

Design of Bacterial Pathogens Identification System Based on Scattering of Laser Beam Light and Classification of Binned Plots

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Abstract : Detection and classification of microbes have a vast range of applications in biomedical engineering especially in detection, characterization, and quantification of bacterial contaminants. For identification of pathogens, different techniques are emerging in the field of biomedical engineering. Latest technology uses light scattering, capable of identifying different pathogens without any need for biochemical processing. Bacterial Pathogens Identification System (BPIS) which uses a laser beam, passes through the sample and light scatters off. An assembly of photodetectors surrounded by the sample at different angles to detect the scattering of light. The algorithm of the system consists of two parts: (a) Library files, and (b) Comparator. Library files contain data of known species of bacterial microbes in the form of binned plots, while comparator compares data of unknown sample with library files. Using collected data of unknown bacterial species, highest voltage values stored in the form of peaks and arranged in 3D histograms to find the frequency of occurrence. Resulting data compared with library files of known bacterial species. If sample data matching with any library file of known bacterial species, sample identified as a matched microbe. An experiment performed to identify three different bacteria particles: Enterococcus faecalis, Pseudomonas aeruginosa, and Escherichia coli. By applying algorithm using library files of given samples, results were compromising. This system is potentially applicable to several biomedical areas, especially those related to cell morphology.

Keywords : microbial identification, laser scattering, peak identification, binned plots classification

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