Wireless Test Setup to Read and Store data from BMP180 using NodeMCU

at

XII SERB School on Experimental High Energy Physics, TIFR, Mumbai

Group II(a)

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- Microcontroller: Micro computer in a chip fabricated by VLSI design [1]

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- Not stand alone device $\xrightarrow[flow of data]{Controlled} Microcontrollers} \longrightarrow Wireless \longrightarrow store data$

BMP180 and NodeMCU

- BMP180
 - consists of piezoresistive sensor, ADC, EEPROM, I2C
 - Supply Voltage: 3.3V
- NodeMCU
 - ESP8266 module containing
 - wifi module (IP, port)
 - microcontroller
 - Arduino (IDE) (C program fed)
- Three sensors:
 - Reference sensor 1: Atm. pressure and temperature
 - Pressure sensor 2: Manometer pressure and temperature
 - Temperature sensor 3: Chamber pressure and temperature
- Result : We have a wireless system to send and store data!

Figures

BMP180 barometric pressure/temperature sensor



Node Microcontroller Unit



Flowchart of the experiment



Figure: Circuit Diagram

Pressure Calibration

Temperature Calibration





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Basic principle of working







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- Plot: P_{uncorrected} along x axis and P_{atm} + height_{WC} along y axis
- A simple technique!

Pressure Calibration Data

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Water Column(mm)	Atm. Pressure(mmWC)	Sensor (mmWC)
5	10322.1	10603.1
28	10323.6	10614.8
48	10321.3	10641.4
74	10322.3	10641.4
100	10322.2	10655.3
128	10321.3	10671.2
154	10321.8	10658.3
176	10322.0	10698.4
196	10321.4	10710.2
216	10320.8	10722.9
233	10322.5	10733.1
298	10321.5	10773.0

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Pressure Calibration Graph



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- Plot *T*_{corrected} vs *P*_{corrected}

UTC (sec)	<pre>T_ref(celsius)</pre>	Atm(mm)	T_measured(Celsius)	<pre>Pressure_true(mm)</pre>
1548065201	21.57	10318.9	25.46	10636.2
1548065205	21.59	10319.6	25.48	10636.4
1548065208	21.60	10319.7	25.50	10636.6
1548065210	21.60	10319.7	25.51	10637.3
1548065213	21.58	10320.0	25.62	10639.8
1548065228	21.58	10319.2	25.64	10640.1
1548065231	21.59	10319.3	25.67	10640.8
1548065235	21.59	10319.1	25.69	10641.5
1548065238	21.61	10318.8	25.71	10641.9
1548065240	21.62	10318.7	25.74	10642.4
1548065243	21.65	10319.5	25.76	10643.0
1548065247	21.64	10319.1	25.78	10643.4
1548065249	21.65	10318.7	25.80	10643.9
1548065252	21.66	10319.3	25.83	10644.2
1548065256	21.66	10319.1	25.85	10645.3
1548065258	21.67	10319.2	25.89	10645.8
1548065261	21.70	10319.4	25.90	10646.6
1548065265	21.70	10319.5	25.93	10646.9
1548065268	21.72	10319.0	25.95	10647.7
1548065270	21.73	10320.1	26.00	10648.1
1548065273	21.74	10319.4	25.96	10648.8
1548065277	21.75	10319.3	26.04	10649.2
1548065279	21.77	10320.0	26.06	10650.0
1548065282	21.77	10319.4	26.09	10650.4
1548065286	21.80	10319.6	26.11	10651.1
1548065288	21.80	10319.5	26.13	10651.5
1 5 4 9 9 6 5 2 9 1	21 77	10210 2	26.16	10552 2

Results



• Leak test in RPC's

- Leak test in RPC's
- Weather stations

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- Measure altitudes

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- Security Cameras (Rotating Cameras)

What we have learned?

- Calibration techniques
- Necessity of calibration
- How simple techniques can be put to use!
 - Cost effectively
 - With minimum time and labour

References



Open Source : Internet.

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