What is claimed is:

1. A valve comprising:

a housing configured to surround a tube, the housing defining a hole;

a filler disposed within the housing, the filler having at least two differing stiffness layers;

a plunger configured to engage the filler within the housing through the hole to thereby operatively deform the tube within the housing when engaging the filler; and

an actuator operatively coupled to the plunger and configured to actuate the plunger.

2. The valve according to claim 1, wherein the at least two differing stiffness layers includes a stiffer layer and a softer layer.

3. The valve according to claim 2, wherein the softer layer has a shore OO hardness from about 20 to about 25.

4. The valve according to claim 2, wherein the softer layer has a shore OO hardness from 20 to 25.

5. The valve according to claim 2, wherein the stiffer layer has a shore A hardness of about 15.

6. The valve according to claim 2, wherein the stiffer layer has a shore A hardness of 15.

7. The valve according to claim 1, wherein the actuator is a linear actuator operatively coupled to the plunger to actuate the plunger at least one of into and away from the tube.

8. The valve according to claim 1, wherein the housing includes first and second clamshell portions.

9. The valve according to claim 8, wherein the first clamshell portion is pivotally coupled to the second clamshell portion, wherein the first and second clamshell portions have an open position and a closed position.

10. The valve according to claim 9, further comprising a latch configured to latch the first and second clamshell portions together in the closed position.

11. The valve according to claim 8, wherein the first clamshell portion includes the hole.

12. The valve according to claim 11, further comprising a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

13. The valve according to claim 1, wherein:

the housing includes first and second clamshell portions,

the first clamshell portion is pivotally coupled to the second clamshell portion,

the first and second clamshell portions have an open position and a closed position, and

the first clamshell portion defines a first portion of a cavity and the second clamshell portion defines a second portion of the cavity such that the first and second clamshells form a cavity when in the closed position.

14. The valve according to claim 13, wherein the at least two differing hardness layers of the filler includes four layers.

15. The valve according to claim 14, wherein the four layers includes first, second, third, and fourth layers, and the first and second layers are within the first portion of the cavity and the third and fourth layers are within the second portion of the cavity.

16. The valve according to claim 15, wherein the first layer is disposed on an inner surface of the first clamshell portion that defines the first portion of the cavity and the second layer is disposed on the first layer.

17. The valve according to claim 16, wherein the second layer defines a channel to guide the tube.

18. The valve according to claim 16, wherein the fourth layer is disposed on an inner surface of the second clamshell portion that defines the second portion of the cavity and the third layer is disposed on the fourth layer.

19. The valve according to claim 18, wherein the third layer defines a channel to guide the tube.

20. The valve according to claim 18, wherein the second layer is stiffer than the first layer.

21. The valve according to claim 20, wherein the third layer is stiffer than the fourth layer.

22. The valve according to claim 1, further comprising a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

23. The valve according to claim 22, further comprising at least one spring operatively coupled to the guide and the plunger to urge the plunger towards the housing.

24. The valve according to claim 1, wherein the actuator is configured for being controlled by a monitoring client.

25. A system, comprising:

a coupler adapted to couple to a drip chamber;

a support member operatively coupled to the coupler;

an image sensor having a field of view and operatively coupled to the support member, wherein the image sensor is positioned to view the drip chamber within the field of view;

a valve fluidly coupled to the drip chamber to regulate the flow of fluid through the drip chamber, wherein the valve comprises:

a housing configured to surround a tube fluidly coupled to the drip chamber, the housing defining a hole;

a filler disposed within the housing, the filler having at least two differing stiffness layers;

a plunger configured to engage the filler within the housing through the hole to thereby operatively deform the tube within the housing when engaging the filler; and

an actuator operatively coupled to the plunger and configured to actuate the plunger; and

at least one processor operatively coupled to the image sensor and to the actuator to operatively control the valve, wherein:

the at least one processor receives image data from the image sensor,

the at least one processor estimates at least one parameter of liquid within the drip chamber using the image data, and

the at least one processor actuates the plunger to achieve a target parameter.

26. The system according to claim 25, wherein the at least one parameter is one of a type of formation of the liquid, a volume of the liquid, and a shape of the liquid.

27. The system according to claim 25, wherein the at least one processor determines an existence of a streaming condition using the image data.

28. The system according to claim 25, further comprising a background pattern positioned within the field of view of the image sensor, wherein the drip chamber is between the image sensor and the background pattern.

29. The system according to claim 25, wherein the target parameter is a target flow rate.

30. The system according to claim 25, wherein the target parameter is a target drop-growth rate.

31. The system according to claim 25, wherein the housing of the valve includes first and second clamshell portions.

32. The system according to claim 31, wherein the valve further comprises a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

33. The system according to claim 25,

the housing includes first and second clamshell portions,

the first clamshell portion is pivotally coupled to the second clamshell portion,

the first and second clamshell portions have an open position and a closed position, and

the first clamshell portion defines a first portion of a cavity and the second clamshell portion defines a second portion of the cavity such that the first and second clamshells form a cavity when in the closed position.

