

Type of the Paper (Abstract)

# Multiple Camera Fluorescence Detection for Real Time PCR

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**Abstract:** The general polymerase chain reaction (PCR) amplifies DNA and analyzes the amplification results of the quantified DNA. The process of DNA detection by PCR requires four steps: DNA extraction, DNA amplification, electrophoresis and gel Image analysis. Recently, real-time PCR has been developed to detect DNA amplification in various ways. real-time PCR system based on fluorescence measurement detects DNA amplification to measure fluorescence brightness. In this system, there are a photodiode method including an optical system and a camera-based method to measure fluorescence brightness of amplified DNA. However, the conventional camera-based system is too expensive and difficult to reduce device size. In addition, owing to the simultaneous handling of fluorescence excitation and emission for dozens of tubes, there is a limit to the size, cost, and assembly of optics. Recently, cameras have been continuously developed, so that There are many cameras that are sufficient for image processing. In this paper, we propose a low-cost, compact fluorescence detection system for real-time PCR systems using open platforms camera. To simplify the optics, four low-cost small cameras were fixedly placed and entire tube was divided into four quadrants to minimize the filed of view. In addition, an effective image processing method was used to compensate for the reduction of the signal-to noise ratio of the overlapped image. The proposed system measured the fluorescence detection performance on the basis of the amount of DNA using various fluorescent substances.

**Keywords:** real-time PCR; fluorescence detection; open platform; image processing; raspberry pi;