03/05/2020

Weather Station

Addendum

THIS PROJECT IS COMPLETE AND DEPLOYED IN MY YARD

HOWEVER

DUE TO THE POWER CONSUMPTION ISSUES AND SIZE OF BATTERRY PACK THERE ARE MANY IMPROVEMENTS TO BE MADE

THUS

REVISION 1.X VERSIONS WILL NO LONGER BE UPDATED IN FAVOUR OF A REV 2.X (TIME PERMITTING)

Weather Station

Doc Rev. 1.4.0
Sunday, 03 May 2020

Weather Station

Introduction

A Weather station is a device that collects data related to the weather and environment using many different sensors. We can measure many things like:

- Temperature
- Humidity
- Wind
- Barometric Pressure
- UV index
- Rain

My inspiration to create this weather station came from this source along with the code which was modified to my purpose using Arduino Nano as main board and thing speak to send data to.

https://www.instructables.com/id/Arduino-Uno-Wireless-Weather-Station-Wundergroundc/

ESP8266 WiFi module will send data to www.thingspeak.com
Thingspeak is a clous data collection service.
The following sensors were used:

Humidity, Pressure - BME280
UV, Solar - ML8511
Anenometer, wind directionand rain guage (3D printed)

Power Supply

6x18650 cells will be used to power the project 3s2p and will be chard by solar during daytime hours. They fit inside the central control box with the PCB (see 3d Prints)

The original intent was to use 3x18650 in series to provide 12V but there are issues with power consumption and the battery life overnight.

Battery management is by ab 18650 BMS balance protection/charging board such as this

Sch by https://www.allaboutcircuits.com/projects/diy-tools-build-your-own-logic-probe
Board by RetroMakerGoose (retromakergoose@gmail.com)

Sensors

Temperature,Humidity and Barometric Pressure	Sparkfun BME280
UV index	ML8511
Wind Speed	Hall effect sensor and Magnet
Rain	Hall effect sensor and Magnet
Wind Direction	CJMCU-103 Angle Sensor

3D Printed Parts

STL files included for 3d printing.