34. The system according to claim 33, wherein the at least two differing hardness layers of the filler includes first, second, third, and fourth layers, and the first and second layers are within the first portion of the cavity and the third and fourth layers are within the second portion of the cavity.

35. The system according to claim 34, wherein the first layer is disposed on an inner surface of the first clamshell portion that defines the first portion of the cavity and the second layer is disposed on the first layer.

36. The system according to claim 35, wherein the second layer defines a channel to guide the tube.

37. The system according to claim 35, wherein the fourth layer is disposed on an inner surface of the second clamshell portion that defines the second portion of the cavity and the third layer is disposed on the fourth layer.

38. The system according to claim 37, wherein the third layer defines a channel to guide the tube.

39. The system according to claim 37, wherein the second layer is stiffer than the first layer.

40. The system according to claim 39, wherein the third layer is stiffer than the fourth layer.

41. The system according to claim 25 wherein the valve further comprises a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

42. The system according to claim 41, wherein the valve further comprises a spring operatively coupled to the guide and the plunger to urge the plunger away from the housing.

43. The system according to claim 25, wherein the actuator is configured for being controlled by a monitoring client.

44. A method for controlling a flow of fluid through a drip chamber, the method comprising:

capturing, using an image sensor, a plurality of images of a drip chamber;

estimating, using a processor, a flow rate through the drip chamber using the plurality of images;

receiving a desired flow rate from a user;

comparing, using the processor, the estimated flow rate with a desired flow rate;

determining, using the processor, a magnitude and a direction of valve actuation to achieve the desired flow rate; and

actuating a valve in accordance with the determined magnitude and direction, to achieve the desired flow rate.

45. The method of claim 44, further comprising the act of communicating the estimated flow rate to a fluid monitoring client.

46. The method of claim 44, further comprising the act of monitoring for unplanned events.

47. The method of claim 46, further comprising stopping flow when the unplanned event occurs.

48. The method of claim 44, further comprising deforming a flexible tube in fluid communication with the drip chamber to reduce its lumen size while the tube is being installed or removed from an apparatus performing this method.

49. The method of claim 48, further comprising removing a force deforming the tube, allowing the tube to reform to substantially its initial size after completion of the installation or the removal process of the tube is completed.

50. The method claim of 44 wherein the valve actuation action comprises:

providing a flexible tube having a lumen in fluid communication with the drip chamber; and

using a valve to adjust pressure around a defined section of a flexible tube containing the lumen to thereby modify a shape of the lumen.

51. The method of claim 50, wherein the pressure adjustment act comprises:

disposing a rigid housing around the defined section of the lumen; and

engaging a plunger with a substantially incompressible filler material enclosed within the housing, wherein the material transfers the pressure created by the engaging plunger to deform the lumen.

52. The method of claim 44, further comprising lighting a light to indicate the status of an apparatus performing this method.

53. The method of claim 52, wherein a first color of light is emitted when the pump is operating, a second color of light is emitted when fluid flow has been paused, and a third color of light is emitted when the pump has stopped.

54. The method of claim 52, wherein the light flashes every time a drip falls in a drip chamber having fluid communication with the valve.

55. The method of claim 44, further comprising displaying infusion information related to the method on a display.

56. The method of claim 44, further comprising outputting audio to inform an operator of an apparatus performing this method.

57. A system for controlling fluid flow comprising:

a drip chamber holster configured to receive and secure a drip chamber;

an imaging device configured to capture images of the drip chamber thereby creating image data;

a light emitting device configured to emit at least at least one pattern of light onto the drip chamber and into the field of view of the imaging device;

a flexible tube defining a lumen operatively connected to the drip chamber, the lumen in fluid communication with the drip chamber; and

a valve axially disposed around a portion of the flexible tube to control flow through the drip chamber, the valve comprising:

a first clamshell portion and a second clamshell portion pivotally connected together to complementarily align to form an enclosure when in a closed position, wherein the enclosure defines an inlet hole and an outlet hole when closed, wherein the first clamshell portion defines a plunger hole;

a male latch component coupled to the second housing component opposite the pivot connection;

a female latch component operatively coupled to the first housing component opposite the pivot connection;

a substantially incompressible filler enclosed within the casing, the filler comprising:

a conduit, defined within the filler, sized for a specific tube, wherein the conduit connects the inlet hole and outlet hole of the valve casing; and

a plurality of variations of stiffness in the filler;

a plunger longitudinally aligned with the plunger hole; and

an actuator operatively connected to the plunger, to urge the plunger through the plunger aperture thereby engaging the filler and ultimately deform the tube.

58. The system of claim 57, further comprising a safety cutoff comprising:

an occluding mechanism configured to compress the tube into a backstop to thereby reduce area of the lumen defined by the tube;

at least one spring configured to force the occluding mechanism towards the backstop; and

a trigger mechanism configured to retain the occluding mechanism until it is triggered.

