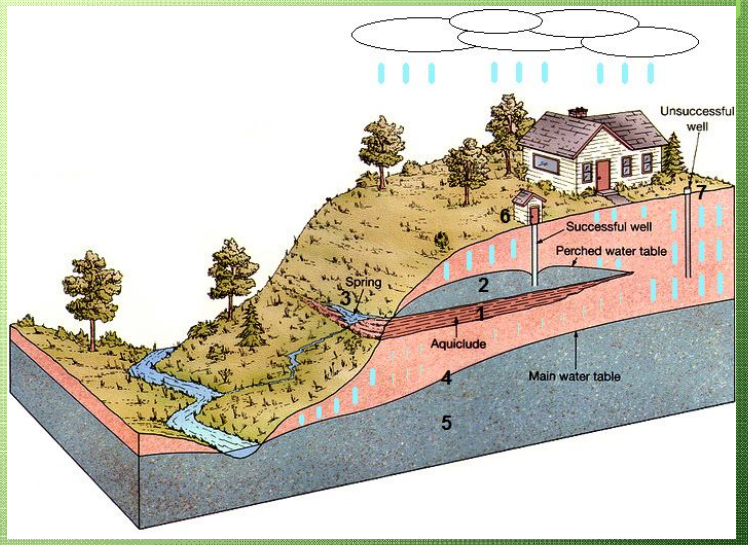
Market Attractiveness

Traditional irrigation techniques take use of a cyclical watering cycle routine with little to no soil moisture content feedback which wastes water, damages the soil and prevents hurts farmer's yields.

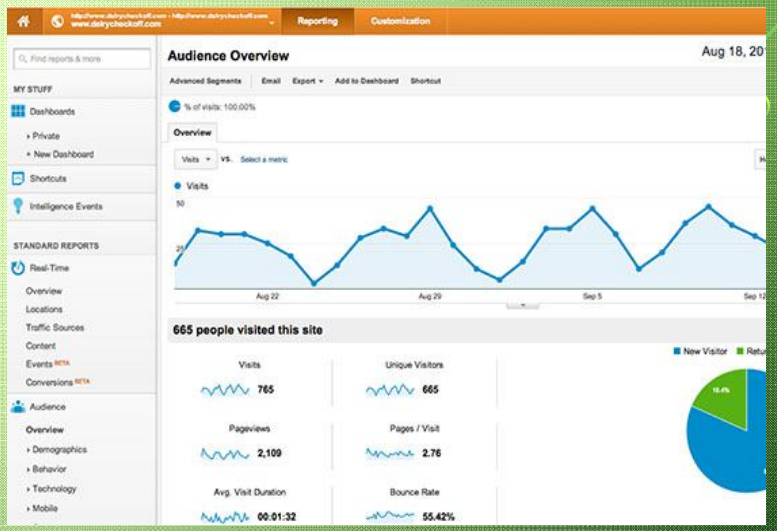
Farmers with variations in soil densities and compositions or geographical variances often suffer from over/under watering their crops in affected areas.



Soil Smart Goals

Provide a user friendly environment that allows farmers to observe data drawn from crops and control irrigation flow based on given conditions.

Display reliable data analytics in a clean environment that informs farmers on past and present soil conditions.



Product Definition

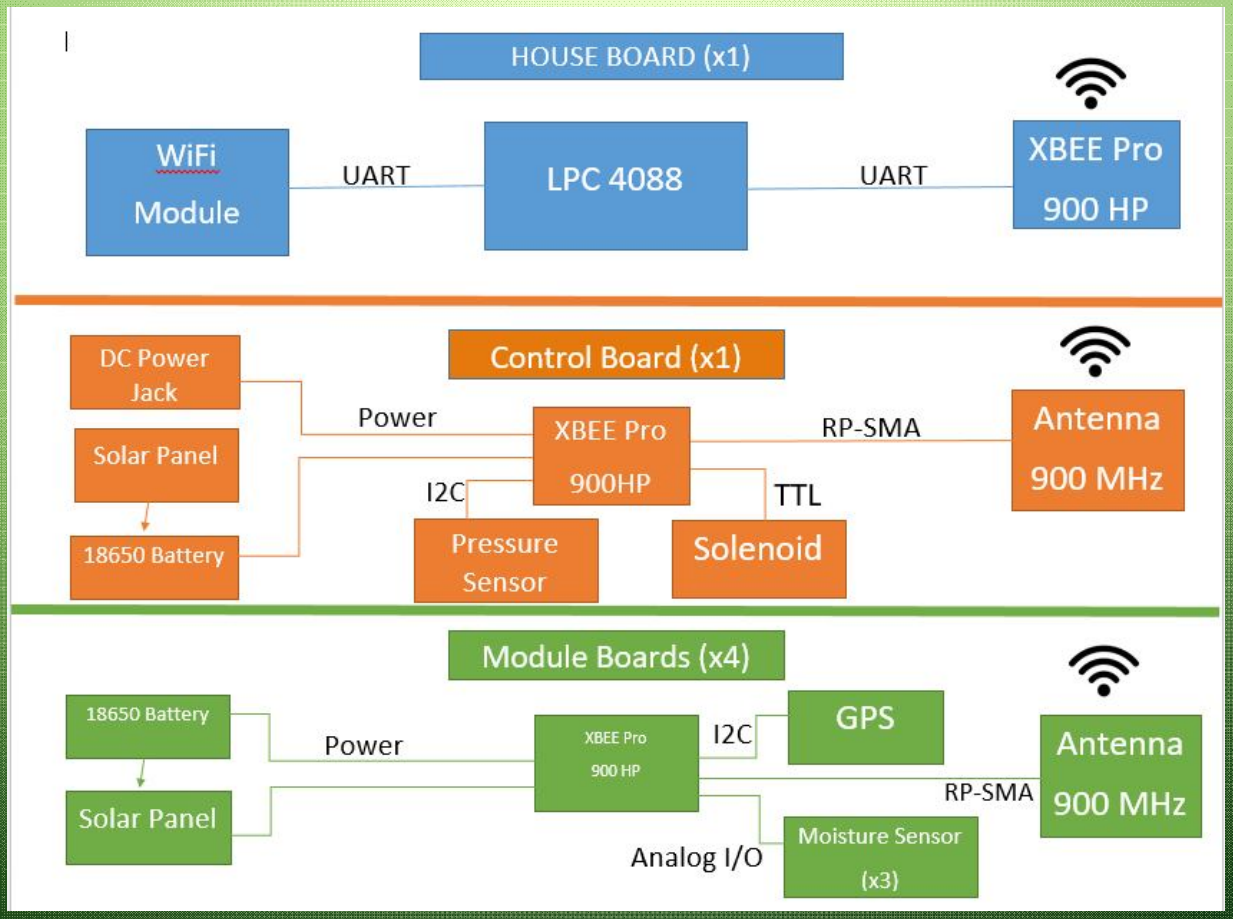
Soil Smart is a wireless sensor network that monitors and records soil conditions. This information is used to control irrigation systems and is made available to the user via a mobile app and web interface.

