

Jennifer Hill ESD 2

by Jennifer Hill

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Electronic System Design

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INTRODUCTION

The increasing interest and involvement of amateur weather forecasters, a sophisticated yet user-friendly microcontroller-based weather and air quality monitor/logger is proposed. This system aims to provide accurate and comprehensive data over a 14-day period, catering to the specific needs of amateur weather prediction. Designed for portability, adaptability, and ease of operation, the system will monitor various environmental parameters critical for weather forecasting.

Key Objectives:

Portability:

The system will be designed with portability in mind, featuring a compact and lightweight design for easy transportation and deployment at different monitoring sites.

Enclosure:

The system will be housed in a weather-resistant and durable enclosure, ensuring protection against environmental elements and reliable performance in various conditions.

Connectivity and Data Retrieval:

The system will feature a USB interface for data retrieval and clearing. The user can access, analyse, and clear the stored data when connected to a computer.

Adaptability:

The system will be adaptable to various environments and conditions, ensuring reliable data collection across different locations.

Sensor Suite:

The microcontroller-based system will integrate sensors to capture weather parameters:

- Temperature
- Humidity
- Wind Speed
- Wind Direction
- Airborne particle count
- Sunlight brightness
- UV levels
- GPS position
- VOC level

Data Logging:

The system will feature a robust data-logging mechanism capable of recording measurements over a 14-day.

Existing Portable Weather Measurement Systems

Comparison Summary of the Weather Measurement Systems

Each system offers a comprehensive suite of sensors, including common parameters like temperature, humidity, wind speed, and wind direction. Variations of the series exist in additional parameters such as particle count, sunlight brightness, and VOC levels. Some systems have limitations in specific sensor capabilities. For example, the Davis Vantage Pro2 has limited particle count capabilities, and the Onset HOBO RX3000 may require additional sensors for certain measurements.

Comparison Table of the Weather Measurement Systems

				
SYSTEMS	Davis Instruments Vantage Pro2:	Campbell Scientific CR800 Series:	Onset HOBO RX3000 Weather Station:	WeatherFlow Smart Weather Station:
SENSORS	Temperature, Humidity, Wind Speed, Wind Direction, Airborne Particle Count (limited), Solar Radiation (for sunlight brightness), UV Sensors, and GPS position (with additional module).	Temperature, Humidity, Wind Speed, Wind Direction, Particle Count (with external sensors), Pyranometer (for sunlight), UV Sensors, and GPS position.	Temperature, Humidity, Wind Speed, Wind Direction, UV Sensors, GPS position (with additional module), and External sensors available for particles.	Temperature, Humidity, Wind Speed, Wind Direction, Light Sensor (for sunlight), UV Sensors, GPS position (with additional module), and External sensors for VOC (with additional module).
FEATURES	Wireless transmission, LCD, customisable alerts, and compatibility with customisable additional sensors.	Data logger, programmable measurement intervals, broad sensor compatibility.	Wireless data transmission, cloud-based data storage, modular sensor options.	Wireless connectivity, smartphone app integration, real-time data sharing.
PROS	Modular design for sensor expansion.	Versatile for research applications and customizable programming.	Flexible and expandable remote data access.	User-friendly, compact design.
CONS	Limited particle count capabilities.	Requires additional sensors for some parameters.	It may require additional sensors for specific measurements.	Limited options for particle count.

Table 1

Reference 1

Microcontroller Selection

MICROCONTROLLER	[1] PIC24FJ64GA0	[2] PIC16F18015	[2] PIC16F18025
SPECIFICATIONS			
Program Memory Size (KB)	64	14	14
RAM (bytes)	8KB	1024	1024
Data EEPROM (bytes)	64KB	128	128
Pin Count	64	14	14
Operation Voltage Max.(V)	3.6V	5.5V	5.5V
Operation Voltage Min.(V)	2V	1.8	1.8
Max ADC Resolution (bits)	10	10	10
Low Power	No	Yes	Yes
Fail-Safe Clock Monitor	allows safe shutdown if clock fails		
Analogue			
ADC Channels	16	11	11
Analogue comparators	2	0	0
Peripherals			
SPI	x 2	x 1	x 1
SPI modules	2 x 3-Wire/4-Wire	x 1	x 1
I2C	x 2	x 1	x 0
UART	x 2	0	0
UART modules support	RS-232, RS-485 and LIN/J2602	0	0
(input/output) (capture/compare) PWM	5	0	0
Timer Modules	16 bit	3 x 8-bit - 3 x 16-bit	2 x 8-bit - 3 x 16-bit
System			
Voltage Pin Tolerance	5.5V Input (digital pins only)	5.5V	5.5V
Internal oscillator support	31 kHz to 8 MHz, up to 32 MHz with 4X PLL	0	0

Table 2

Reference 2

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PIC24FJ64GA0

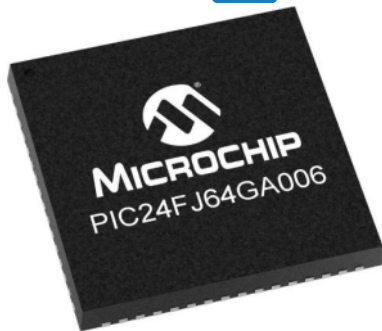
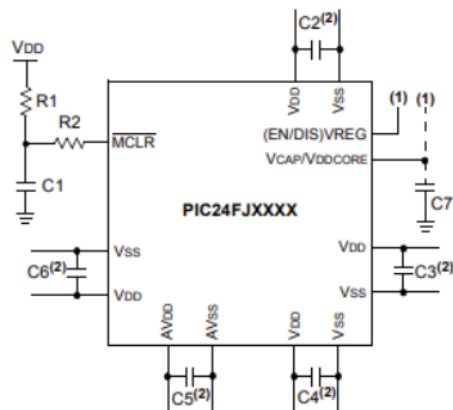


Figure 1

Minimum circuit for the Microcontroller Pic



Key (all values are recommendations):

C1 through C6: 0.1 μ F, 20V ceramic

C7: 10 μ F, 6.3V or greater, tantalum or ceramic

R1: 10 k Ω

R2: 100 Ω to 470 Ω

Figure 2

Battery

To estimate the battery power needed for the portable weather system to last 2 weeks we need to know the total hours (336) and mA consumption of each sensor. To show the workings, a table is used for totalisation and equations under.



