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THE SIMULATION OF VARIED TEMPERATURE SENSOR

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ABSTRACT

The study have successfully simulated 40 units data of temperature sensor during heating process and cooling process. Simulated data in temperature sensor has interval time 3 to 18 seconds for 5 iterations that are combined with other 7 data temperature sensor until get 40 data iterations. The data which has been simulated and then plotted into a graph with the x-axis is time and y-axis is average heating process or cooling process. The graph formmed cupped-down with quadratic function for heating process and cupped-up for cooling process.

Keywords: data simulation, temperature sensor, heating, cooling

INTRODUCTION

Research and practicum on temperature sensors topic are exciting to be reviewed, as did previous researchers [1-41]. Previous researchers have successfully developed the application of temperature sensors for daily life in all fields of scientific disciplines including: Micropower CMOS temperature sensor with digital output [1], Photonic Crystal Fiber Temperature Sensor Based on Quantum Dot Nanocoatings [2], Investigating the effect of taper length on sensitivity of the tapered-fiber based temperature sensor [3], How Temperature Sensor Change Affects Warming Trends and Modeling: An Evaluation Across the State of Colorado [4], The sensitivity of distributed temperature sensor system based on Raman scattering under cooling down, loading and magnetic field [5], High-resolution and fast-response optical waveguide temperature sensor using asymmetric Mach-Zehnder interferometer structure [6], Development of wearable temperature sensor based on peltier thermoelectric device to change human body temperature [7], An internal thermal sensor controlling temperature preference in *Drosophila* [8], A flexible temperature sensor based on reduced graphene oxide for robot skin used in internet of things [9], A high resolution and large range fiber Bragg grating temperature sensor with vortex beams [10], High sensitivity fiber temperature sensor based PDMS film on Mach Zehnder interferometer [11], High sensitivity fiber temperature sensor based PDMS film on Mach Zehnder interferometer 12], Flexible wireless temperature sensors based on Ni microparticle-filled binary polymer composites [13], Sensitive Wearable Temperature Sensor with Seamless Monolithic Integration [14], Microstrip Patch Antenna Temperature Sensor [15], On the influence of infra-red sensor in the accurate estimation of grinding temperatures [16], Cholesteric liquid-crystal laser as an optic fiber-based temperature sensor [17], A 405-nW CMOS temperature sensor based on linear MOS operation [18], Organic temperature sensors based on conductive polymers patterned by a selective-wetting method [19], Temperature sensor based on ge doped microstructured fibers [20], Analysis of Controlling Wireless Temperature Sensor for Monitoring Peat-Land Fire [21], The temperature responsive mechanism of fiber surface plasmon resonance sensor [22], Light Control Using Human Body Temperature Based on Arduino Uno and PIR (Passive Infrared Receiver) Sensor [23], Development of a Wireless Temperature Sensor Using Polymer-Derived Ceramics [24], Temperature dependence of the dynamic parameters of contact thermometers [25], Development of chipless and wireless underground temperature sensor system based on magnetic antennas and SAW sensor [26], Developing efficient thin film temperature sensors utilizing layered carbon nanotube films [27], Stretchable Active Matrix Temperature Sensor Array of Polyaniline Nanofibers for Electronic Skin [28], An All-Elastomeric Transparent and Stretchable Temperature Sensor for Body-Attachable Wearable Electronics [29], Flexible temperature sensor array based on a Graphite Polydimethylsiloxane composite [31], A temperature sensor based on tapered few mode fiber long-period grating induced by CO2 laser and fusion tapering [32], High Dynamic Range Organic Temperature Sensor [33], High-sensitivity refractive index and temperature sensor based on cascading FBGs and droplet-like fiber interferometer [34], Rapid thermal conductivity measurement with a hot disk sensor: Part 1. Theoretical considerations [35], A high-resolution all-digital temperature sensor with process variation compensation [36], Ultrasensitive temperature sensor based on a urethane acrylate coated off-axis spiral long period fiber grating [37], An ultra low power 1V, 220nW temperature sensor for passive wireless applications [38], A passive wireless temperature sensor for harsh environment applications [39], Investigation of SrB4O7:Sm2+ as a Multimode Temperature Sensor with High Sensitivity [40], Characteristics of Thermistors as Temperature Sensors on the Sensor Unit (SU-6803) and OP Amp Unit (OU-6801) [41], Sensor Application Trainer: Temperature sensors on the Sensor Unit (SU-6803) and OP Amp Unit (OU-6801) [42].

