Schrödinger Bees

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. To reduce the uncertainty, beekeepers do hefting, listen to the hive sounds and sometimes even apply modern technologies.

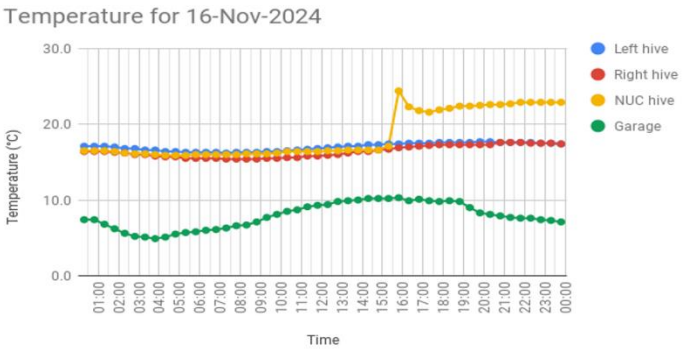
In November's newsletter there was an advertisement called "Remote Hive Monitoring" from HiveBeat.co.uk. It caught my attention as I am running my own temperature and humidity monitoring system to keep an eye on the hives. I built it with ready off-the-shelf components, it is significantly cheaper than system from HiveBeat, requires no subscription and provides full control. It works great with the hives nearby in the garden.

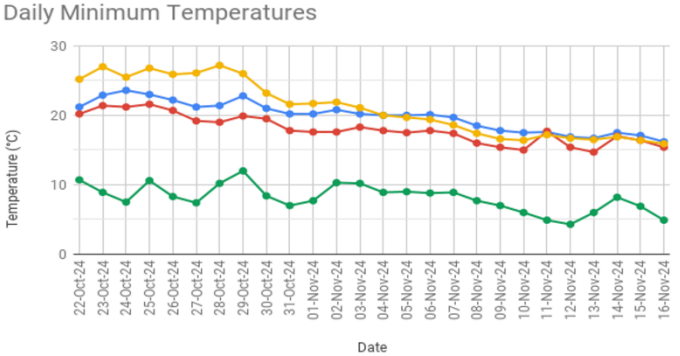
After some research I chose temperature and humidity sensors from a German company SwitchBot (available via Amazon or directly from https://switch-bot.com). Sensors are 28x20x66mm in size (see picture with AAA batteries for size comparison), they can work outdoors (IP65 waterproof rating), and they use two AAA batteries which provide 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 at the side of a brood box and double as winter insulation. Sensors are covered with a metal mesh to prevent bees propolising a small hole used to measure humidity.

Apart from purchasing sensors and building frames you will also need a "mini- hub" from SwitchBot which communicates with sensors via Bluetooth (currently £33.98: https://www.amazon.co.uk/SwitchBot-Control-Universal-Conditioner-Connect-White/dp/B07TTH5TMW). Using Bluetooth means that sensors should be in <30-40m range from the hub. If nothing works at this point, then you probably forgot to remove metal foil from the back side of the Celotex board, and it blocks Bluetooth radio waves!

To finalize the setup, you will need to connect the hub to your WiFi and install an app from SwitchBot (instructions come with the sensors). You will then be able to inspect current measurements as well as daily, weekly and monthly graphs of temperature and humidity in any hive 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 30 minutes and Emails me summary graphs every day. Additionally, I will get alerts when temperature or humidity goes into a danger zone. This step requires a bit of IT skills but is not rocket science – find detailed steps and script code in https://github.com/drmuttik/hivemonitor. Enjoy!

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