Student's Name

Professor's Name

Course

Date

Integrated Low-Cost 3D Printers Capable Of Transmission of Fluorescence and Hyperspectral Imaging

Over time there has been a rise in demand for better and more cost effective data collection methods. The continued improvement of hyperspectral imaging technologies represents an area of study that has the potential to revolutionize data collection methods in a lot of research areas. In the past, hyperspectral imaging sensors were mainly found in aircraft setups. However, the recent rise in demand for affordable imagers provides room for an expansion of the technology to various fields and portable applications (Stuart et al. 2019 97). These new developments have resulted in the improved accessibility of low-cost hyperspectral sensing technology. The new imagers have proven to be far better and more accurate with high spatial resolution.

In the past, hyperspectral imaging has been used in laboratory applications, yet the imagers using this type of setting still prove to be bulky and very expensive, limiting the user base due to the lack of accessibility. The development of low-cost hyperspectral imaging components has resulted in the ease in development of a cost-effective setting for laboratory use. A traditional digital projector adopts a color wheel with just a handful of colors and is not suitable for encoding the spectral information (Xu et al. 2020 45). The components of a hyperspectral 3D imaging system are easily accessible for commercial use and are also easy to program to be suitable for the intended application.

A hyperspectral imager consists of rotary mirrors, a tiny spectrometer, and a Thorlabs Plano-convex lens. Spectral capture is achieved using the spectrometer. Different wavelengths and spectral resolutions with beams steer the rotary mirrors. The components of the hyperspectral imager are now available for commercial use due to technological improvements that have made them cheap, easily accessible, and less bulky (Rateni et al. 2017 45). The components can be easily programmed to fine tune the imager so that it performs smoothly.

The need for better hyperspectral imaging technology has led to improvements in the modern methods of data collection. Hyperspectral imaging is more accurate compared to older imaging technology. It is less costly, and offers improved data collection and improved accessibility by engineers since it is less bulky and has lower production costs. Improved hyperspectral imaging, from an engineer's perspective, yields better data collection (which is more accurate compared to the older imaging technology), costs less and allows better accessibility for the user base.

Works Cited

Rateni, Giovanni, et al. “Smartphone-Based Food Diagnostic Technologies: A Review.” *Sensors*, vol. 17, no. 6, 2017, p. 1453. *Crossref*, doi:10.3390/s17061453.

Stuart, et al. “Hyperspectral Imaging in Environmental Monitoring: A Review of Recent Developments and Technological Advances in Compact Field Deployable Systems.” *Sensors*, vol. 19, no. 14, 2019, p. 3071. *Crossref*, doi:10.3390/s19143071.

Xu, Yibo, et al. “A Hyperspectral Projector for Simultaneous 3D Spatial and Hyperspectral Imaging via Structured Illumination.” *Optics Express*, vol. 28, no. 20, 2020, p. 29740. *Crossref*, doi:10.1364/oe.402812.