

## ABSTRACT

Diabetes Mellitus (DM) is a metabolic disease that can affect almost every organ system in the body. Early symptoms that can be known that a person suffering from diabetes can be seen directly from the effects of elevated glucose levels. Elevated levels of glucose in the blood reaches a value above 160-180 mg / dL, and urine diabetic containing sugar (glucose). In patients with type 1 diabetes, they must carefully guard their blood glucose levels. If glucose levels are too high will cause organ damage, while if it is too little, the body will lose the necessary fuel.

In this proposal, we will design a plethysmograph system with microcontroller-based method using an optical sensor to calculate the absorption rate on the fingertips. Optical sensor used is infrared light-emitting-diode (IR LED) and a phototransistor, coupled to each other face to face. IR sensor sends light to the fingers and the phototransistor receive a portion of the light reflective back. The reflective of light intensity depending on the viscosity of blood plasma. Thus, the viscosity of the blood plasma into the success parameter reflectance infrared that can be detected by a photodiode. With appropriate signal conditioning, small changes in amplitudo of reflected light can be converted into a signal. This data is then processed by a microcontroller to calculate the value of a person's glucose.

Results of the design was as expected, although in some parts there are still rudimentary, such as from the design of the amplifier is not very consistent with the calculation and filter test results still cut-off frequency shift. But the output signal is as expected, which is in the range of 0-5 volts so it can be processed by microcontroller.

**Key words:** Glucose, Diabetes Mellitus, non-invasive, plethysmograph