Electronic Supplementary Information (ESI)

Green-PADs array combined with chemometrics for pH measurements

RGB detector

The RGB detector was developed to simplify the RGB readings and allow laboratory and in situ analysis.

In order to obtain a functional and efficient device, some design constraints were needed:

- Maximum overall dimensions, in order to be portable
- Easy-to-find components
- Multi-analysis possibility (up to 6 PADs that can be consecutively read)
- Only one needed sensor for the reading of the RGB
- Standardization of measurement
- Easy assembly and maintenance
- User-friendliness
- Environmental sustainability
- Low cost

The functioning logic must be easy to understand, reliable, and durable, allowing repeatable readings in an enclosed setting with well-defined lights and sample placement.

Arduino UNO was the chosen hardware, while we selected the sensor TCS3200 for its ability to work in the visible spectrum and to receive the reflected light from the sample. A touchscreen display was used to have a more user-friendly interface.

Once the project was completed, we proceeded to build the mechanical structure with 3D printing through PLA+, and the components fabricated are:

- Box and cover
- Partition to obtain a darkroom
- Sample holder
- A couple of gears

Since the aim was to obtain a portable device, Li-ion batteries were needed to have power.

The RGB-detector works through the sensor TCS3200 that reads the colors and sends a quadratic wave, with frequency directly proportional to the reflected light of the sample, to the Arduino hardware. The latter receives times that need to be associated with R, G, and B values through calibration with colored papers of known RGB indexes.

Figures S1 and S2 show, respectively, a picture and the placement scheme of the RGB detector.

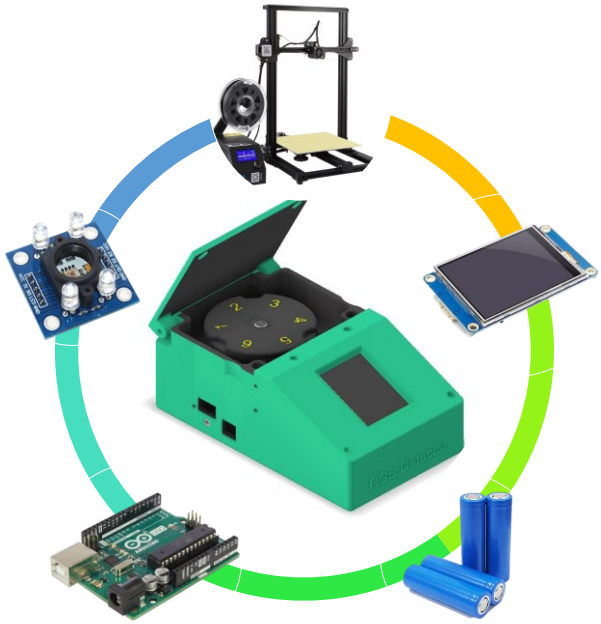


Figure S1. Picture of the RGB detector [1]