Created by SeanTheITGuy on thingiverse

https://www.thingiverse.com/SeanTheITGuy/collections/arduino-weather-station

The Anemometer and Rain bucket use Hall effect sensors and magnets

The Wind vane uses CJMCU-103 Angle Sensor

Printer settings as follows:-

Material: PLA

Nozzle Dia: 0.4

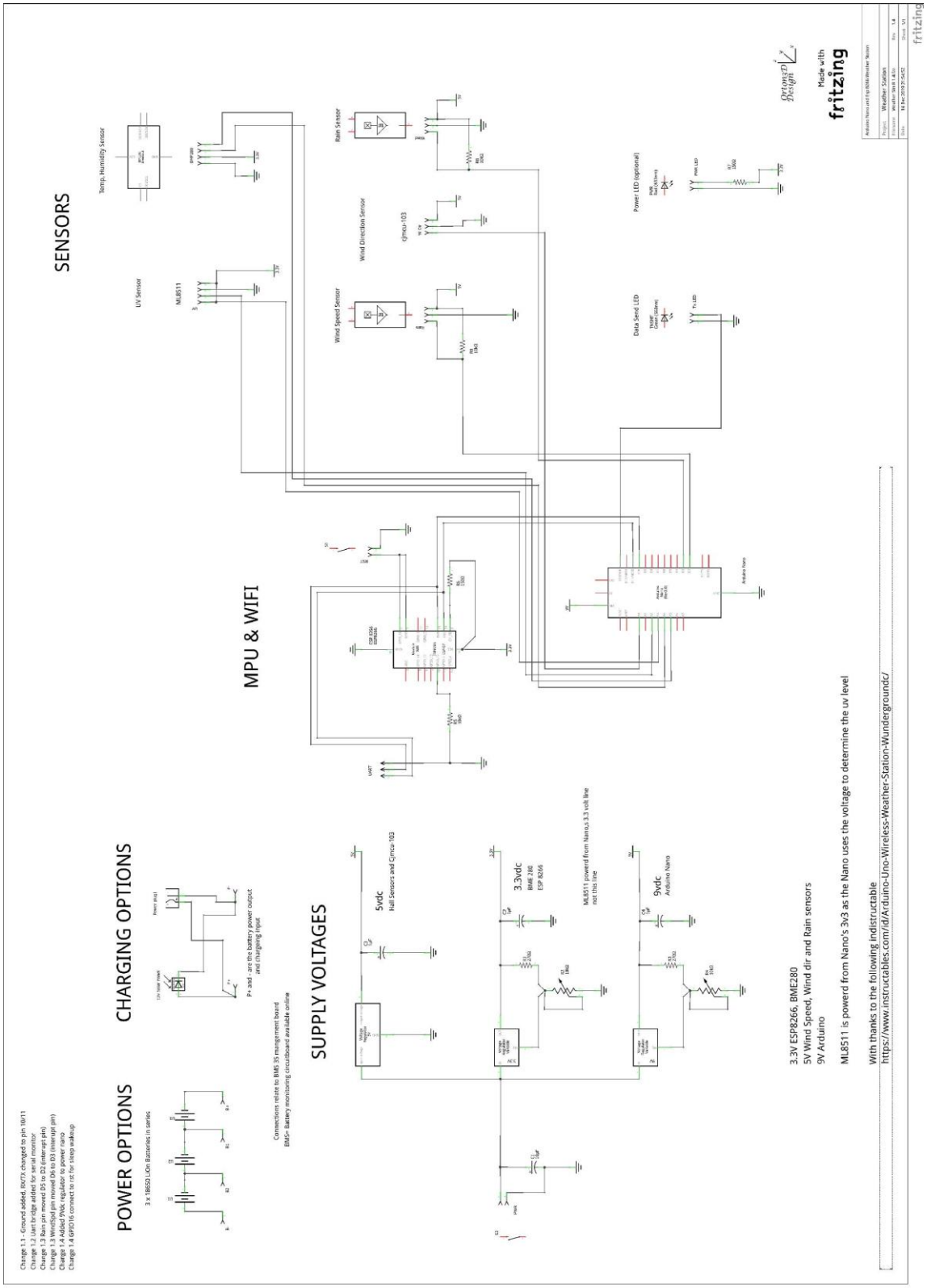
Layer height: 0.2

Support: Use tree support where possible

Skirt: Yes

Infill: 33% or higher

Schematic



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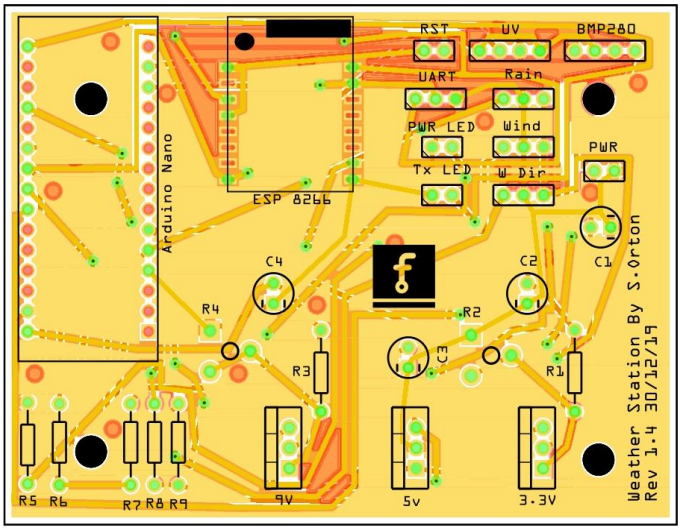
PCB



