CLAIMS

1. A fire-fighting system comprising:

a pump;

a nozzle for directing fluid from said pump to a target area;

a discharge valve configured to control fluid flow between said pump and said nozzle;

a valve pressure sensor configured to detect a fluid pressure of the fluid at said discharge valve;

a nozzle pressure sensor coupled to said nozzle and configured to detect a fluid pressure of the fluid at said nozzle; and

a controller communicatively coupled to said valve pressure sensor and said nozzle pressure sensor, said controller comprising a memory having a machine learning algorithm stored thereon, said controller configured to:

receive a user-requested fluid pressure indicating a desired fluid pressure at said nozzle;

determine an expected fluid pressure differential between said nozzle and said discharge valve based on the machine learning algorithm and the fluid pressure detected by said valve pressure sensor at said discharge valve;

control operation of at least one of said pump and said discharge valve based on the detected fluid pressure of the fluid at said nozzle and the user-requested fluid pressure in a primary mode of operation to deliver fluid to said nozzle at the desired fluid pressure; and

control operation of said at least one of said pump and said discharge valve based on the expected fluid pressure differential and a last received user-requested

fluid pressure in a secondary mode of operation when communication between said nozzle pressure sensor and said controller is interrupted.

2. The fire-fighting system of Claim 1, wherein said controller is configured to determine an expected fluid pressure at said nozzle based on the expected fluid pressure differential and the detected fluid pressure at said discharge valve.

3. The fire-fighting system of Claim 1, wherein said controller is further configured to:

determine a detected fluid pressure differential based on the detected fluid pressure at said nozzle and the detected fluid pressure at said discharge valve;

compare the detected fluid pressure differential with the expected fluid pressure differential; and

update the machine learning algorithm based on the comparison.

4. The fire-fighting system of Claim 3, wherein said controller is further configured to:

determine that the detected fluid pressure differential is different from the expected fluid pressure differential; and

update the machine learning algorithm based on the determined difference between the detected fluid pressure differential and the expected fluid pressure differential.

5. The fire-fighting system of Claim 3, wherein said controller is configured to control operation of said at least one of said pump and said discharge valve by adjusting a control setting of said at least one of said pump and said discharge valve, and wherein said controller is further configured to:

determine that the detected fluid pressure at said nozzle is substantially the same as the desired fluid pressure at said nozzle; and

store, in response to determining that the detected fluid pressure at said nozzle is

substantially the same as the desired fluid pressure, the control setting and the detected fluid pressure differential in the memory.

6. The fire-fighting system of Claim 1, wherein said nozzle further comprises a transceiver communicatively coupled to said valve pressure sensor and configured for wireless communication with said controller.

7. The fire-fighting system of Claim 6, wherein said nozzle further comprises a user-interface communicatively coupled to said transceiver and configured to receive the user-requested fluid pressure from a user, said transceiver configured to transmit the user-requested fluid pressure to said controller.

8. The fire-fighting system of Claim 7, wherein said controller is further configured to transmit the detected fluid pressure at said discharge valve to said transceiver at said nozzle, said user-interface configured to display the transmitted fluid pressure.

9. The fire-fighting system of Claim 1, wherein the user-requested fluid pressure is a preset pressure associated with said nozzle and stored on the memory.

10. The fire-fighting system of Claim 1, wherein said nozzle is a first nozzle, said valve pressure sensor is a first valve pressure sensor, and said discharge valve is a first discharge valve, said fire-fighting system further comprising:

a second nozzle for directing fluid flow from said pump to a target area;

a second discharge valve controlling fluid flow between said pump and said second nozzle; and

a second valve pressure sensor configured to detect a fluid pressure of the fluid at said second discharge valve.

11. The fire-fighting system of Claim 1, wherein said controller is further configured to control operation of said discharge valve by controlling an actuation state of said discharge valve.

12. The fire-fighting system of Claim 1, wherein said controller is further

configured to control operation of said pump by at least one of controlling a speed of said pump and controlling an actuation state of an additional valve of said fire-fighting system, the additional valve coupled in fluid communication with said pump.

13. The fire-fighting system of Claim 1 further comprising a fire-fighting device, wherein said pump and said controller are located at said fire-fighting device and said nozzle is configured to be positioned remote from said fire-fighting device.

14. A method of controlling a fire-fighting device including a pump, said method comprising:

receiving a user-requested fluid pressure indicating a desired fluid pressure at a nozzle;

detecting, by a valve pressure sensor, a fluid pressure of a fluid at a discharge valve that controls fluid flow between the pump and the nozzle;

detecting, by a nozzle pressure sensor coupled to the nozzle, a fluid pressure of the fluid at the nozzle;

determining, by a controller communicatively coupled to said valve pressure sensor and the nozzle pressure sensor, an expected fluid pressure differential between the nozzle and the discharge valve based on the fluid pressure detected by the valve pressure sensor at the discharge valve and a machine learning algorithm stored on a memory of the controller;

controlling, by the controller, operation of at least one of the pump and the discharge valve based on the detected fluid pressure of the fluid at the nozzle and the user-requested fluid pressure in a primary mode of operation to deliver fluid to the nozzle at the desired fluid pressure; and

controlling, by the controller, operation of the at least one of the pump and the discharge valve based on the expected fluid pressure differential and a last received user-requested fluid pressure in a secondary mode of operation when communication between the nozzle pressure sensor and the controller is interrupted.

15. The method of Claim 14 further comprising determining, by the controller, an expected fluid pressure at the nozzle based on the expected fluid pressure differential and the detected fluid pressure at the discharge valve.

16. The method of Claim 14 further comprising:

determining, by the controller, a detected fluid pressure differential based on the detected fluid pressure at the nozzle and the detected fluid pressure at the discharge valve;

comparing, by the controller, the detected fluid pressure differential with the expected fluid pressure differential; and

updating the machine learning algorithm based on said comparing.

17. The method of Claim 16 further comprising:

determining that the detected fluid pressure differential is different from the expected fluid pressure differential; and

updating the machine learning algorithm based on the determined difference between the detected fluid pressure differential and the expected fluid pressure differential.

18. A controller for use with a fire-fighting device including a pump, said controller comprising a memory having a machine learning algorithm stored thereon, said controller configured for communication with a valve pressure sensor configured to detect a fluid pressure of a fluid at a discharge valve controlling fluid flow between the pump and a nozzle, said controller being further configured for communication with a nozzle pressure sensor coupled to the nozzle and configured to detect a fluid pressure of the fluid at the nozzle, said controller configured to:

receive a user-requested fluid pressure indicating a desired fluid pressure at the nozzle;

determine an expected fluid pressure differential based on the machine learning algorithm and the fluid pressure detected by the valve pressure sensor at the discharge valve;

control operation of at least one of the pump and the discharge valve based on the detected fluid pressure of the fluid at the nozzle and the user-requested fluid pressure in a primary mode of operation to deliver fluid to said nozzle at the desired fluid pressure, the controller being in communication with the nozzle pressure sensor in the primary mode of operation; and

control operation of the at least one of the pump and the discharge valve based on the expected fluid pressure differential and a last received user-requested fluid pressure in a secondary mode of operation when communication between the nozzle pressure sensor and the controller is interrupted.