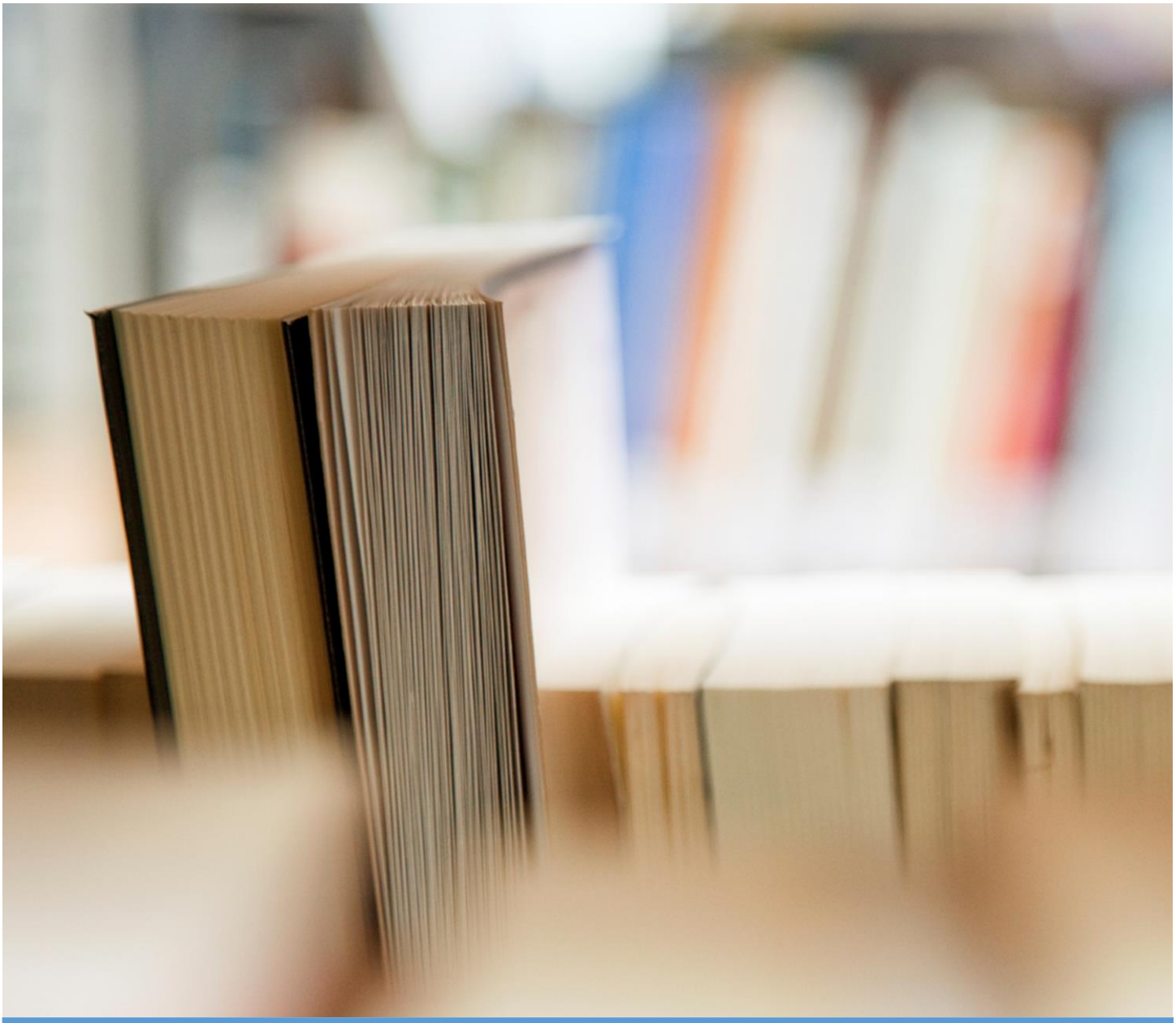


Aquaponics – Physiochemical Properties Monitored

Project Plan

3/5/20

Jose Armando Aguilar
Jonna Jääskeläinen
Lesedi Mmola
Marius Smit
Matthys Van Rooyen

The Proposal

A Raspberry Pi 3b+ will be used as the monitoring station. A breadboard will be connected to the Pi with a Temperature sensor, Water Level sensor and pH Meter and Probe. We will require a number of smaller connectors for the circuitry – resistors, jumpers and wires. Below is a table indicating a rough estimation based on current needs and prices:

Product	Price
Raspberry Pi 3b+	R0 (Already own one)
HC-SR04 Ultrasonic Sensor (Water Level)	R41 (via botshop.co.za)
PH probe Electrode BNC connector (pH)	R394 (via botshop.co.za)
PH prober module (pH)	R421 (via botshop.co.za)
Waterproof DS18B20 Digital Temperature sensor + Resistor 1M	R40 (via pishop.co.za, currently out of stock)
Breadboard	Currently unknown
Cables, resistors and jumpers	Currently unknown

Prices of the breadboard and additional connectors are still unsure as we will need to design the system first before we can have any idea on what need to be procured.

The readings from the sensors will be retrieved by Python on the Raspberry Pi running the Raspbian Linux OS. The script will remain in a constant loop and send information on the sensor's readings to an MQTT broker. Every 10/15 minutes, the readings will also be sent via URL parameters to a PHP script hosted on a shared hosting service.

The shared hosting service will provide a configured server instance on which our database, scripts and website is hosted. The server runs on Linux with MySQL and PHP pre-configured. Additionally, an MQTT Broker must be used to solve our need for a server that offers a websockets connection for live readings. Below is the costs involved with the two services:

Service	Price
GoDaddy Linux Shared Hosting	R180 for 3 months, R540 for 1 year
CloudMQTT	$5/month; R77 for 3 months

Finally, the readings will be shown to the user through a web app UI. Our developers will use HTML, CSS, JavaScript and whichever JS and CSS libraries they want. The web app will focus on being designed for both mobile and desktop use and to display the readings graphically in an intuitive way.

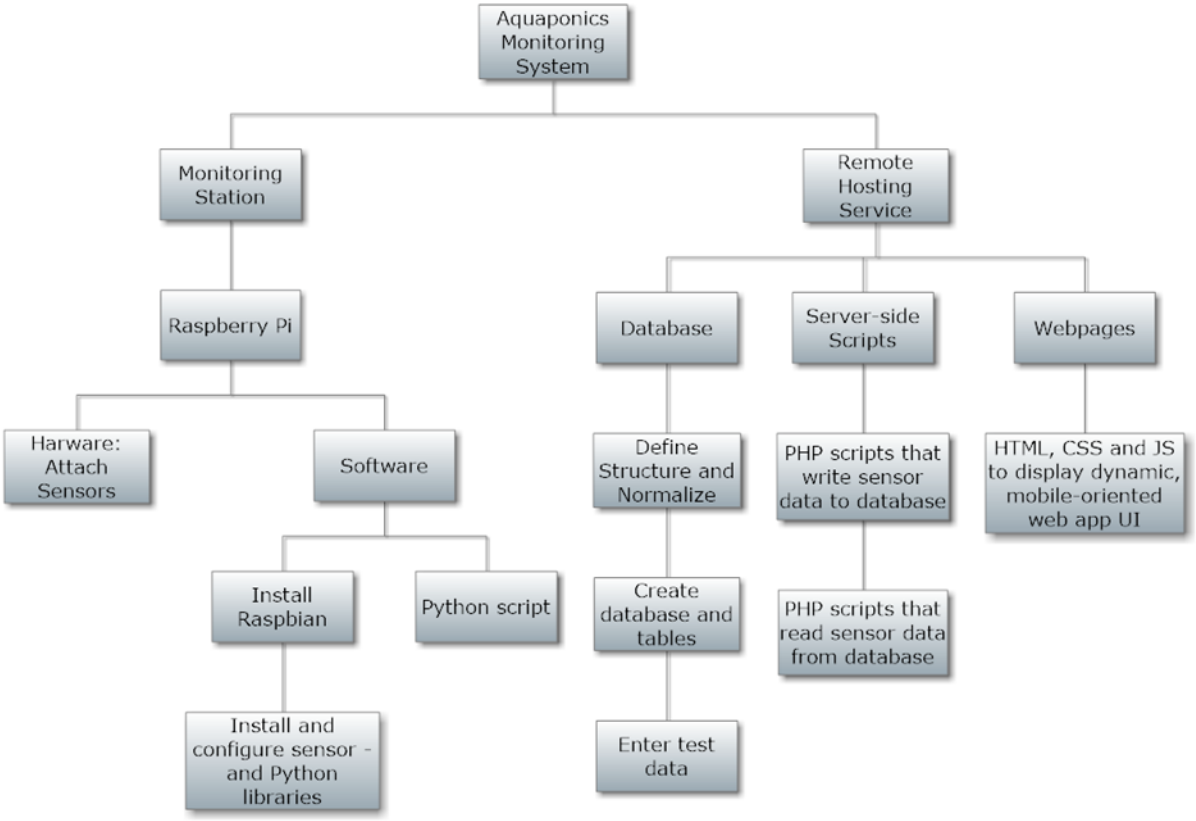
Jose Armando Aguilar
Jonna Jääskeläinen
Lesedi Mmola
Marius Smit
Matthys Van Rooyen