Figure 3

Powerpack Battery 9V, 160Ah

Reference 12

Sensors	Current
Temperature/Humidity	100mA
WIND SPEED/DIRECTION	100mA
PARTICLE COUNT	50mA
BRIGHTNESS	50mA
UV	50mA
GPS	10mA
VOC	100mA
TOTAL	460mA

Hours in 2 weeks: 336hrs

Total power:

$$460\text{mA} \times 336\text{Hr} = 154,560\text{mA}$$

$$154,560\text{mA} = 154\text{A}$$

Connectors



Figure 4

Reference 13



Figure 5

Physical Design

Design Prediction Example



Figure 6

Case

- 3-in-1 product: box, basket and carrier
- Dimensions when assembled: 450 x 360 x 640 mm
- Two handles
- Body made of high-strength polymer compound
- Solid seal for increased protection against weather
- Elastomer-coated two-component wheels
- Load capacity 25 kg



Figure 7

Reference 3

Memory Requirements

Parameter to measure	Resolution	Number of values	Number of Bits Required
TEMPERATURE	1C°	50	6
HUMIDITY	1%	100	6
WIND SPEED (mph)	1 M/S	90	6
WIND DIRECTION	1%	360	9
PARTICLE COUNT	1	999,999,999 (recording only even N°) ≈390,625	16
BRIGHTNESS	400 lux	100,000	14
UV	1 W/m2	1000	10
GPS	1°	360	
VOC	ppm (Parts Per Million)	1000	10
TOTAL		16 BIT	

Table 3

Structure of Memory

	1 BYTE		1 BYTE
TEMPERATURE		-	
HUMIDITY		-	
WIND SPEED (mph)		-	
WIND DIRECTION		-	
PARTICLE COUNT		-	
BRIGHTNESS		-	
UV		-	
GPS		-	
VOC		-	

Table 4

Working out the amount of memory needed

16Bit = 2 Bytes

x9 Sensors = 18 Bytes

x50samples = 900 Bytes p/s  6

x60seconds= 54,000 B/p/m

x60minutes= 3,240,000 B/p/h

x24hrs = 77,760,000 Bpd

x14days = 1,880,640,000 Bytes

$1,880,640,000 \times 10^{-8} = 1.88064 \text{ GB}$

Equation 1

Sensors

Temperature

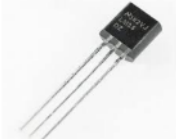
			
SENSOR	[1] Laird Connectivity's Sentrius RS1xx	[2] LM35	[3] SEN0385
SPECIFICATIONS			
Communication		Analogue	I2C
Temperature Range	-100°C to +100°C	M-55°C to 150°C	40 ~ 125 °C
IP Rating	IP 65	NONE	Weatherproof
Accuracy	Where t = >-90°C to +100°C = ± (0.15°C + 0.002 t)	0.5°C	±2%RH
Power	Battery 2 x AA (replaceable)	DC 4V-30V	DC 3.3V-5V
I2C	N/A	N/A	YES
Interface	RTD (Resistance Temperature Detector)	NONE	NONE
OTHER CAPABILITIES	WIRE LESS CONNECTION	INTERNAL	MEASURES HUMIDITY

Table 5

Reference 4



Figure 8

Humidity

			
SENSOR	[1] SEN0385	[2] Temperature/Relative Humidity Smart Sensor (S-THC-M00x)	[3] HIH8000 Series
Communications	I2C		
SPECIFICATIONS			
IP Rating	Weather Proof	Weather Proof	N/A
Accuracy	$\pm 2\%$	$\pm 2.0\%$	0.01%
Power	3.3V-5VDC	digital communication cable	3.3 VDC
I2C	YES	N/A	YES
Output type	Digital	Digital	Digital
OTHER CAPABILITIES	Measures Temperature	Measures Temperature	Measures Temperature

Table 6

Reference 5

Figure 9

Wind Speed and Direction

			
SENSORS	[1] WindMaster (GILL) 3 AXIS	[2] WindSonic (GILL) 2 AXIS	[3] WindUltra (GILL) 2 AXIS
SPECIFICATIONS			
Communication	Digital Analogue RS232, RS422 & RS485	Digital Analogue RS232, RS422 & RS485	Digital Analogue RS232, RS422 & RS485
Wind speed & direction	Up to 0-65m/s	0-75m/s	0-75m/s
Accuracy	<1.5% RMS @ 12m/s	±2% @ 12 m/s	<2% RMSE @ 0-20m/s
Sample rate	20Hz or 32Hz	4Hz	8Hz
Digital outputs	RS232, RS422, RS485	RS232 + RS422 + RS485	RS485, NMEA, SDI-12, MODBUS
Output rate	1-20Hz	up to 4Hz	up to 8Hz
Analogue outputs	0-5v, 4-20mA	0-5 V , 4-20mA	No
Power	9-30VDC	5-30VDC	5-30VDC
IP rating	IP65	IP66	IP69k
Weight	1kg	0.5kg	Sensor 150g, 1" (25-26mm) pole mount 120g
Height	750mm	163mm	189mm with 1" (25-26mm) pole mount,
Diameter	240mm	142mm	84mm

