Lit Review – Microcontroller use in conservation

<https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.13128> This article mentions the iButtons used currently by Ben and how they are too expensive. They have limited scalability and in our case we want to have several, one in each nest. They don’t have replaceable batteries and parts and have limited data storage. Using an Arduino can be more flexible, modular and cheaper. This particular one uses an ESP8266. (consider other microcontrollers that can be used). The ESP has better features than an Arduino (clock rate, RAM, built-in Wi-Fi, more flash storage space). Can be programmed using Arduino IDE even, making it very easy to use. Just requires some additional setup for the breadboard and sensors. This could all be embedded on a PCB to allow quick roll-out. Much cheapers.

<https://academic.oup.com/bioscience/article/71/10/1038/6322306>

<https://idus.us.es/handle/11441/152607>

Title: Microcontroller Applications in Conservation: A Literature Review

Introduction:

The growing need for efficient and cost-effective monitoring systems in conservation has led researchers to explore alternative technologies, particularly microcontrollers. This literature review focuses on the utilization of microcontrollers, with a specific emphasis on the shortcomings of current technologies, such as iButtons, and the advantages offered by microcontrollers like the ESP8266, especially when implemented using platforms like Arduino.

Review of Existing Literature:

1. **iButtons Limitations and Challenges:**
   * The study by Ben (insert full citation) highlights the current use of iButtons in conservation, emphasizing their drawbacks. Notably, iButtons are deemed expensive, have limited scalability, and lack replaceable batteries and parts. Moreover, the restricted data storage capacity poses a hindrance, particularly in scenarios requiring multiple devices, such as one in each nest.
2. **Advantages of Microcontrollers, with a Focus on ESP8266:**
   * Microcontrollers, such as the ESP8266, emerge as promising alternatives. Unlike iButtons, the ESP8266 is characterized by its flexibility, modularity, and cost-effectiveness. Its enhanced features, including a higher clock rate, RAM, built-in Wi-Fi, and increased flash storage space, make it a compelling choice for conservation applications.
3. **Arduino Integration for Ease of Use:**
   * The ESP8266's compatibility with Arduino IDE adds to its appeal, simplifying the programming process and rendering it user-friendly. This integration allows for straightforward development, even for those with limited programming experience. Additionally, the adaptability of Arduino facilitates the incorporation of various sensors and peripherals, contributing to the overall flexibility of the monitoring system.
4. **Implementation Potential:**
   * The potential for embedding the entire microcontroller system, including the ESP8266, sensors, and associated components, onto a printed circuit board (PCB) is highlighted. This approach ensures a quick and cost-effective rollout of the monitoring system, further reducing expenses compared to traditional iButton setups.

Conclusion:

In conclusion, the literature reviewed underscores the limitations of current conservation monitoring technologies, particularly iButtons, and presents microcontrollers, notably the ESP8266, as a viable and advantageous alternative. The integration with Arduino enhances usability, while the potential for PCB implementation offers a scalable and cost-effective solution for nature conservation monitoring..