The purpose of this experiment is to simulate 40 datas of temperature sensor from 8 groups in 5 replications.

METHOD

The research with the theme of thermistor characteristics as a temperature sensor on the Sensor Unit (SU-6803) and OP Amp Unit (OU-6801) in the Sensor and Transducer Laboratory of the Department of Physics, FMIPA IPB Bogor [41-42]. Experiment Steps and the Apparatus Installation follow the steps of the previous research with cooling process and heating process steps on the temperature sensor [41-42].

RESULT AND DISCUSSION

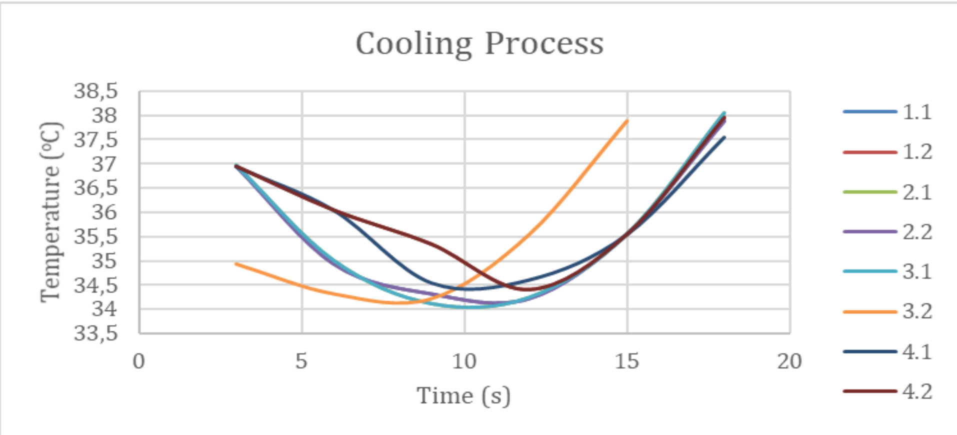

FIGURE 1. Cooling process for 8 data

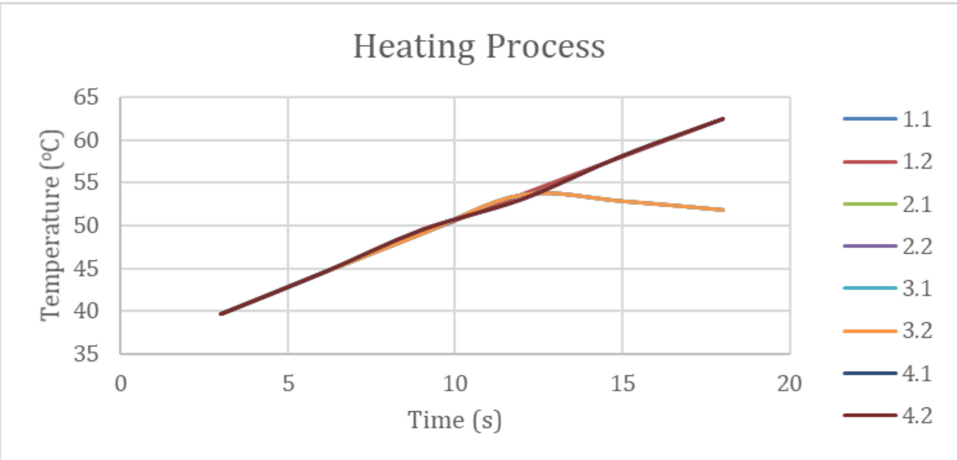

FIGURE 2. Heating process for 8 data

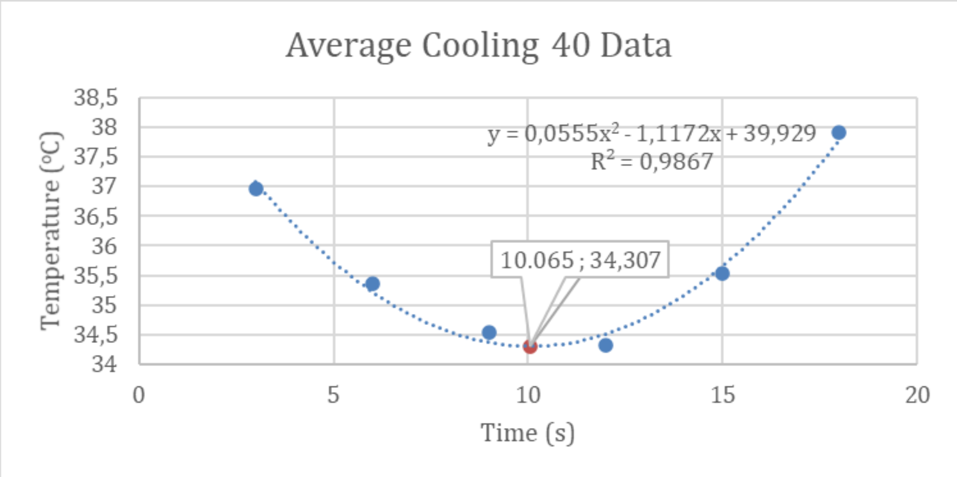

FIGURE 3. Average Cooling Process

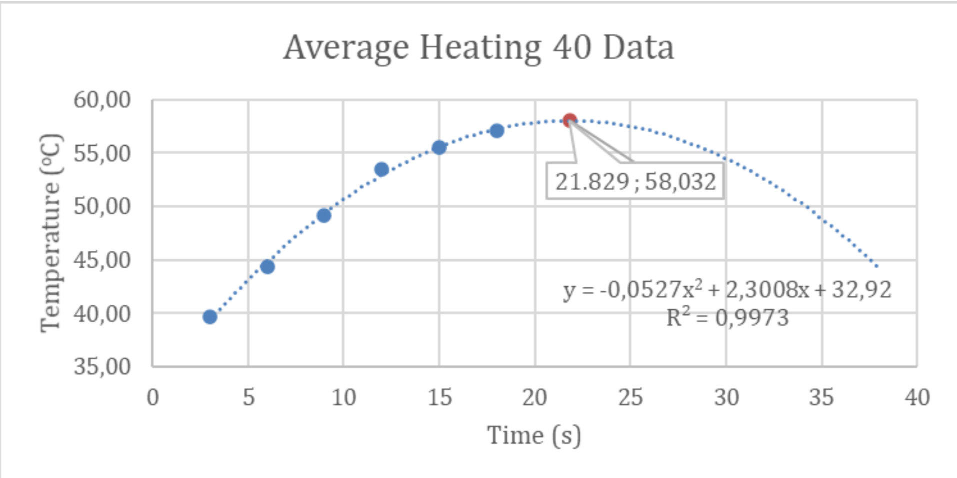

FIGURE 4. Average Heating Process

TABLE 1. Curve Analysis of the 2nd order Polynomial Facilitated by Microsoft Office Excel software.

No	Figure	Polynomial Curve	R2	Information	Optimum Point Coordinate
1.	Figure 3. Average Cooling Process	$y = 0.0555x^2 - 1.1172x + 39.929$	0.9867	Cupped up	(10.065 ; 34.307)
2.	Figure 4. Average Heating Process	$y = -0.0527x^2 + 2.3008x + 32.92$	0.9973	Cupped down	(21.829 ; 58.032)

CONCLUSION

Has succesfully conducted an experiment entitled Simulation of 40 units temperature sensor data with 5 repetitions for 3 to 18 seconds. The results of this experiment are graphs which represent the relation of time (in second) at the x-axis and average heating or cooling process (in celcius degrees) at the y-axis. The graphs form cupped up quadratic function for the cooling process and cupped down quadratic function for the heating process.

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