Table 7

Reference 6

Figure 10

Air Borne Particle Count

						
SENSOR	[1] PARTICULATE MATTER OEM		[2] Amphenol SM-UART-04L		[3] MCERTS-certified SPS30	
SPECIFICATIONS						
Technology	Optical		Lazer		Optical	
Particle Size detection range	0,3 - 10 μm diameter		0,3 - 10 μm diameter		0,3 - 10 μm diameter	
Power	5VDC		5VDC		5VDC	
Dimensions	L 62 mm x W 52 mm x H 23 mm		L 418 mm x W 295 mm x H 210 mm		L41 x W41 x H12	
Weight	0.45kg		5kg		0.26kg	
Number Concentration Range	PM1	0.3 to 1.0 μm	PM1	0.3 to 1.0 μm	PM0.5	0.3 to 1.5 μm
	PM2.5	0.3 to 2.5 μm	PM2.5	0.3 to 2.5 μm	PM1	0.3 to 1.0 μm
	PM10	0.3 to 10.0 μm	PM10	0.3 to 10.0 μm	PM2.5	0.3 to 2.5 μm
	Temperature				PM4	0.3 to 4.0 μm
	Relative Humidity				PM10	0.3 to 10.0 μm

Table 8

Reference 7

The MCERTS-certified SPS30 proves to be an optimal choice for weather forecast systems owing to its high precision and versatile measurement capabilities. Covering a wide mass concentration range (0 to 1,000 $\mu\text{g}/\text{m}^3$) and offering detailed size categorisation (PM1.0, PM2.5, PM4, and PM10), this sensor ensures comprehensive monitoring of particulate matter. The SPS30 stands out as a durable, accurate, and reliable

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solution for weather forecasting applications, ensuring prolonged, high-quality performance in diverse environmental conditions.



Figure 11

Sunlight Brightness



SENSOR	[1] SQ-512-SS	[1] SQ-514-SS	[1] SQ-202X-SS
SPECIFICATIONS			
Power Supply	5 to 24 V DC	12 to 24 V DC	5 to 24 V DC
Current Draw	At 12 V is 57 μA	maximum of 20 mA	10 μA
Output sensitivity	0.625 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$	0.004 mA per $\mu\text{mol m}^{-2} \text{s}^{-1}$	0.6 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$
Output Range	0 to 2.5 V	4 to 20 mA	0 to 2.5 V
Field of View	180°	180°	180°
Spectral Range	389 to 692 nm $\pm$ 5 nm (wavelengths where response is greater than 50 %)	389 to 692 nm $\pm$ 5 nm (wavelengths where response is greater than 50 %)	389 to 692 nm $\pm$ 5 nm (wavelengths where response is greater than 50 %)
Temperature Response	-0.11 $\pm$ 0.04 % per C	-0.11 $\pm$ 0.04 % per C	-0.04 % per C
Operating Environment	-40 to 70 C; 0 to 100 % relative humidity; can be submerged in water up to depths of 30 m	-40 to 70 C; 0 to 100 % relative humidity; can be submerged in water up to depths of 30 m	-10 to 60 C; 0 to 100 % relative humidity; can be submerged in water up to 30 m

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Dimensions	D 30.5 mm, H 37 mm	D 30.5 mm, H 37 mm	30.5 mm diameter, 37 mm height
Mass (5 m of cable)	140 g	140 g	140 g

Table 9

Reference 8

UV Levels



SENSOR	[1] SU-202-SS	[1] SU-205-SS	[1] SU-200-SS
SPECIFICATIONS			
Power Supply	5 to 24 V DC	5.5 to 24 V DC	Self-powered
Output sensitivity	25 mV per W m^{-2} ; 8.33 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$	50 mV per W m^{-2} ; 16.67 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$	0.1 mV per W m^{-2} ; 0.03 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$
Output Range	0.2.5V	0 to 5 V	0.10mV
Field of View	180°		
Spectral Range	305 to 390 nm (wavelengths where the response is greater than 10 % of the maximum)		
Temperature Response	Less than 0.1 % per C		
Operating Environment	-30 to 85 C; 0 to 100 % relative humidity		

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Dimensions	30.5 mm diameter, 37 mm height
Mass (with 5 m of cable)	140 g

Table 10

Reference 9

GPS position

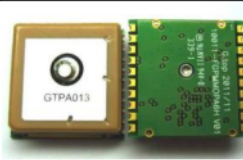
			
GPS LOCATION	[1] u-blox 6 based NEO-6 series	[2] CD-PA1616S GPS	[3] GlobalTop FGPM60PA6H
SPECIFICATIONS			
Horizontal Position Accuracy	2.5m	< 3m	< 3m
Navigation Update Rate	1HZ (5Hz maximum)	1 to 10 Hz	1 to 10 Hz
Capture Time	1s to 27seconds	1s to 34seconds	1s to 34seconds
Navigation Sensitivity	-161dBm	-165 dBm	-165 dBm
Communication Protocol	NMEA, UBX Binary, RTCM	NMEA, RTCM	NMEA, RTCM
Serial Baud Rate	4800-230400 (default 9600)	9600 bps (default)	9600 bps (default)
Operating Temperature	-40°C ~ 85°C	-40°C ~ 85°C	-40°C ~ 85°C
Power	2.7V ~ 3.6V	3.3V ~ 4.3V	3V ~ 4.3V
Operating Current	45mA	25mA	25mA

