Liquid Level Analysis with Machine Learning
Team 23 - Capstone 2020-2021

Abstract

Sepsis is a life-threatening condition that is often elusive of timely diagnosis and therefore requires faster processing and detection time of bacteria in blood samples for quicker diagnosis and treatment. To shorten the processing time, our team has developed an imaging system component for automated medical diagnostic equipment. The component accurately identifies the liquid level of a patient blood sample that has been collected in a clear test bottle with a label and compiles barcode data scanned from the label with the liquid level analysis and stores the information in a unique patient file. It is highly effective (>96% accuracy) under different lightings and variable liquid levels conditions such as the presence of liquid foam. To ensure that our final design improves the accuracy and efficiency of the measurement of blood samples taken for sepsis detection, our team employed a Raspberry Pi 4 and HQ Camera Module in conjunction with a backend convolutional neural network (CNN) and real time image analysis programmed in Python 3 utilizing OpenCV. This project was made possible with the guidance and leadership of our mentors, Leon Tate and Gaurav Falia from Becton Dickinson, and Dr. Joe Huang from the University of Maryland Fischell Department of Bioengineering.