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This project is an experimental attempt in designing a working instrument which utilizes the thermal priorities of a dioxide as a temperature meter and controller. The first chapters of the project report discuss into detail the physics of semiconductors and through mathematical analysis the temperature effect of the semiconductor is realized. In particular a semiconductor diode is found to exhibit quite a linear relationship between temperature and its voltage drop across the junction in the forward direction. Experimental results are contained to verify this and some graphs are plotted for both germanium and silicon dioxides. From these experimental results a suitable semiconductor diode is chosen. This diode is a germanium OA95 in glass casing. Any other germanium diode could do provided that the size, durability, availability, sensitivity and suitable operating current and voltage values of the diode as a temperature sensor are taken into considerations. After establishing a suitable temperature sensing device, a practical design on an instrument which can act as a temperature sensor is, stage by stage, fully discussed. The design starts with the building of transducer unit which holds the diodes. The procedure of measuring the temperature of a medium is first decided. It is chosen that there ought to have two diode of almost identical properties. The purpose of one is to be placed in a fixed reference temperature whereas the other diode is placed in a medium whose temperature is to be occupied with the reference temperature. Thus the temperature readings obtained, strictly speaking, are temperature differences between the two diode, and this is conveniently detected as voltage difference between the anodes of two sensing diodes. To simplify the design, especially for calitration, we have chosen only two reference temperature. One is the 0˚c reference temperature, allowing the diode sensor to act as a thermometer which can read in ˚C from 0 to 50 ˚C. The other reference is the room temperature, where room is taken to be any fixed temperature between 20 ˚C to 30 ˚C. This scaling allows a maximum temperature difference reading of about 25 ˚C only. Due to the properties of the sensor the permitted range of temperature operation is between 0 to 50 ˚C. a study of the behaviour in which the differential voltage varies with temperature revealed that for a given temperature change their corresponded a very small voltage difference in terms of Millivolts. Therefore, an operational simplifier was essential to boost up the voltage output. Temperature control of any medium is achieved by using a Schmitt trigger switching circuit which drives an electrochemical relay. This relay has terminals for connecting heating or cooling electric systems. Selection of temperature to be controlled between 0 ˚C and 50 ˚C is achieved by varying switching levels of the Schmitt trigger. A meter calibrated in degree is coupled at the input of the Schmitt trigger. In spite of the unsolved problems faced during the design the instrument has the ability of controlling temperature to be a mean fluctuation of 0.2 ˚C, but it depends on the power of the heating and cooling agents. Its accuracy in reading temperature is about ± 1 ˚C. The simplicity and low cost of the design as compared to the work it

can possibly do warrants some future work on it, and if possible be adopted as a useful locally made instrument for laboratory use.