Development of a cost-effective IoT hyperspectral device for distributed and autonomous monitoring of vine crops

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Viticulture 4.0 has a growing interest for the development of interconnected sensors (IoT) helping the wine-growers through the decision making. The presence of sensors is steadily increasing especially for the optical proximal sensing. However, the costs for such sensors are not so affordable. Therefore, a cost-effective hyperspectral prototype will be designed, built and tested to drastically reduce the cost of these instruments by comparing it with commercial ones. For farmers, the cost limitations for the use of these instruments are not strictly related to the device itself, but to the specific applications. Indeed, even though the hyperspectral imaging technique can collect a large amount of data, the application of only one device (in some cases) is not enough to cover all the critical points that the company has to handle. As the production process in a firm, the field monitoring requires distributed systems to collect data and provide information. In this scenario, considering the application of several hyperspectral devices, the costs become prohibitive for most of the wineries and, therefore, the research is moving toward the development of hyperspectral solutions taking into account a considerable cost reduction for distributed stand-alone applications. The project will focus on the application of the hyperspectral prototype (target TRL 5 at the end of the project) for the evaluation of grapevines water and phytosanitary status. Considering the application of this sensor in real operating conditions, the device will integrate predictive models and a graphical user interface to allow the end user to take decisions in real time.

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