SolarGuardn System

## AirGuard

* ESP w/ Temperature, Humidity, TVOC / eCO2

## SoilGuard

* ESP w/ Temperature, Humidity, Soil Moisture

## TankGuard

* ESP w/ Temperature, Humidity, Ultrasonic Water Level

## LightGuard

* ESP w/ Temperature, Humidity, Full Spectrum Light Sensor

## GuardnPower

* SonOff w/ Power usage, pump/light/solenoid control

## GuardnHub

* Raspberry Pi W Zero, MQTT broker, nosql, automation

## Summary

The SolarGuardn System is made up of a variety of modules that monitor various aspects of the garden environment. Each guard module communicates with the GuardnHub for its configuration and to report data. The GuardnHub runs on a Raspberry Pi with Raspbian Linux. The hub provides a local front-end for module control, configuration, monitoring and event control, as well as uploading the data to the cloud. Without a local hub, all reporting, control and configuration activities rely on having a stable Internet connection.

## Hardware

Each Guard module is based on an ESP module of various types, contains an 18650 2500mAh lipo battery, and is powered either by a Solar cell or a USB charger. The ESP8266 supports WiFi, has one analog input, and several GPIOs available. The ESP32 supports WiFi and Bluetooth, has four analog inputs, and several GPIOs available. The SonOff-POW is an ESP8266 based power relay, with power monitoring built-in, though requires soldering a header inside to program.

SoilGuard uses a capacitive soil moisture sensor, which must be calibrated for the type of growing media and nutrients being used. It is very sensitive to depth of insertion and only works reliably when inserted into undisturbed soil to the correct depth, and not withdrawn or jostled. Improving the usability and reliability of this sensor has been a major focus.

## Parts

(example parts, for prototypes, available more cheaply on ebay)

|  |  |  |
| --- | --- | --- |
| ESP8266 NodeMCU 1.0 with 18650 battery holder and charging circuit | <http://a.co/518tkHj> | https://images-na.ssl-images-amazon.com/images/I/61QJDkGRutL._SL1200_.jpg |
| BME280 weather sensor | <http://a.co/6fis93Z> | https://images-na.ssl-images-amazon.com/images/I/61pGyutp4WL._SL1500_.jpg |
| DFRobot Capacitive Soil Moisture sensor | <http://a.co/3iVQXh5> | DFRobot Capacitive Soil Moisture Sensor- Corrosion Resistant |
| SonOff Pow | <http://a.co/b1oLWcm> | https://images-na.ssl-images-amazon.com/images/I/51QlMLQ25tL._SL1000_.jpg |
| HC-SR04 Ultrasonic sensor | <http://a.co/6q1ENUZ> | https://images-na.ssl-images-amazon.com/images/I/71q-OgiXKkL._SL1500_.jpg |