1. Project specification:

System level

* The greenhouse frame has dimensions of 120cm(length)\*60cm(width)\*80cm(height).
* The whole system is connected to 110V AC power via GFCI, and it has 24V DC and 48V DC power ports for connection.
* Maximal power consumption: 268 watts
* Normal power consumption: 30 watts

Sub-system level

* A 24V 250W heater is used for heating function. (Use hysteresis to avoid heater run/stop too often at target temperature)

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| --- | --- |
| Temperature( 25 degrees as example) | Heater Fan PWM(%) |
| Lower than 21 | 100 |
| 21 to 23 | 80 |
| 23 to 25 | 50 |
| Higher than 26.5 | off |

* A 24V cooling fan is used for cooling function.

|  |  |
| --- | --- |
| Temperature(25 degrees as example) | Cooling Fan PWM(%) |
| Higher than 29 | 100 |
| 27 to 29 | 70 |
| 25 to 27 | 40 |
| Lower than 23.5 | off |

* The soil humidity range from 0% to 100 %. The tolerance of soil humidity is ±5%.

|  |  |
| --- | --- |
| Rated Voltage | 5V DC |
| Rated Current | 480mA |
| Max Power | 2.4W |
| Max. Flow Quantity | 250L/H |
| Max. Lift | 200cm / 6.56ft |
| Waterproof Class | IP68 |
| Inlet diameter | 8mm / 0.33in |
| Outlet diameter | 8mm / 0.33in |

* At a room temperature of 30 degrees, it takes 3 minute for soil moisture to increase from 20% to 40% (water flow rate 250L/H) and 8 hours for soil moisture to drop from 40% to 20%
* The website page refreshes every 10sec. The Raspberry is powered by a 5V/2A DC power supply.
* Motor Driver (L298N) has a working range from 3.2V to 40 VDC, and the current range is 0 ~ 36mA.
* Lifting has 4 height levels, 4cm,8cm,12cm and 16cm
* LED light bar is 870mm in length. Its working voltage is 38V and has maximum power consumption of 12 watts when providing 300LM illuminance
* Two 5V illuminance sensors working in the range of 3 to 55,999 Lux environmental light
* A 4x4 keypad sends instructions to MCU, and an LCD screen displays the greenhouse working state and sensor received data. The size of the control board is 15.87x 13.33 cm^2