1 Introduction

A standard definition for sensing could be [1]:

1. becoming aware of something via the senses
2. the perception that something has occurred or some state exists

Speaking about investigation or science is impossible without sensing. We need to sense to be aware of the reality; in science, we need to know exactly how is the reality to be able to model it. And we need to model it because the reality is too complex to be used without modeling. We need to notice every variation, to be able to understand it. But not only qualitative sensing is enough; we need numerical values to have a dimension.

The engineering profession has little room for improvement without measurements. An engineer must know the output of a measurement before he or she can manipulate it for a given purpose. Many years ago, people dealt with rulers and protractors to perfect geometry in structures. Today, advancements in technology have allowed measurements of complex systems that people previously thought were impossible.

In engineering applications, we could define sensing or sensory as the acquisition and measurement of data/information on some property(ies) of a phenomenon, object, or material by a device.

These devices are sensors, and its basic function is to measure, to read a bit of the reality and to dimension it; techniques involve both a direct measurement of this property – whenever it is possible – or amassing knowledge pertinent to environments by measuring, for example, force fields, electromagnetic radiation, lasers, thermal devices, seismographs, magnetometers, gravimeters, and other instruments.

The basic function of a sensor is to measure some feature of the world, such as light, sound, pressure, or pH and convert that measurement into an electrical signal, usually a voltage or current. By the use of sensors and transducers, the properties of a system can be measured by observing the change in the properties of another. Typical sensors respond to stimuli by

changing their resistance (photocells), changing their current flow (phototransistors), or changing their voltage output (pH sensors). The electrical output of a given sensor can easily be converted into other electrical representations, which can be used, measured, dimensioned and interpreted. It is the user, the scientist or the robot in charge, who has to be aware of the meaning of this value.

So why do we need these things? We do not need them for survival, but, for continuing improvement in technology, sensors and transducers are a must. Sensors are applied in most fields; like medicine, chemistry, weather prediction, and also robotics and automatics. The possibilities are limitless. Any abnormality that causes a change in a measurable property could be an interesting aim of study or a determining variable to control, and this could open the pathway for developing new transducers and sensors.

Some sensors, related normally to physical values as voltage, current, or temperature, are characterized by using good or stable measurement techniques, due to the stable nature of the property itself. Chemical sensors, on the other hand, are much more problematic, as the measured property is a concentration of a substance, which is not so stable and depends strongly on other physical characteristics. .

The aim of this project is oriented to the study of the viability of, through the use of new materials (hydrogels), determinate the concentration of substances. Concretely, it opens the basic investigation to study the pH value - it is to say the hydrogen ion - H^+- concentration – by building an automatic "smart hydrogels" test bench.