Table 11

Reference 10



Figure 12

VOC level

			
VOC LEVEL	[1] SEN54-SDN-T	[1] SEN50-SDN-T	[2] ES101TVOC
SPECIFICATIONS			
Communication			
Sensor outputs	Particulate Matter Relative Humidity Temperature VOC Index	Particulate Matter Relative	Particulate Matter Relative
MEASUREMENT RANGE	1-500 VOC index points	1-500 VOC index points	0~60000ppb
POWER SUPPLY	5VDC	5VDC	10-30Vdc
OPERATING CONDITIONS	-10 to 50°C	-10 to 50°C	-40~30VDC
DIMENSIONS	W 5230mm x H 4330mm x D 2230mm	W 5230mm x H 4330mm x D 2230mm	W 85mm x H 110mm x D 44mm

Table 12

Reference 11



Figure 13

Schematic Diagram

Battery Regulator from 10V to 3.3V

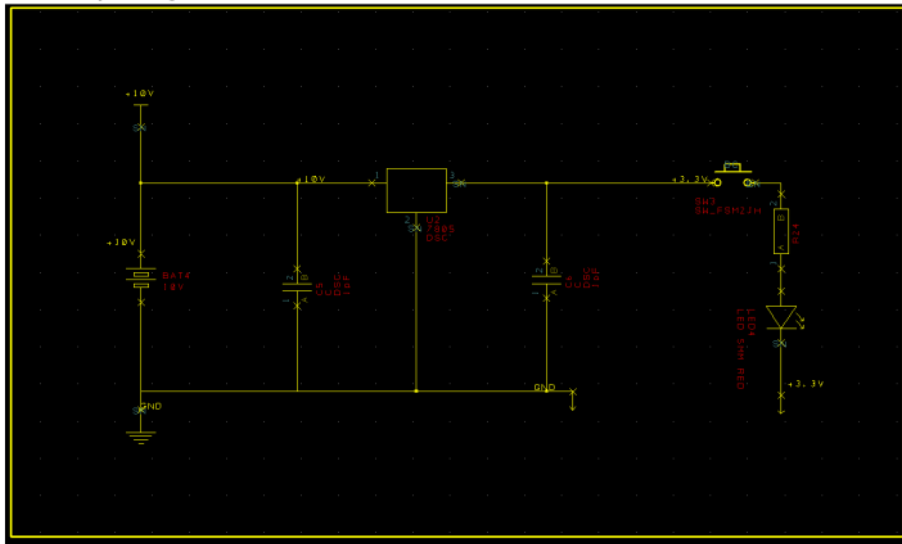


Figure 14

Battery Regulator from 10V to 5V

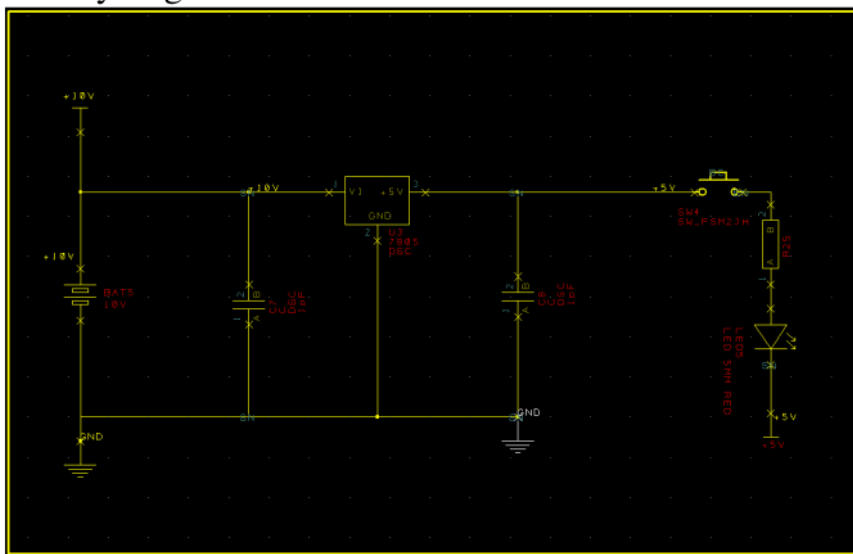
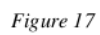