BOM—Bill of Materials

Assembly List

Label	Part Type	Properties
12v Solar Panel	SOLAR-IXYS	package solarbit-12x1; variant -
3.3V	Voltage Regulator - Variable	voltage Variable V; package TO220 [THT]
5v	Voltage Regulator - 5V	voltage 5V; package TO220 [THT]
9V	Voltage Regulator - Variable	voltage Variable V; package TO220 [THT]
Arduino Nano	Arduino Nano (Rev3.0)	type Arduino Nano (3.0)
B+	Generic female header - 1 pins	pins 1; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
B-	Generic female header - 1 pins	pins 1; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
B1	Generic female header - 1 pins	pins 1; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
B2	Generic female header - 1 pins	pins 1; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
BMP280	BME280 Breakout	power 3.3V; variant BME280
BMP280	Generic female header - 4 pins	pins 4; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
C1	Electrolytic Capacitor	voltage 6.3V; package 100 mil [THT, electrolytic]; capacitance 10µF
C2	Electrolytic Capacitor	voltage 6.3V; package 100 mil [THT, electrolytic]; capacitance 1µF
C3	Electrolytic	voltage 6.3V; package 100 mil [THT, electrolytic]; capacitance 1µF

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	Capacitor	
C4	Electrolytic Capacitor	voltage 6.3V; package 100 mil [THT, electrolytic]; capacitance 1µF
ESP 8266	ESP8266 WiFi Module	variant variant 7; part # ESP8266
P+	Generic female header - 1 pins	pins 1; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
P-	Generic female header - 1 pins	pins 1; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
Part2	Schematic Frame	rev 1.4; descr Arduino Nano and Esp 8266 Weather Station; date 1576360492; project Weather Station; sheet 1/1; filename Weather Stn R 1.4.fzz
Power plug1	Power plug	
PWR	Red (633nm) LED	package 5 mm [THT]; color Red (633nm); leg yes
PWR	Generic female header - 2 pins	pins 2; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
PWR LED	Generic female header - 2 pins	pins 2; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
R1	270Ω Resistor	tolerance ±5%; resistance 270Ω; package THT; bands 4; pin spacing 400 mil
R2	Trimmer Potentiometer	maximum resistance 10kΩ; package THT; type Trimmer Potentiometer; size Trimmer - 6mm; track Linear
R3	270Ω Resistor	tolerance ±5%; resistance 270Ω; package THT; bands 4; pin spacing 400 mil
R4	Trimmer Potentiometer	maximum resistance 10kΩ; package THT; type Trimmer Potentiometer; size Trimmer - 6mm; track Linear
R5	10kΩ Resistor	tolerance ±5%; resistance 10kΩ; package THT; bands 4; pin spacing 400 mil
R6	150Ω Resistor	tolerance ±5%; resistance 150Ω; package THT; bands 4; pin spacing 400 mil
R7	150Ω Resistor	tolerance ±5%; resistance 150Ω; package THT; bands 4; pin spacing 400 mil
R8	10kΩ Resistor	tolerance ±5%; resistance 10kΩ; package THT; bands 4; pin spacing 400 mil
R9	10kΩ Resistor	tolerance ±5%; resistance 10kΩ; package THT; bands 4; pin spacing 400 mil
Rain	HALL-EFFECT	package sc70; variant smd
Rain	Generic female header - 3 pins	pins 3; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
RST	Generic female header - 2 pins	pins 2; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
S1	Pushbutton	package THT; switching circuit SPST; default state Normally Open
S2	Pushbutton	package THT; switching circuit SPST; default state Normally Open
TNSMT	Green (560nm) LED	package 5 mm [THT]; color Green (560nm); leg yes
Tx LED	Generic female header - 2 pins	pins 2; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
U1	LIPO-2000mAh	package lipo-2000; variant 2000mAh
U2	LIPO-2000mAh	package lipo-2000; variant 2000mAh
U3	LIPO-2000mAh	package lipo-2000; variant 2000mAh
UART	Generic male header	pins 3; row single; form ♂ (male); package THT; hole size

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	- 3 pins	1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
UV	Generic female header - 4 pins	pins 4; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
W Dir	Generic female header - 3 pins	pins 3; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)
Wind	HALL-EFFECT	package sc70; variant smd
Wind	Generic female header - 3 pins	pins 3; row single; form ♀ (female); package THT; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm)

Change Log

Date	Doc Rev.	Board Rev.	Change
03/05/2020	1.4.0	1.4	First Document Issue

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