Summary of Solution:

- We connect Temperature, pH and water level sensors to a Raspberry Pi 3b+. Raspbian is then installed on the Pi and configured with the necessary libraries.
- A Python script runs on the Pi and publishes MQTT messages to a MQTT broker. Every 10/15 minutes, Python triggers a PHP script and includes the sensor readings in the parameters.
- A shared-hosting service provides us with a server on which we can run the PHP scripts, host a database and serve the web pages.
- When a user navigates to the specified domain, a website is displayed to them that:
    - Shows historical data in intuitive graphs

Opens a Websockets connection to the MQTT broker and displays live sensor readings

Work Breakdown Structure:



Jose Armando Aguilar
Jonna Jääskeläinen
Lesedi Mmola
Marius Smit
Matthys Van Rooyen

Project Plan

Week 2

Monday 24th February 2020	Tuesday 25th February 2020	Wednesday 26th February 2020	Thursday 27th February 2020	Friday 28th February 2020
	Problem domain research to be done		Group meeting	

Week 3

Monday 2nd March 2020	Tuesday 3rd March 2020	Wednesday 4th March 2020	Thursday 5th March 2020	Friday 6th March 2020
Submission of Research domain	Develop initial project plan		Group meeting. Submission of initial Project Plan	

Week 4

Monday 9th March 2020	Tuesday 10th March 2020	Wednesday 11th March 2020	Thursday 12th March 2020	Friday 13th March 2020
Determining work allocation	Session on Agile methodologies.		Group meeting. Developing user Stories	

Week 5

Monday 16th March 202	Tuesday 17th March 2020	Wednesday 18th March 2020	Thursday 19th March 2020	Friday 20th March 2020
	Submission of user Stories	Individual Research on Responsibilities	Group meeting. Feedback on your user Stories	Individual Development

Jose Armando Aguilar
Jonna Jääskeläinen
Lesedi Mmola
Marius Smit
Matthys Van Rooyen

Week 6

Monday	Tuesday	Wednesday	Thursday	Friday
13th April 202	14th April 2020	15th April 2020	16th April 2020	17th April 2020
	Project Team development		Group meeting. Milestone Submission	

Week 7

Monday	Tuesday	Wednesday	Thursday	Friday
20th April 202	21st April 2020	22nd April 2020	23rd April 2020	24th April 2020
	Project Team development		Group meeting. Status update presentation	

Week 8

Monday	Tuesday	Wednesday	Thursday	Friday
27th April 202	28th April 2020	29h April 2020	30st April 2020	1st May 2020
			Group meeting.	

Week 9

Monday	Tuesday	Wednesday	Thursday	Friday
4th May 2020	5th May 2020	6th May2020	7th May2020	8th May 2020
	5 minutes status update presentation	Testing	Group meeting.	

Jose Armando Aguilar
Jonna Jääskeläinen
Lesedi Mmola
Marius Smit
Matthys Van Rooyen

Week 10

Monday 4th May 2020	Tuesday 5th May 2020	Wednesday 6th May2020	Thursday 7th May2020	Friday 8th May 2020
		Testing	Group meeting. 5 minutes status update presentation	

Week 11

Monday 4th May 2020	Tuesday 5th May 2020	Wednesday 6th May2020	Thursday 7th May2020	Friday 8th May 2020
	Final Project Presentation	Group meeting.	Final presentation Submission of final Project Report	

GANTT Chart

Please note: the schedule is a rough estimation and can change at any time based on the project's needs.