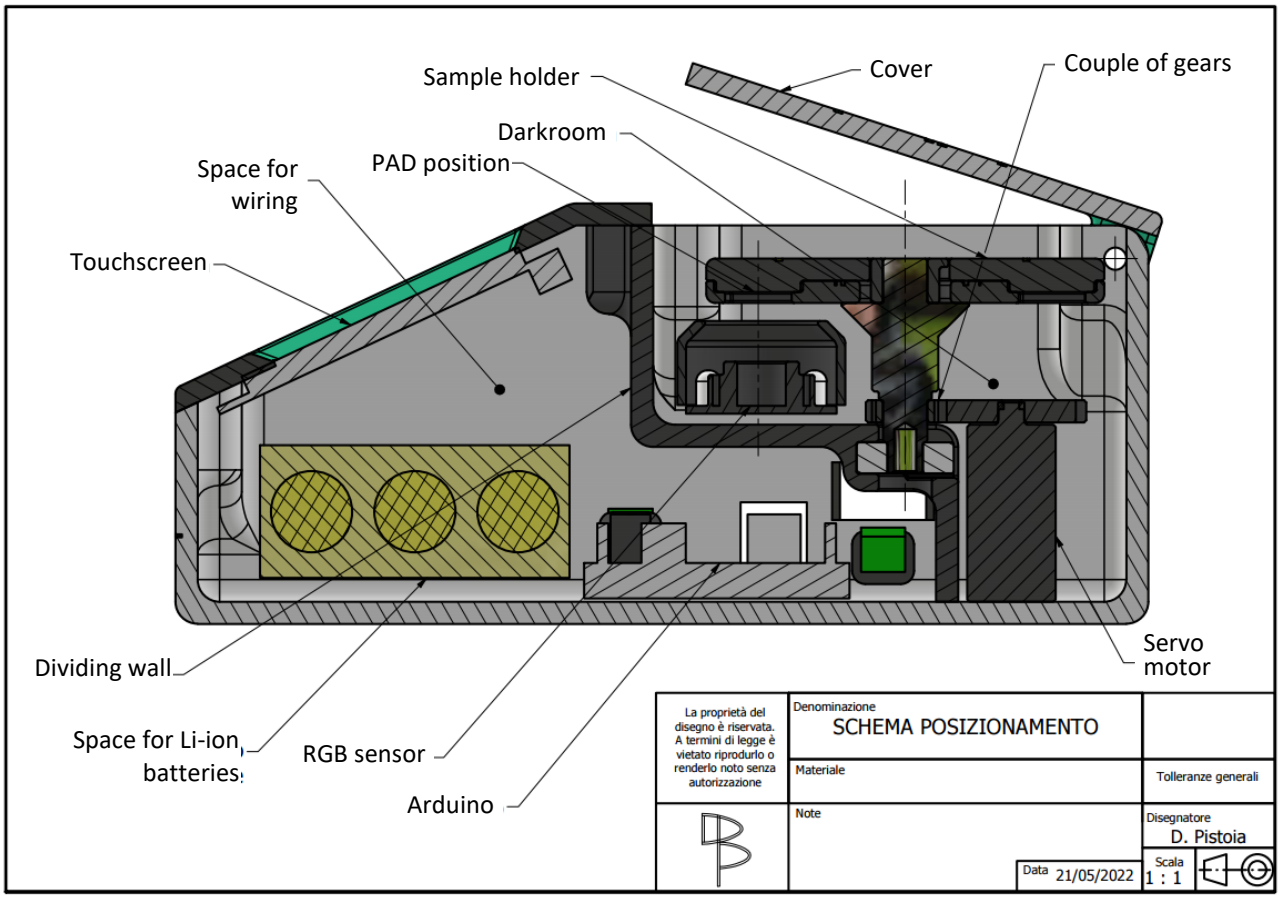
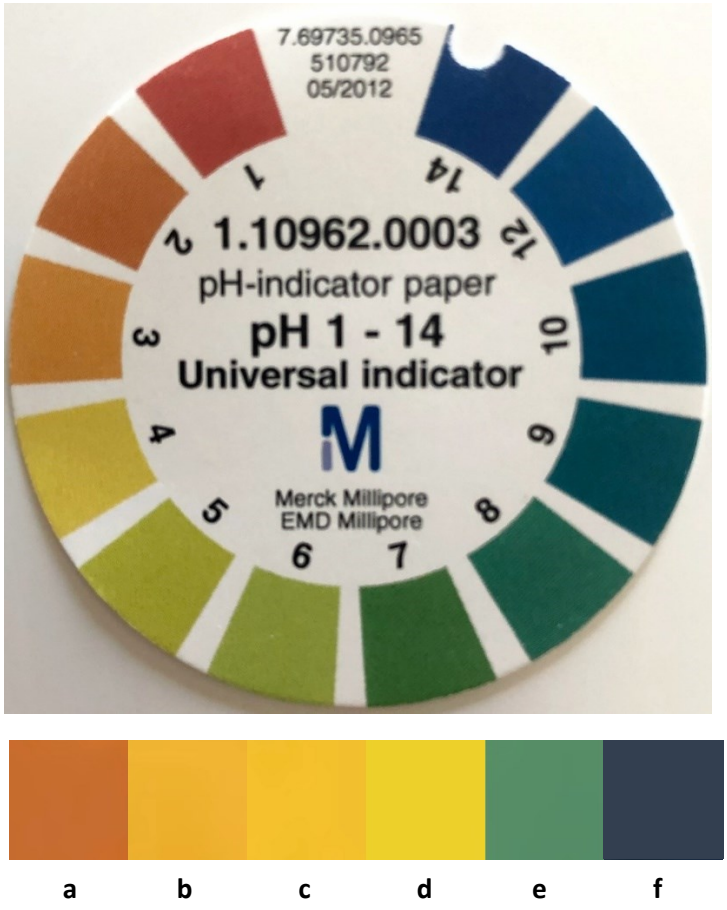


Figure S2. Placement scheme of the RGB detector [1]

1. D. Pistoia, B.M. Pazzi and G. Alberti, Green-PADs@RGB detector for pH measurements, *Green Chemistry and Sustainable Engineering (GreenChem-22),* Rome (Italy) 20-22 July 2022.



a = Schweppes

b = Sprite

c = White wine vinegar

d = Tropical aloe vera

e = Tap water

f = Ammonia cleaner

Figure S3. pH Color chart of the Litmus paper and color of the Litmus paper after contact with the samples.