Figure 15



UART Connector for PC Connection

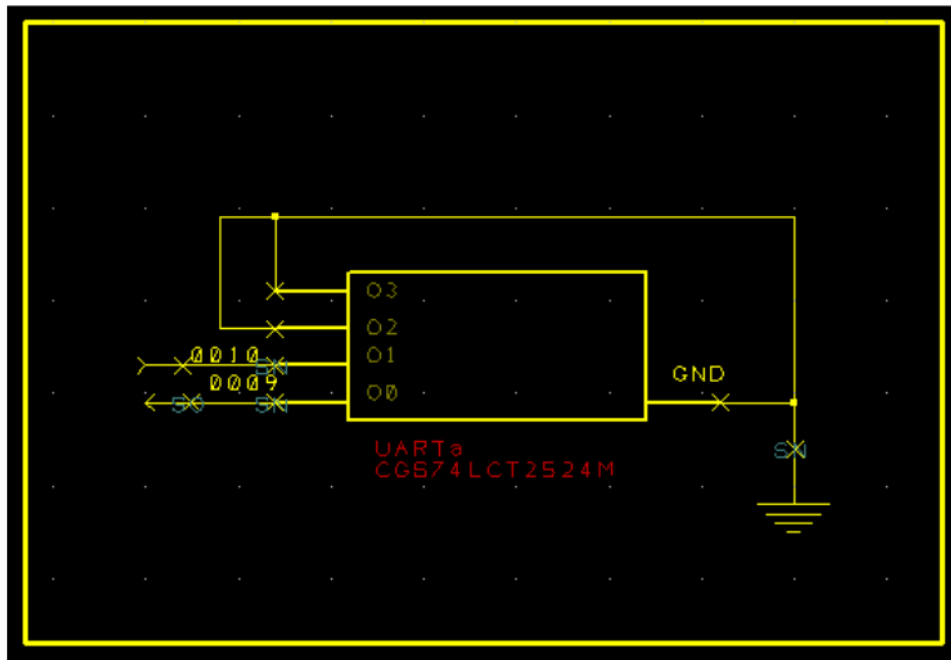


Figure 18



Figure 19

SD Card Module Circuit

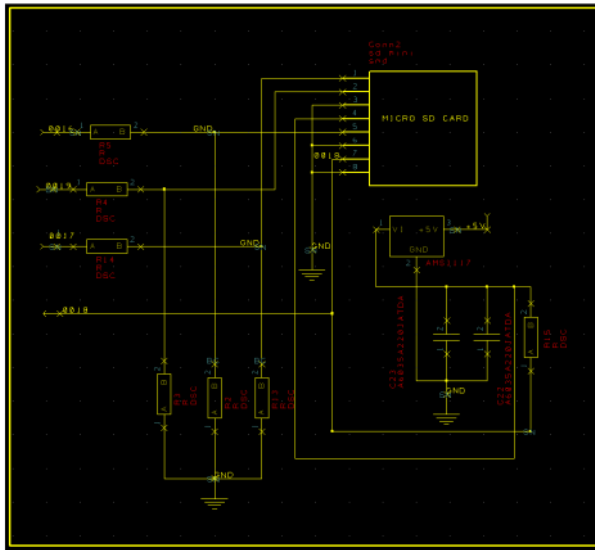


Figure 20

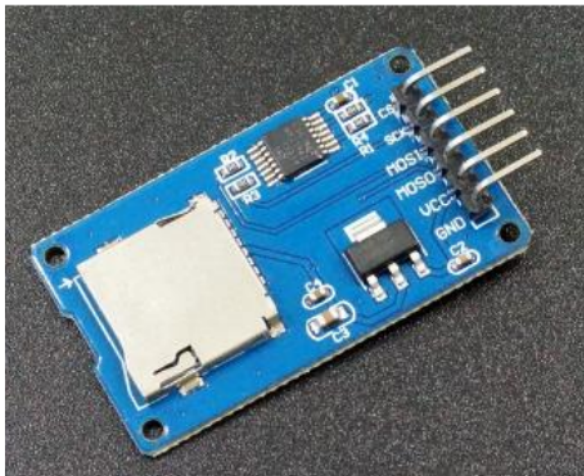


Figure 21

Ultra-Low Noise, Ultra-Fast CMOS LDO Regulator

