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Project Proposal

Problem:

Succulents, sometimes touted as the easiest plants to grow, are not actually foolproof. In fact, most people assume that because succulents are so forgiving it doesn't matter how often you water them. This is not the case, and succulents often die because they are not properly taken care of. Too much water will drown the plant and cause it to rot, and too little water will starve the plant and prevent it from growing. While water is not the only factor that impacts plant health, it is likely the most significant. Properly watering succulents, even though it does not have to be done frequently, can result in healthy plants that don't require much effort to grow.

Watering succulents the right amount can be more difficult than it seems. One cause of this is that people simply don't know how much water is enough. Some people think it is fine to water succulents as much as other common house plants, but this is too much. Other people neglect them, thinking water is not that important, but that isn't acceptable either. Succulents should be planted in well-draining soil and should be watered when the soil is dry. This typically takes about a week. A common issue is that the comparatively long time span between watering allows people to forget to check and forget to water. This project attempts to solve this problem by monitoring soil moisture levels and sending text message reminders when it's time to water again. A web interface would also allow people to check the status of their plants' soil moisture levels.

Background:

Smart gardening is not a new concept, and many products have been created for this purpose. GreenIQ Smart Garden and Edyn Smart Garden Sensor are two examples of products that can automatically monitor and water a garden. Despite those devices performing well in an outdoor garden environment, neither are suitable for small-scale indoor use, and neither are specifically made for succulents. On top of that, both cost at least one hundred dollars.

Another promising smart gardening product is FarmBot, a CNC-like farming device that automates everything from seeding to harvesting. FarmBot is fully programmable and customizable, and it combines various sensors with weather and plant database data to automate fine-tuned plant care. FarmBot could be customized for caring for succulents, but again, its high cost makes it prohibitively expensive. It would also be overkill for growing a small number of succulents.

Solution:

A simple solution to this problem would be to equip multiple Raspberry Pi controllers with soil moisture sensors and an internet connection. After determining an acceptable moisture level, possibly gleaning this information from preexisting open source farming data or by collecting moisture measurements in a trial-and-error fashion, the Pi's could send text message notifications through Twilio's reliable text message API when it was time to water again.

In addition to these features, a web portal could be created for monitoring current soil moisture data from the various sensors connected to the various Pi's. The portal could also list historical data as well as an estimated time until the plant would need to be watered again. This solution addresses the issues posed by the original problem stated at the beginning of this proposal. An architecture diagram of this solution is included below.