Vita Seat: An Innovative Toilet Seat With Built-In UV Sanitization for Health Monitoring of Cardiovascular and Respiratory Diseases

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Cardiovascular and respiratory diseases make up 2 of the 3 leading causes of death globally amounting to more than 23 million people. More than half of these deaths are preventable with early diagnosis and treatment. 80% of the mortality occurs in low-income nations where preventative health monitoring is non-existent. Many barriers exist in people accessing health care facilities. Regular monitoring of cardiovascular and respiratory health is sorely lacking. This is due to lack of easy and unintrusive monitoring technologies. Additionally, there has been an increase in health issues related to prolonged sitting on toilet seats. To combat these issues, a highly affordable smart toilet seat, the Vita Seat was developed, to monitor ongoing health vitals like pulse, blood oxygenation, and temperature. The toilet seat contains a set of 6 sensors with Arduino Nano microcontrollers that track the key vitals. An embedded RP2040 in the seat cover contains a set of 3 circuit boards with 4 UVC LED lights each to sanitize the toilet. A timer in the Vita Seat warns users of prolonged time on the toilet seat. Data from multiple Vita Seat users was tracked and displayed using a mobile app. Notification of health data abnormalities to caregivers and family members of the elderly provides real time access to monitor their health trends. This completely unobtrusive mechanism of gathering data while people perform daily routines and reporting abnormal readings provides an early warning mechanism for people to seek immediate medical help. The Vita Seat readings for the pulse rate, blood oxygenation and temperature were on average 99% accurate compared to the expecting readings. The total cost to build the Vita Seat is $40, making this a very affordable and valuable health tracking tool.

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