

# Schrödinger Bees by Igor Muttik (imuttik@outlook.com)

Like a Schrödinger's cat, a wintering bee colony exists in a superposition of states, neither alive nor dead until observed by the beekeeper during the first spring inspection. In order to reduce the uncertainty, beekeepers do hefting, listen to the hive sounds and sometimes even apply modern technologies.

I recently saw an advertisement for “Remote Hive Monitoring” from [HiveBeat.co.uk](https://hivebeat.co.uk) and it caught my attention as I am running my own temperature and humidity monitoring system to keep an eye on the hives. I built it with ready-made off-the-shelf components, it is significantly cheaper than a system from HiveBeat, requires no subscription and provides full control. It works great with hives nearby in the garden.

After some research I chose temperature and humidity sensors from a German company - SwitchBot (available via Amazon or directly from <https://switch-bot.com>). Sensors are 28x20x66mm in size (see picture with AAA batteries for size comparison), they can work outdoors (IP65 waterproof rating), and they use two AAA batteries providing enough juice for at least one year. These sensors are very reasonably priced and fairly often sold with a discount (e.g. right now there is a -15% deal on Amazon for 3 sensors at £26.99: <https://www.amazon.co.uk/SwitchBot-Hygrometer-Thermometer-Bluetooth-Refrigerator/dp/B0BVZC9Q31>).



To house sensors in hives, I built special frames with 25mm-thick Celotex board. These frames sit on the side of the brood box and double as winter insulation. The sensors are covered with a metal mesh to prevent bees propolis-ing a small hole used to measure humidity.

You will benefit from adding a “hub mini” from SwitchBot which provides a permanent and stable Bluetooth link to sensors within <30-40m range (currently £33.98: <https://www.amazon.co.uk/SwitchBot-Control-Universal-Conditioner-Connect-White/dp/B07TTH5TMW>).

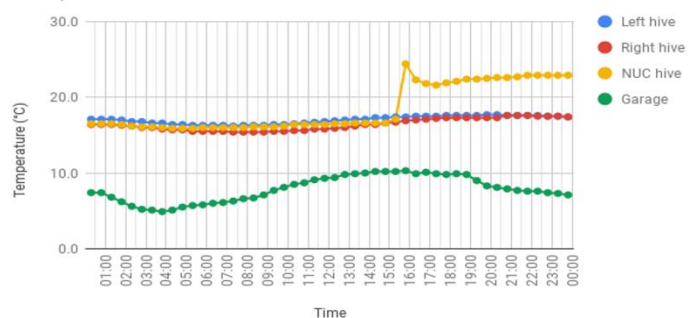
To finalize the setup, install the SwitchBot app (instructions come with the sensors) and connect the hub to WiFi. If nothing is working at this point, then you probably forgot to remove metal foil from the back side of the Celotex board, as it blocks Bluetooth radio waves! Fix it and you will be able to inspect current temperature and humidity in any hive (as well as daily, weekly and monthly graphs)

from your smartphone. With a hub it'll work even when you are away from home!



I then went a little further and added some automation via a script in Google Sheets. It collects data from all sensors every hour and Emails me summary graphs every day. Additionally, I will get alerts when temperature or humidity goes into a danger zone. You may need some IT skills to make it work but it is not rocket science – find detailed steps and script code in <https://github.com/drmuttik/hivemonitor>. Enjoy!

Temperature for 16-Nov-2024



Daily Minimum Temperatures

