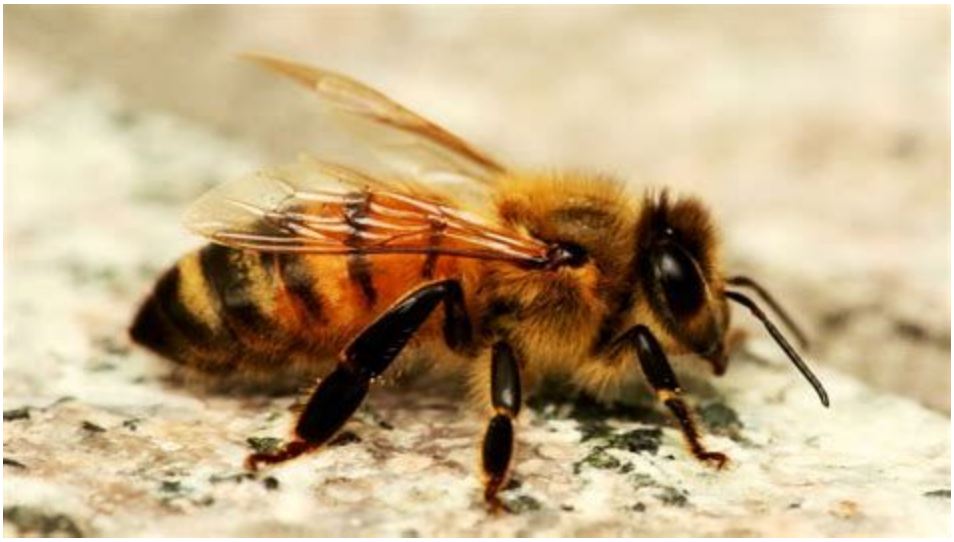
Bill of specifications

OPEN RUCHE



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I - Context of the project Open Ruche

A bee hive is an ecosystem on its own. Their inhabitants, marvels of evolution, have created a complex architecture. They maintain an environment which obeys to strict conditions and to which they dedicate a life of hard work as well as a blind devotion.

It is therefore not surprising that bees, in order to perpetuate their cocoon and their precious sweet nectar, seek to isolate their nest from the hostility of the outside and from the gluttony of other species. One of them, however, Man, has created apiculturists. Fine connoisseurs of these small flying insects, the spiritual heirs of Arista have been passing on techniques since the Mesolithic period, allowing them to take advantage of their work to the point of transforming artisanal harvesting into farming. But art evolves with techniques and with Time.

Indeed, centuries of urbanization and pollution have given birth to an unprecedented culture of environmental protection and a need for well-being through the reintroduction of vegetation in our cities. However, there is no plant flourishing without a pollinator, the most famous representative being bees. Thus, beehives are blooming on the roofs of buildings and gardens.

But how do you know the health of foragers? Traditionally, it is necessary to equip yourself with a specific protective suit, which is often uncomfortable, in order to be able to assess the situation.

Excessively aggressive or, on the contrary, amorphous bees, sluggish productivity and empty cells can, depending on the season, reflect the malaise of these insects due to disease, pollution or the wrong location of the hive.

These parameters and constraints, subjective, incomplete and based on experience, can discourage novice beekeepers.
However, today we have access to a technology that is affordable, compact and precise enough to analyze a multitude of physical parameters in and around a beehive. Which ones and how? These are the questions we will answer in this document.

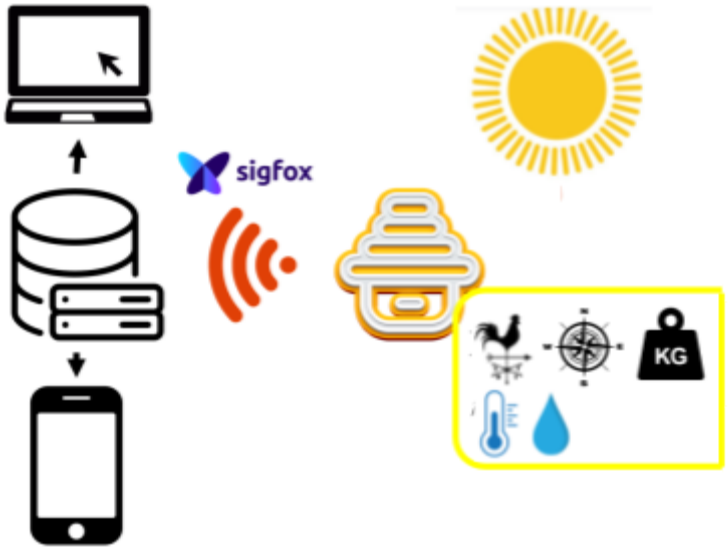
II - What needs for apiculturists?

