KdUSTICK: Low-Cost instrumentation (DIY) to asses the water transparency connected by the Internet of Things

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A critical parameter to assess the environmental status of water bodies is the transparency of the water, as it is strongly affected by different water quality related components (such as the presence of phytoplankton, organic matter and sediment concentrations). One parameter to assess the water transparency is the light diffuse attenuation coefficient (Kd).

In recent years, the citizen science concept has emerged as a cost-effective environmental monitoring approach. The latest technological advances in embedded systems and sensors also enable volunteers (citizens) to create their own devices (known as Do-It-Yourself or DIY technologies) to increase the number of environmental observations, both in time and space. With this idea, our research group has created the KdUINO, a DIY moored instrument that measures Kd.

The first KdUINO versions were designed to measure the Kd of the Photosynthetically Active Radiation (PAR) in marine areas, where the optical depth of the water column can reach several tens of meters. Now, within the framework of H2020 MONOCLE project, our group is redesigning the KdUINO, mainly to retrieve Kd from near surface measurements. The new KdUINO will have multispectral capabilities, being able to estimate the light extinction coefficient also in the RGB bands.

The new design of KdUINO also improves its usability in terms of facilitating its construction, maintenance and operational use.
The new version has improved it the connectivity to the Internet as well. The instrument will be able to transmit data using the Internet of Things (IoT) networks, such as LoRaWan and Sigfox. In particular, our research group participates in the initiative "The Things Network" (TTN), a global, crowdsourced, open, free and decentralised IoT network based on LoRaWAN. The new KdUINO instrument has been designed to connect to TTN nodes, bringing public coverage over the coast where the TTN is active.