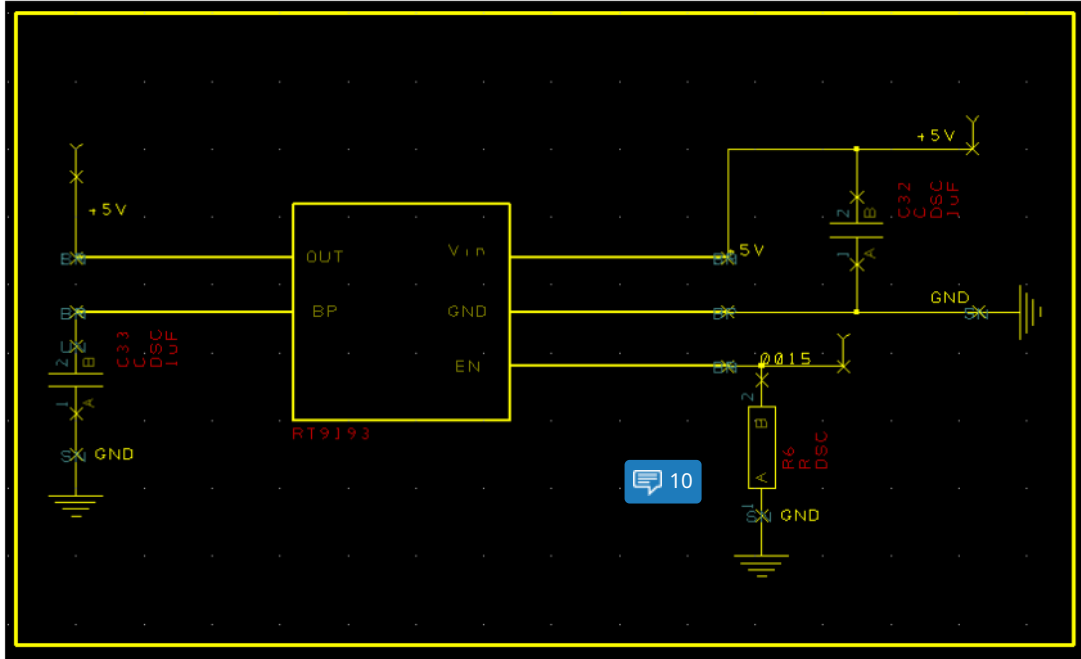


Figure 22

Sensors

Temperature and Humidity

11

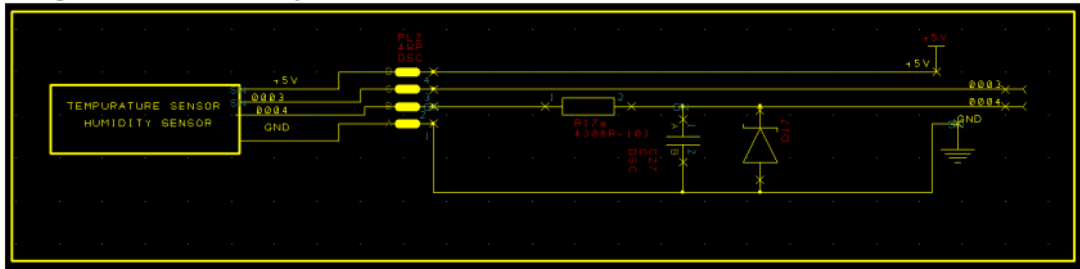


Figure 23

Wind Speed and Direction

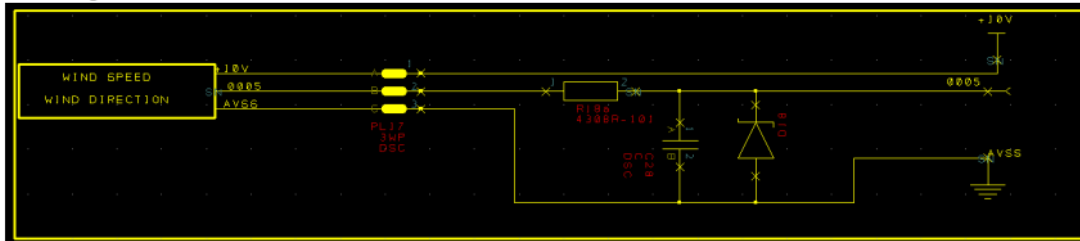
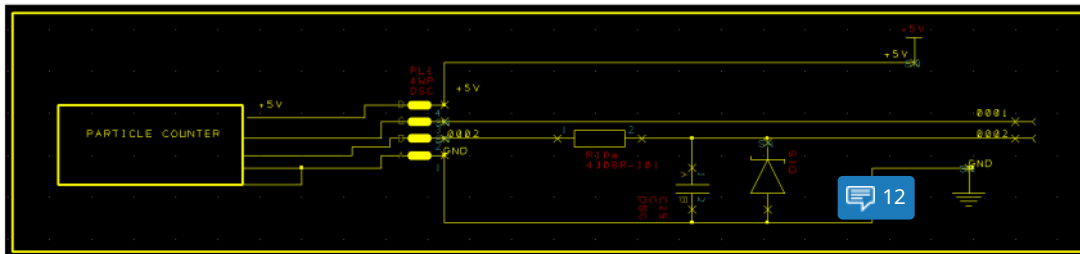