1) Objectives

The goal of our project is to create an energy self-sufficient and easy-to-install kit for beehives located in an outdoor area. This kit shall contains a multitude of sensors, at least the following ones:

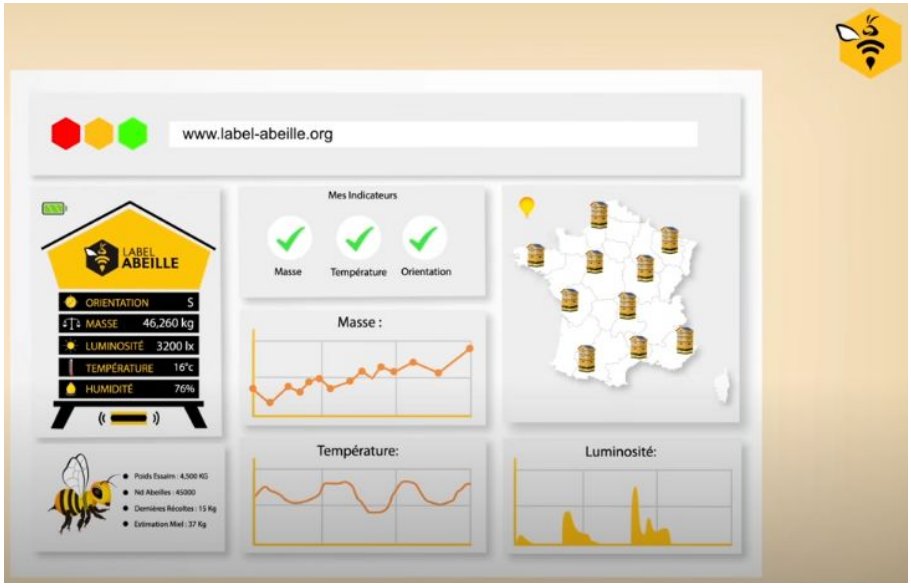
Inside the beehive	Outside the beehive
Thermometer	Weight sensor
Hygrometer	Thermometer
	Hygrometer
	Anemometer
	Weathercock
	LPWAN Transmitter (Sigfox)

All the data collected by these sensors will be sent to a remote server via a wireless link. They will be accessible via a web page accessible from PC and smartphone.



Principle diagram of the project

Thus, the user will always have in his hand a tool allowing him to access all of these parameters. Data processing tools will be available so the apiculturist can, on the long term, associate fluctuations of some quantities with the health of its foragers.



Extract from the video of Label-abeille©

2) Assessment criteria

N°	*Title*	*Characteristic*	*Choice criteria*	*Level of precision*	*Importance*
1	Weigh the weight of the hive	Mass	Range of measure	3 - 120 kg .100g	1
2	Communicate wirelessly with a server		Quality of the network	≈ 120 msg/day	1
3	Measure the inside temperature of the hive	Temperature	Precision	+/- 0,3 °C	1
4	Measure the outside temperature of the hive	Temperature	Precision	+/- 0,3 °C	1
5	Measure the inside hygrometry of the hive	Humidity	Precision	+/- 2%	2
6	Measure the outside hygrometry of the hive	Humidity	Precision	+/- 2%	2

7	Measure wind speed	Speed	Precision	Less than 2,5 km/h	2
8	PC / Smartphone compatible interface		Lightness		2
10	Tools for analyzing the data collected		Exhaustiveness		2

3) Constraints

The budget for the realization of the first prototype is 150 € while the budget for the second prototype is 50 €. This budget can be adjusted if relevant technical choices require it.

4) Competitors and alternatives

Recent progress in the field of embedded systems as well as in wireless communication has allowed an explosion of connected devices. Beehives are no exception. Individual initiatives are noteworthy but also commercial offers from start-ups such as label-ruche © or HELP-BEES ©. If all seem to offer an equivalent level to ours in terms of connectivity and ergonomics, we can make the difference by offering more sensors, for a more reasonable price, although we have only few elements that can allow us to estimate the approximate price of our kit.