

Measurement of Flame Temperatures using Ubiquitous Mobile Phone Camera

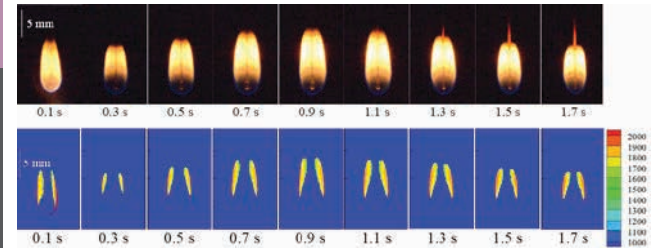
Problem Statement: Measurement of flame temperature is one of the cornerstones of combustion diagnostics. It directly impacts combustion efficiency and emission control, including mechanisms of soot formation and destruction. Commonly used non-intrusive methods of flame temperature measurements are expensive and may need significant technical expertise on the operator's side. They are also often inaccurate for sooty flames. The researchers have developed a solution to measure flame temperature using a mobile phone camera to overcome these shortcomings.

Uniqueness of the Solution: This technology is a low-cost, reasonably accurate solution for measuring the temperature of yellowish flames while combusting hydrocarbon fuels. Once the calibration is performed for a particular brand of camera-lens system, a cheap, cost-effective and robust unit is ready and capable of temperature

measurement. The technology is accessible to a wide population since smartphones are ubiquitous. The product being developed is an app that will work with compatible phone cameras. It can be made available to the end-user at a reasonable cost.

Current Status of Technology: The colour-ratio pyrometry (CRP) technique is validated in the lab using a commercially available CANON DSLR camera and a Samsung Note 10 camera. Predicted blackbody temperatures have been shown to be in good agreement with experimental observations. In addition, the flame temperatures for candles, McKenna flat flame, and droplet flames have been validated against thermocouple measurements using this technique.

Societal Impact: These environment-friendly sensors can be used in domestic and industrial applications where the monitoring of flame temperature is



essential. Additionally, these can also be used for measuring the temperature of solid/ opaque objects with temperatures over 1000 K. Contributing to a cleaner, more efficient combustion process helps build a sustainable environment for future generations.

Patent(s): Nil

Relevant Industries: Thermal/Detection Industries, Thermo Sensors.

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