Sustainability of a Hydroponic Farm via Raspberry PI

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Project goal

- We plan to sustain a hydroponic farm via a Raspberry Pi by providing nutrients through the water and making sure the water does not stagnate
- Furthermore, we provide other information on the plant through visual monitoring as well as monitoring PH and water level.
- Detect hazards such as persistent low light and pest detection through sensors.

Progress/Challenges

- Have most sensors set up, waiting on waterlevel and ph detector.
- Have a rough webapp set up for displaying sensor output.
- Have temporary water pump system set up and circulating water.
- Have relay between webapp and sensors set up.
- Have machine vision edge detection working
- Challenges include the prohibitive cost of ph measuring kits compatible with raspberry pi and delays in funding
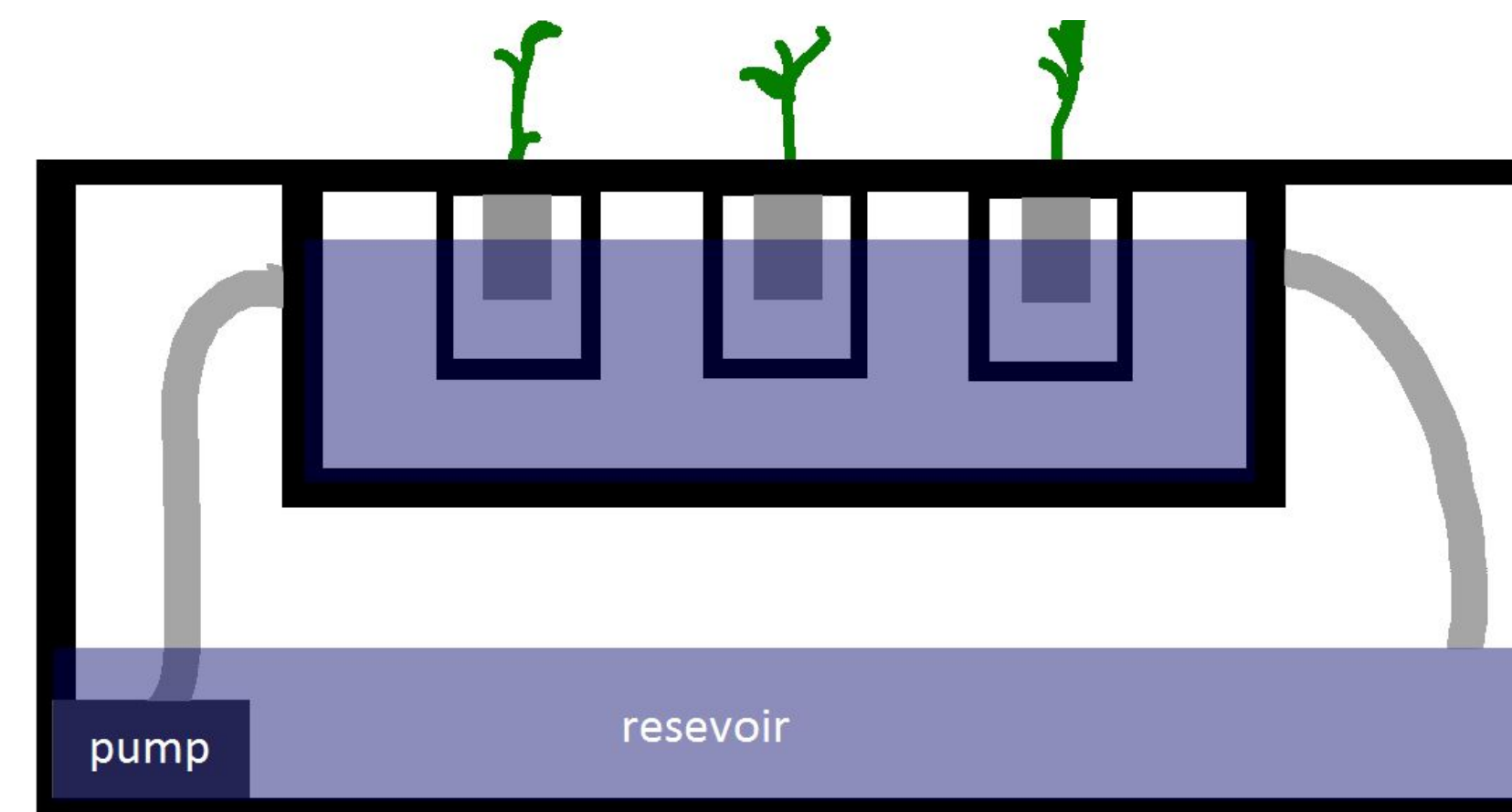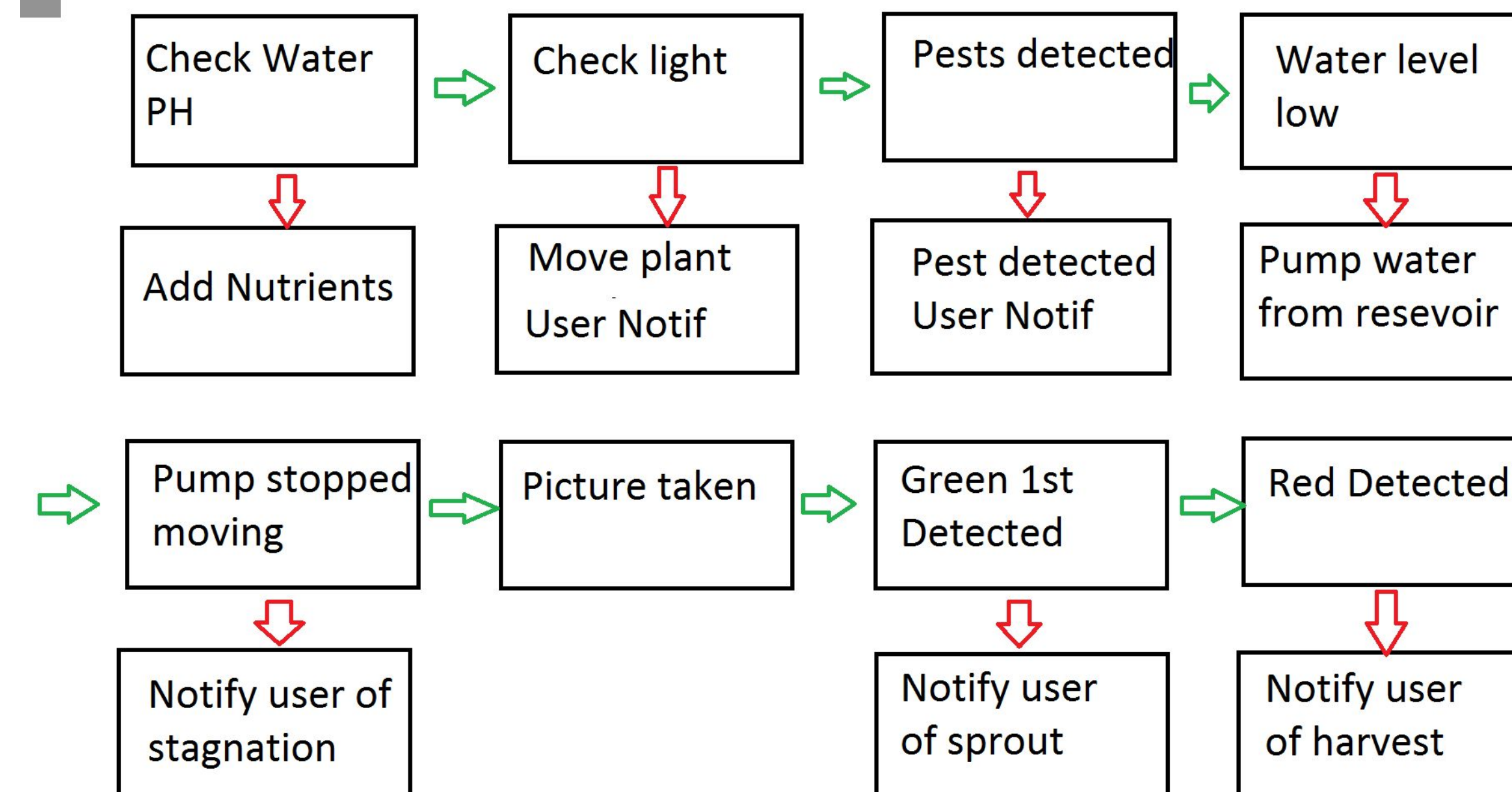
Hydroponic Water System Diagram
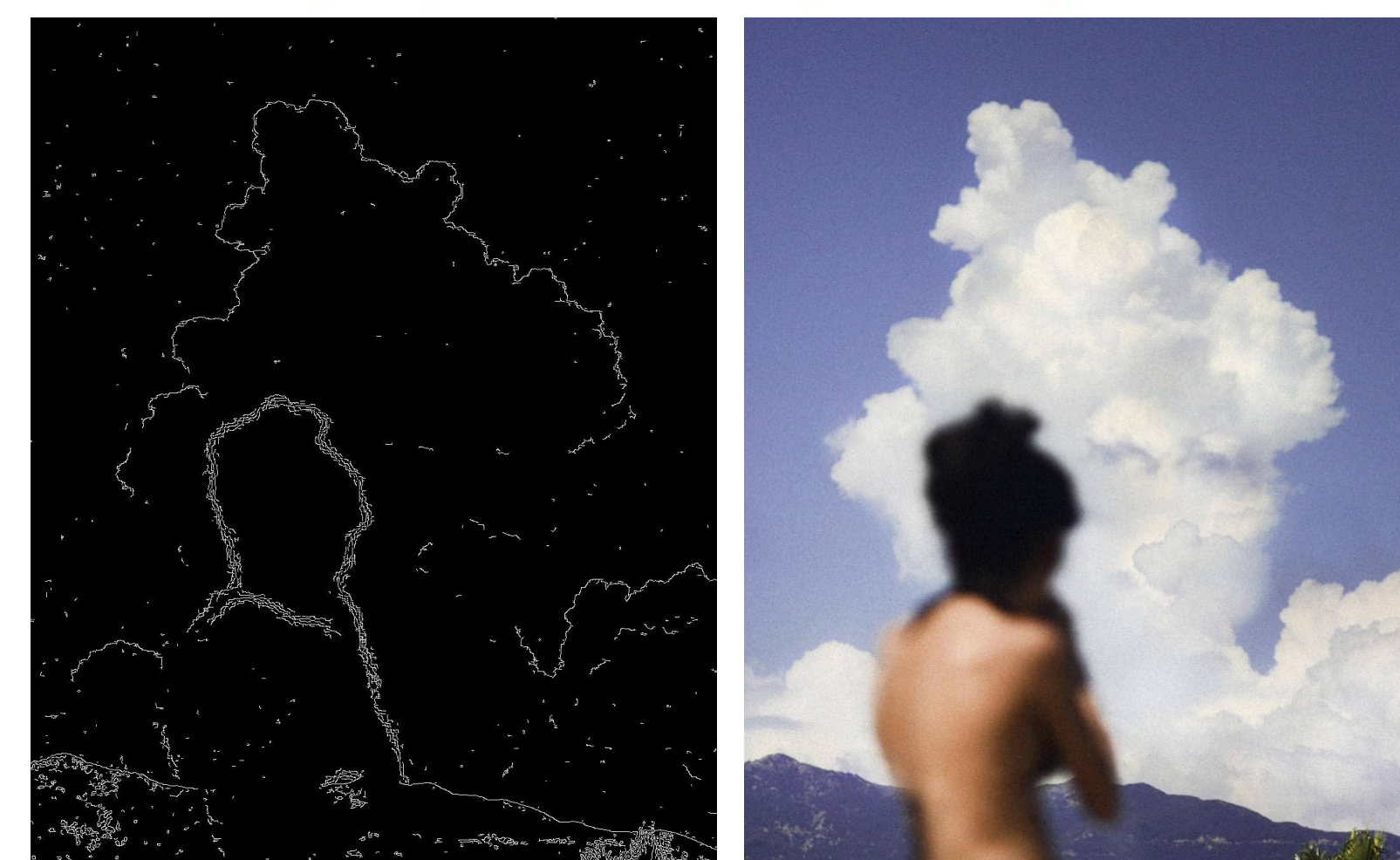
Example output of edge detection program to help enable taking plant measurements

Implementation

- All water and nutrients are recycled in a closed pump system.
- System is also closed to prevent further loss due to evaporation.
- Plants roots will grow in more compact and space conservative due to abundance of nutrients.
- Plant roots are supported through gravel but 100% of nutrients come from water table.

Future Work

- Replace current pump with raspberry pi pump. Have the raspberry pi pump system running with no leaks and effectively reaching all plants in the system.
- Test the system's effectiveness at hazard detection and see if there is any need for fine tuning.
- Set up camera to take pictures on regular intervals and set up notification system of desired goals.
- Integrate water ph and water level sensors into the system so that nutrient levels and pump efficiency can be monitored..