Figure 24

Particle Counter



12

Figure 25

Sunlight Brightness



Figure 26

UV

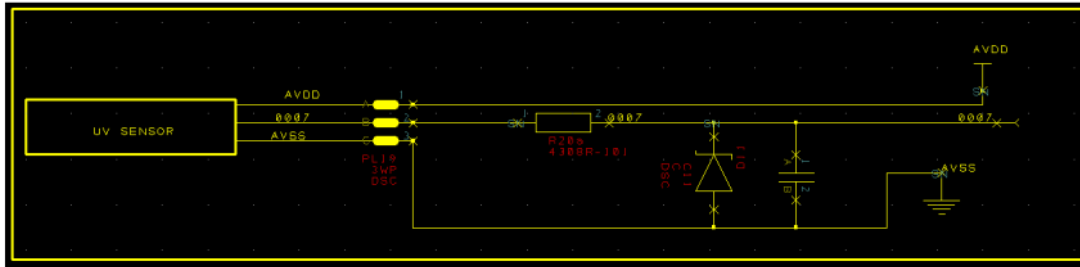


Figure 27

GPS

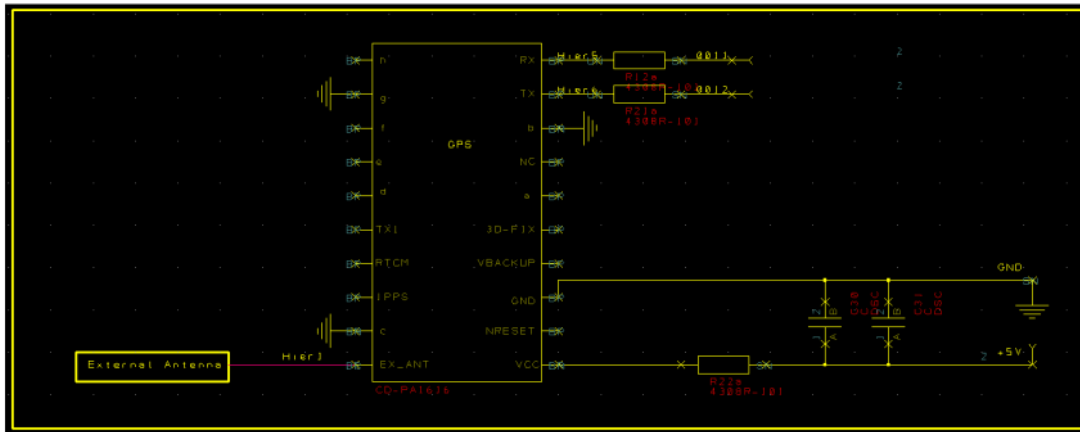


Figure 28

VOC

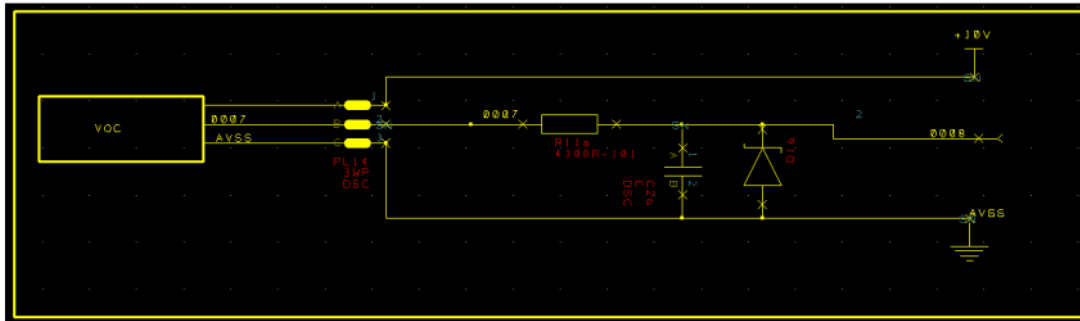


Figure 29

References

(Link via [headings](#))

Refs missing info 

EXISTING WEATHER SYSTEMS

- [Table 1](#)

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- [2] “CR800 - measurement and control Datalogger,” CR800: Measurement and Control Datalogger, <https://www.campbellsci.com/cr800>
- [3] “Hobo RX3000 Weather Station,” Onset’s HOBO and InTemp Data Loggers, <https://www.onsetcomp.com/rx>
- [4] “WeatherFlow smart weather stations and weather meters,” WeatherFlow, <https://shop.weatherflow.com/> (accessed Jan. 12, 2024).

Reference 2

MICROCONTROLLER

- [Table 2](#)
 - [Figure 1](#)

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- [2] PIC16F18015 - Microchip Technology, <https://www.microchip.com/en-us/product/PIC16F18015>
- [3] PIC16F18025 - Microchip Technology, <https://www.microchip.com/en-us/product/PIC16F18025>

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Reference 3

STORAGE

- *Figure 7*

[1] “Kistenberg heavy KHVW tool box cart 3in1 Mobile Storage Tower system with wheels set handle Sturdy workshop garage,” Euroelectronics UK, https://euroelectronics.co.uk/products/kistenberg-heavy-khvw-tool-box-cart-3in1-mobile-storage-tower-system-with-wheels-set-handle-sturdy-workshop-garage?variant=43132292497575&utm_source=google&utm_medium=cpc&utm_campaign=Google%2BShopping¤cy=GBP&country=GB

Reference 4

TEMPERATURE

- *Table 5*

[1] 455-00036B laird connectivity | Mouser, <https://www.mouser.com/ProductDetail/Laird-Connectivity/455-00036B?qs=BJlw7L4Cy78GBQW9wVjTWQ%3D%3D>

[2] “LM35,” LM35 data sheet, product information and support | TI.com, <https://www.ti.com/product/LM35>

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[3] “SEN0385 - Temperature & humidity sensor, sht31 weather-proof, Arduino, micro: Bit, esp32 boards,” Farnell, <https://il.farnell.com/dfrobot/sen0385/weather-proof-temp-humidity-sensor/dp/3879710#:~:text=Product%20Overview,to%20submerge%20it%20in%20water>

Reference 5

HUMIDITY

- *Table 6*

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Reference 6

WIND DIRECTION/SPEED

- *Table 7*

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- [2] Wind Speed & Direction Sensor - Gill Instruments, <https://gillinstruments.com/wp-content/uploads/2022/08/WindSonic75-1405-0035-Iss-5.pdf>
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Reference 7

Airborne Particles

- *Table 8*

- [1] Datasheet SPS30 - sensirion.com, https://sensirion.com/media/documents/8600FF88/64A3B8D6/Sensirion_PM_Sensors_Datasheet_SPS30.pdf
- [2] Telaire SM-UART004L Laser Dust Sensor - Mouser Electronics, https://www.mouser.com/datasheet/2/18/1/Amphenol_12202018_AAS_916_139A_Telaire_SM_UART04L_-1891934.pdf
- [3] Datasheet SPS30 - sensirion, https://sensirion.com/media/documents/8600FF88/616542B5/Sensirion_PM_Sensors_Datasheet_SPS30.pdf (accessed Jan. 12, 2024).

Reference 8

Brightness

- *Table 9*

- [1] "SQ-500-SS: Full-spectrum quantum sensor," Apogee Instruments, Inc., <https://www.apogeeinstruments.com/sq-500-ss-full-spectrum-quantum-sensor/#product-tab-description>
- [2] Spectral response the photosynthetically active ... - apogee instruments, <https://www.apogeeinstruments.com/content/SQ-spec-sheet.pdf>

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Reference 9

UV

- *Table 10*

[1] UV-A sensors - apogee instruments, <https://www.apogeeinstruments.com/content/SU-200-spec-sheet.pdf>

Reference 10

GPS

- *Table 11*

[1] FGPMMOPA6H by Adafruit Industries LLC datasheet | DigiKey, <https://www.digikey.com/en/htmldatasheets/production/1797888/0/0/1/fgpmmopa6h.html>

[2] Posted by Dan Hastings on 22nd Feb 2021, "NEO-6M GPS module for Arduino with large antenna," Proto, <https://proto-pic.co.uk/product/neo-6m-gps-module-for-arduino-with-large-antenna>

[3] CD-PA1616S GPS patch antenna module data sheet V - Adafruit Industries, <https://cdn-shop.adafruit.com/product-files/746/CD+PA1616S+Datasheet.v03.pdf>

[4] 300mA, ultra-low noise, ultra-fast CMOS LDO regulator - richtek, https://www.richtek.com/assets/product_file/RT9193/DS9193-18.pdf (accessed Jan. 12, 2024).

