Monitoring Environmental Status of a Mesocosm Using an ESP32

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Remote monitoring of the environmental status of a mesocosm would allow for immediate real-time data collection with customisation using a variety of sensors depending on the experiment or monitoring needs. Teachers and professors could use this inexpensive customisable device as a teaching tool, as well as for smaller studies of mesocosms or monitoring of a specific environment. This study centered around the creation of a wireless device using an ESP32 and various sensors which collects, records and reports the CO2, air, and water temperature, humidity, dissolved oxygen and nitrate levels in an enclosed mesocosm. The program allows for any sensor using a supported communications protocol to be used for measurements. This allows for the sensors to be swapped depending on the situation. The program is optimised to use a minimal amount of power by avoiding unnecessary wireless transmissions and going into a hibernation mode using a timer interrupt between sample times set by the user. The data is stored in a CSV file on the SD card in the device and can be downloaded and cleared for space from the web interface. As in specific scenarios, it may be desirable to restrict access to changing the configuration of the monitoring device but allow access to viewing the data. A password can be applied which would be required for all configuration changes. This would be beneficial in a classroom setting where students would be able to view and download the data but not change the configuration.

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