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Physiological Assessment for Straightforward Symptom Identification (PASSify): An Oral Diagnostic Device for Infants

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Abstract : The international mortality rate for neonates and infants has been declining at a disproportionally low rate when compared to the overall decline in child mortality in recent decades. A significant portion of infant deaths could be prevented with the implementation of low-cost and easy to use physiological monitoring devices, by enabling early identification of symptoms before they progress into life-threatening illnesses. The oral diagnostic device discussed in this paper serves to continuously monitor the key vital signs of body temperature, respiratory rate, heart rate, and oxygen saturation. The device mimics an infant pacifier, designed to be easily tolerated by infants as well as orthodontically inert. The fundamental measurements are gathered via thermistors and a pulse oximeter, each encapsulated in medical-grade silicone and wired internally to a microcontroller chip. The chip then translates the raw measurements into physiological values via an internal algorithm, before outputting the data to a liquid crystal display screen and an Android application. Additionally, a biological sample collection chamber is incorporated into the internal portion of the device. The movement within the oral chamber created by sucking on the pacifier-like device pushes saliva through a small check valve in the distal end, where it is accumulated and stored. The collection chamber can be easily removed, making the sample readily available to be tested for various diseases and analytes. With the vital sign monitoring and sample collection offered by this device, abnormal fluctuations in physiological parameters can be identified and appropriate medical care can be sought. This device enables preventative diagnosis for infants who may otherwise have gone undiagnosed, due to the inaccessibility of healthcare that plagues vast numbers of underprivileged populations.

Keywords : neonate mortality, infant mortality, low-cost diagnostics, vital signs, saliva testing, preventative care
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