P38 - Real-Time Portable Raspberry Pi-Based System for Sickle Cell Anemia Detection

4. Biomedical engineering education

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Abstract text*: Sickle cell anemia is a genetic blood disorder that affects millions of people worldwide. Early detection and monitoring of sickle cell anemia can contribute to effective treatment and improved patient outcomes. We present a novel real-time portable system for sickle cell anemia detection based on the Raspberry Pi platform. The system incorporates a 100x zoom USB camera, allowing high-resolution imaging of blood samples, and employs an artificial intelligence (AI) algorithm trained on a publicly available open-access dataset of sickle cell anemia images. The main objective of this research is to develop an educational and training tool for understanding the structural characteristics and detection of sickle cell. The portability of the system enables easy access and utilization in various educational settings, such as classrooms, laboratories, and clinical training environments. The Raspberry Pi-based system provides real-time image acquisition and processing capabilities, facilitating immediate visualization of blood samples on an attached LCD screen. The acquired images are processed using the pre-trained AI algorithm, which identifies and highlights sickle cells in real time. By using the Raspberry Pi's computational power, the system ensures prompt and accurate analysis, enabling efficient identification of sickle cells within the acquired images. The significance of this research lies in its potential to enhance the understanding of sickle cell anemia among students, healthcare professionals, and researchers. The real-time visualization and automatic detection of sickle cells provided by the portable system allow users to observe the characteristic morphology of the disease and gain valuable insights into its diagnosis. Furthermore, the portability and ease of use of the system make it suitable for both educational purposes and clinical settings with limited resources. The affordability and accessibility of Raspberry Pi technology make this system a cost-effective solution for training programs and workshops aimed at improving sickle cell disease awareness and diagnostic skills.