Product User Interface (UI)

Farmer will be able to access soil data from Website or Mobile App

- observe current soil moisture levels at different locations throughout farmland
- control irrigation flow
- view past to present moisture trends displayed with graphs all specific to locations on farmland

HIGH LEVEL BLOCK DIAGRAM



HIGH LEVEL METHODOLOGY

-Our sensor modules, spread throughout the test area, will use GPS to map their coordinates and form a grid that will relay the drawn data to a control board.

-Each sensor module will have three soil moisture sensors placed at different depth levels which will relay its data to the control board.

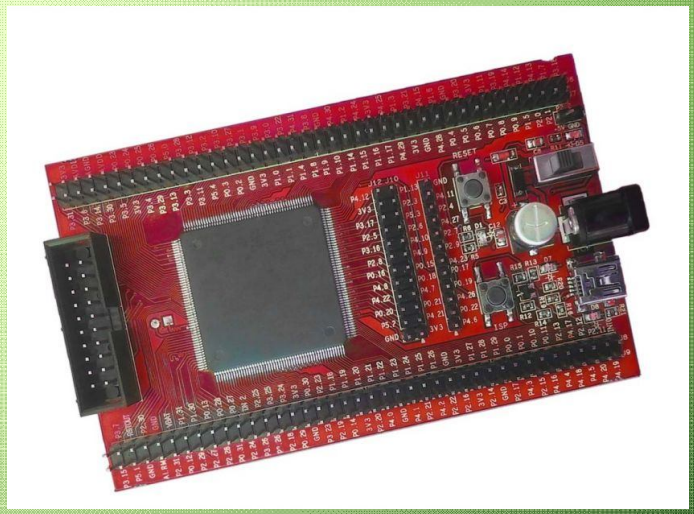
-The control board will send the data to the house board where the data will then be grouped accordingly.

-The house board will send the data to the server through the internet and will be displayed on the mobile app/ website.

MAIN COMPONENTS

- Cortex M4 LPC 4088
- XBEE Pro 900 HP / XBEE Antenna
- Solar Panels
- 18650 Battery
- GPS Module
- WiFi Module
- Soil Moisture Sensor
- Pressure Sensor
- Solenoids

Cortex M4 LPC4088



- Power: 3.3V
- Buses:
  - UART (x5)
  - SSP (x3)
  - I2c (x3)
  - CAN
- Memory: 512KB on-chip flash mem
- Clock Source: main oscillator

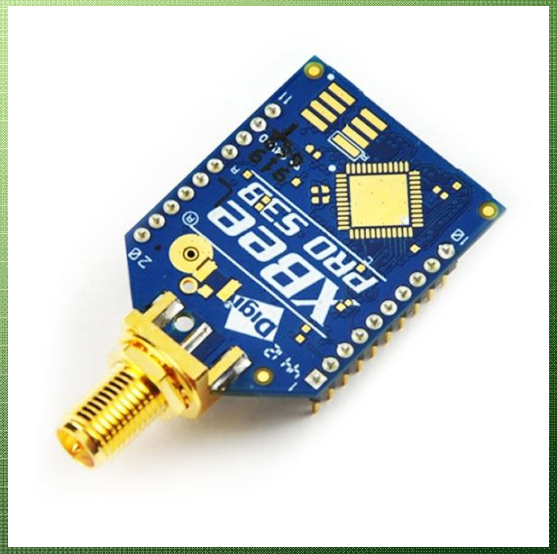
  variable speed

Solar Panel - IXOLAR Solar MD

- Voc: 6.3V
- Isc: 25 mA
- Solar Cell Efficiency: 22%
- Dimensions (LxWxH): 22 x 35 x 2 [mm]

XBEE PRO 900HP

- Processor: Cortex-M3 EFM32G230
- Data Interface: UART (3V), SPI
- GPIO: 15 Digital I/O, 4 10-bit ADC inputs, 2 PWM outputs
- Memory: 32KB Flash / 2KB RAM
- CPU/Clock Speed: HCS08 / 50.33 MHz
- Supply Voltage: 2.4 - 3.6 VDC



Possible Constraints

Power

- sensor modules must have ultra low-power consumption to elongate lifespan to avoid constant charging and replacing
- Solution:
  - Install solar panel to charge 18650 battery
  - utilize low-power processors
  - employ interval wake-up periods to draw data then return back to deep-sleep mode

Memory

- XBee programmable MCU flash memory 32Kb
- Solution: efficient coding