Reference 11

VOC

- *Table 12*

[1] Datasheet SEN5X - Mouser Electronics, https://www.mouser.com/datasheet/2/682/Sensirion_Datasheet_SEN5x-2932120.pdf

[2] "Catalogs," WoMaster ES101 Air Quality Sensors - WoMaster - PDF Catalogs | Technical Documentation | Brochure, <https://pdf.directindustry.com/pdf/womaster/womaster-es101-air-quality-sensors/192288-1005451.html> (accessed Jan. 10, 2024).

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Reference 12

Battery

Figure 3

- [1] "Powerpack battery (9V, 160ah)," Fencing & Farming Supply Specialists - McVeigh Parker, https://mcveighparker.com/powerpack-battery-9v-160ah?gad_source=1&gclid=CjwKCAiA44OtBhAOEiwAj4gpOceMIPq8Um75pAZollc5FyRiWbOB3_QSI TqkjnQIgoJMJBEXIMlCxoCbfUQA vD_BwE#212=6515

Reference 13

Connectors

Figure 4

- [1] "Phoenix contact MKDS 3/ 3-5.08 PCB header," RS, https://uk.rs-online.com/web/p/pcb-terminal-blocks/1895865?cm_mmc=UK-PLA-DS3A_-google-_-CSS_UK_EN_PMAX_Catch%2BA11-_-1895865&matchtype=&&gad_source=1&gclid=CjwKCAiA44OtBhAOEiwAj4gpOaoF_Vg3Sfn8EkPibRB7UFOVjmtSZSDRf4C1iThqYiHYxKUCgsndEhoCUtAQAvD_BwE&gclsrc=aw.ds

Figure 5

- [2] "5-pin DIN plug connector 240°," Switch Electronics | Your One Stop Component Shop, <https://www.switchelectronics.co.uk/products/5-pin-din-plug-connector-240>

Reference 14

Modules

Figure 19

- [1] "FTDI chip 1m USB to UART cable in black," RS, <https://uk.rs-online.com/web/p/raspberry-pi-cables/7676200?gb=s>

Figure 21

- [2] "MicroSD card module with level shifter," ProtoSupplies, <https://protosupplies.com/product/microsd-card-module-with-level-shifter/#:~:text=This%20MicroSD%20card%20module%20is,damage%20to%20the%20SD%20card.> (accessed Jan. 12, 2024).

FINAL GRADE

GENERAL COMMENTS

36/100

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Comment 1

Why did you choose this device? What features make it more appropriate than the others?

PAGE 10



Comment 2

Where are these current values from? You haven't even discussed the sensors yet



Comment 3

Should be mAh.



Comment 4

154Ah

PAGE 11



Comment 5

No justification or comparison

PAGE 12

PAGE 13

PAGE 14



Comment 6

Do you need to sample all your sensors 50 times a second? Surely the temperature and humidity don't change that quickly.

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Comment 7

Good justification for the choice of this sensor

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Comment 8

Not sure what is going on in this circuit. It looks like a crowbar circuit, but the fuse is missing.

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Comment 9

Good idea to use an RS232 to USB converter

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Comment 10

Regulators need to have a voltage drop across them to be able to regulate properly. This circuit has no voltage drop across it. This will impact its performance

PAGE 30



Comment 11

Your temp & humidity sensor is communicating using I2C, this is a digital signal and will not work if you use a low pass filter as you have. All you need for I2C is two pull-up resistors (of about 4k7), one on the data line and the other on the clock line.



Comment 12

You do not need to put over voltage protection and low pass filtering on digital lines.

If you are using this device in I2C mode (as indicated by the 2nd pin connected to GND) You only need pull-up resistors on the SCL and SDA lines.

As I2C is a multi-master / multi-slave communication standard, that means the SCL and SDA lines can be shared between ALL your I2C devices and the microcontroller chooses which to talk to by transmitting a unique address relating to the device it wants.

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Comment 13

No PCB design.

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Refs missing info

Some of your references are missing information. To understand what information should be included, see the university IEEE referencing handbook on the library website.

https://uwtsd.ac.uk/media/uwtsd-website/content-assets/documents/library-and-learning-resources/infoskills/IEEE-eng_v.1.2.pdf

Additional Comment

Your reference list is supposed to start at 1 and keep increasing to the end, not re-start at 1 for each section of your report.

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GRADING FORM: SMU GENERIC_SMOSEY

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36

ENGAGEMENT WITH LITERATURE

including reading, referencing, academic conventions and academic honesty



Inclusion of a range of research-informed literature, including sources retrieved independently. Referencing conventions mostly consistently applied.

5

Look at the university guide on referencing.

KNOWLEDGE & UNDERSTANDING

Knowledge of the basic underlying concepts and principles of a subject.



Hardware design is ok, although some errors. - see comments on schematic drawings
No PCB design presented.
No Software structure / flowcharts presented
Diagrams generally clear enough, although some are a little fuzzy

8.75

COGNITIVE & INTELLECTUAL

Evaluate underlying concepts and principles of a subject and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements.



Sample rate chosen is far too high - weather data does not change that quickly.
Memory sizing is ok.
Justification missing from most sensor and component selections.
The justifications which are present are good.

15.75

PRACTICAL APPLICATION SKILLS

Different approaches to solving problems in particular contexts.



No costing given.
No suggestions for improvement

0

TRANSFERABLE SKILLS

Communicate the results of their study/work accurately and reliably, and with structured and coherent arguments; the qualities needed for

employment requiring the exercise of some personal responsibility within a structured and managed environment.



Can communicate well, confidently and consistently in a suitable format.

Work is coherent and fluent and is well structured and organised.

6.5