Q1090

Wireless micro-oxygenation system

for VA Filtration

29/11/2019

Quotation Number: 1090

Valid for 30 days only

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ABSTRACT

Elemental Electronics (EE) are pleased to provide this quote to VA Filtration (VAF), who have requested a quotation to research, design and manufacture a scalable wireless micro-oxygenation system for use in the wine manufacturing process.

PROJECT SCOPE

Elemental Electronics will provide turn-key design and sample manufacturing. The project scope includes:

- Research on best system level design based on cost
- Electronic design
- Software development (embedded and high-level web-app)
- Manufacture of prototypes
- BOM and documentation

PROPOSED SYSTEM – FULLY WIRELESS

As per Figure 1, EE propose the

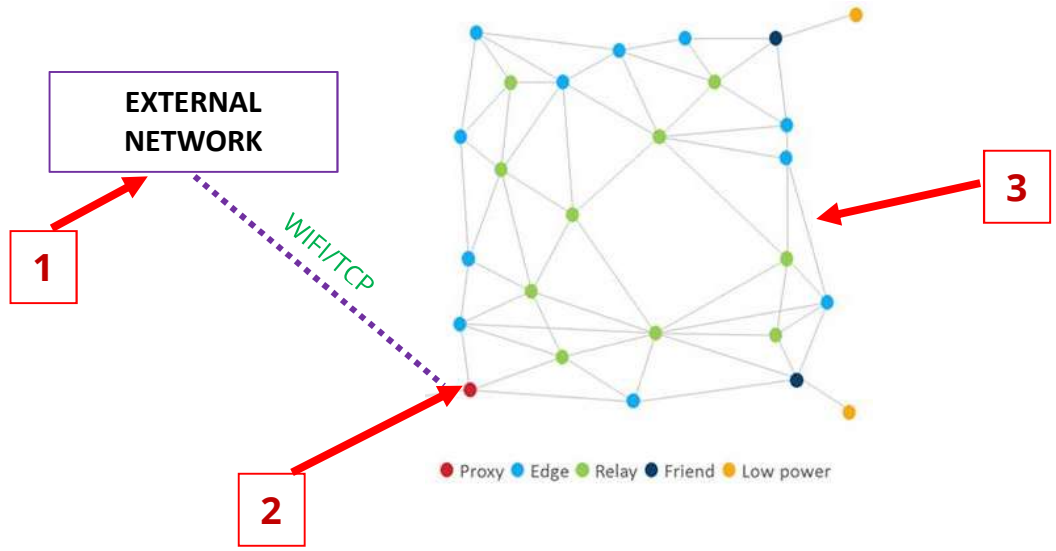

FIGURE 1: SYSTEM OVERVIEW

Item #	Description
1	External network (plant wifi) such that operators can login through a web-portal
2	Red node is “Proxy” or Central Node Unit (This communicates to external network)
3	Bluetooth 5.0 mesh network (each dot represents a barrel unit)

SYSTEM COMPONENTS

The overall system will comprise of a Central Node Unit (CNU) and multiple Barrel Units (BU).

CENTRAL NODE UNIT

The central node unit will contain the following functions

1. Pairing and communication to all barrel units via Bluetooth 5.0
2. Overall control over BU's synchronous timing
3. SOC/SBC
4. Wifi access and configuration of the system an on-board server/web-application
    a. Fail-safe system TBD
5. Ethernet port for initial setup
6. On-board power via 120-240VAC connection
7. Off-shelf enclosure to suit

BARREL UNITS

1. Li-Ion battery
2. PCB
    a. Recharging circuit & PMIC
    b. Circuit for blower
    c. Complied Bluetooth 5.0 module (Used as MCU as well)
        i. GPIO to run blower and PMIC's of blower circuit
3. Blower
    a. CurieJet BL1
4. Custom enclosure to suit
    a. With pin-hole for air entry
    b. Poron foam for battery if required
    c. USB socket for charging

BARREL UNIT RUN TIME & CHARGING

Using a 2000maH 3.7V battery EE's initial estimate is that:

1. Barrel unit runs for 5 seconds/minute
    a. The Barrel unit's battery life will last greater than 1.5 months
2. Battery dimensions will be 60mm x 36mm x 7mm

EE suggest that the batteries inside the BU's are permanent. Customers will just need to connect a 5V USB power source to the socket on the barrel unit for charging.

ESTIMATED UNIT PRICING

Central Node Unit

Estimated finished cost of the central unit is $500/unit (low volumes)

Barrel Unit

Cost breakdown of parts/material cost for barrel unit is shown in the table below (excludes assembly time).

Estimated Part Cost Low-Volume

Enclosure	15
Battery	10
PCB (MCU, Power Circuit)	50
Bluetooth 5.0 Module	15
Blower	45
Total	**135**

FUTURE PROOFING

By using EE's proposed system, the overall design will be future proof such that the following features can be added at a later stage:

- Remote sensing
- Integration to factory automation systems and logistics software

PROJECT STAGES

STAGE 1 – Research, Development & Planning

- Project plan & GANTT chart
- Procure and test blower
- Test power consumption on dev boards + blower to determine battery life
- Finalize network topology, infrastructure and operating distances
- Decide on MCU
- Field test with barrels

STAGE 2 – First prototype & Software Development

- Design of main electronics (basic functionality + Bluetooth)
    - PCB board revision 1
- Software development
    - Embedded software
    - CNU software development
    - Networking and communications & web application

STAGE 3 – Mechanical integration, Second PCB prototype, Web-Application continued

- Mechanical design
- 3D printed mechanical enclosure
- Final board revision x 2 to suit enclosure
- Web-application for system setup
- Field testing and acceptance

STAGE 4 – BOM & Documentation handover

STAGE	TIMING	EST COST
1	4-6 Weeks	18,400
2	8 Weeks	27,500
3	12 – 18 Weeks	60,300
4	1 Week	2,100
TOTAL (ESTIMATE ONLY)	**33 weeks**	**108,300**

ESTIMATED PROJECT COST

EE estimate the total cost of integration will be $108,300 ex GST. Sufficient prototypes will be included where necessary.

PAYMENT TERMS

Payments are to be made net 7 days and are invoiced fortnightly upon milestones agreed upon in Stage 1.

ASSUMPTIONS

1. Design will use piezo blower (Curiejet BL1 or similar or fan forced)
2. VAF will provide sample of current system
3. VAF will support with field testing and usability testing

SUMMARY

We (EE) believe that the solution proposed meets the requirements VAF's new micro-oxygenation system. While we have put considerable effort to providing the best solution, we will continue to look at ways to improve and optimise the system during research and planning stage.

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