59. The system of claim 58, wherein a solenoid applies force to the trigger mechanism to thereby release the occluding mechanism.

60. The system of claim 59 wherein a current responsive material is coupled to the solenoid, the current responsive material applies force to the solenoid which applies force to the trigger mechanism to thereby release the occluding mechanism.

61. The system of claim 58 wherein the trigger mechanism is comprised of first and second magnets configured to permit alignment of opposite magnetic poles of the first and second magnets.

62. The system of claim 61 wherein the first and second magnets are reconfigured to permit alignment of like magnetic poles of the first and second magnets which

applies a repulsive magnetic force to the trigger mechanism to thereby release the occluding mechanism.

63. The system of claim 58 wherein the trigger mechanism is comprised of a magnet and a coil applying a magnetic force.

64. The system of claim 59, further comprising a safety sensor configured to sense unplanned events and transmit safety data related to the unplanned events.

65. The system of claim 64, further comprising a processor configured to receive safety data from the safety sensor and trigger the safety cutoff when predetermined criteria are met.

66. The system of claim 57, further comprising at least one processor operatively connected to the imaging device and the actuator wherein the at least one processor is configured to:

receive imaging data from the imaging device;
estimate a flow rate based on the imaging data;
compare the estimated flow rate to a desired flow rate; and
adjust the actuator to create the desired flow rate.

67. The system of claim 57, wherein portions of the filler material proximate the tube are stiffer than the surrounding filler.

68. The system of claim 57, wherein the plunger head has an area smaller than the longitudinal cross-section of the tube disposed within the housing.

69. The system of claim 57, further comprising an enclosure casing, the casing comprising :

a body; and

a door pivotally connected to the body that creates an enclosure when in the closed position, the enclosure houses the valve.

70. The system of claim 69, further comprising an arm with a first end pivotally connected to the door and a second end connected to the female latch component, wherein the arm is configured to latch closed the first and second valve housing components when the door is closed.

71. The system of claim 69, further comprising an arm pivotally connected to the door at a first end and to the female latch component at a second end, wherein the arm is configured to open the latch and valve housing components when the door is opened.

72. The system of claim 69, further comprising a safety cutoff comprising:

an occluding mechanism configured to compress the tube into a backstop to thereby reduce area of the lumen formed by the tube;

at least one spring forcing the occluding mechanism towards the backstop; and

a trigger mechanism configured to retain the occluding mechanism and release the occluding mechanism when the trigger mechanism is triggered.

73. The system of claim 72, further comprising a biasing means having a first end pivotally connected to the door and a second end configured to operatively reset the safety cutoff, allowing freeflow through the tube when the door is opened.

74. The system of claim 69, further comprising:

at least one cutoff spring to operatively urge the actuator and attached plunger towards the valve casing;

a threaded drive shaft with a first end coupled to an output shaft of the actuator and an opposite second end operatively connected to the plunger allowing for rotational freedom between the plunger and drive shaft; and

a threaded engaging member, operatively coupled to the valve casing, configured to engage the threads on the drive shaft to control position of the plunger and disengage the engaging member from the driveshaft to allow the plunger to drive towards the valve casing, substantially deforming the tube.

75. The system of claim 74, further comprising a spring configured to urge the engaging member towards the drive shaft.

76. The system of claim 75, further comprising an arm with a first end pivotally connected to the door and a second end configured to persuade the threaded engaging member away from the drive shaft when the door is open.

77. The system of claim 69, further comprising

a compression tab located within an aperture in the body of the enclosure casing, wherein the tab creates a high enough compressive force with the body of the outer casing to deform an IV tube positioned therebetween; and

a wedge projecting out of the door, wherein the wedge is configured to align with the tab when the door is closed to thereby wedge the tab open relieving its compressive forces against the tube.

78. The system of claim 57, further comprising a status light configured to inform an operator of the status of the pump by lighting up.

79. The system of claim 78, wherein a first light color indicates fluid flow and a second light color indicates no fluid flow.

80. The system of claim 78, wherein a first light color indicates the system is operational, a second light color indicates the system is paused, and a third light indicates the system has stopped.

81. The system of claim 78, wherein the light flashes every time a drip drops in the drip chamber.

82. The system of claim 57, further comprising an audio output device configured to emit audible information to thereby inform an operator or user of this system.

83. The system of claim 57, wherein the light emitting device uses a laser beam as its source.

84. The system of claim 57, wherein the light emitting device produces a first pattern to cast on an upper portion of the drip chamber and a second pattern to cast on a lower portion of the drip chamber.

85. The system of claim 84, wherein the patterns are created using binary optics.

86. The system of claim 57, further comprising input buttons configured to adjust at least one of parameters and the operations of the system.

87. The system of claim 86, wherein a first input button increases the desired flow rate, a second input button decreases the desired flow rate, a third input button pauses flow rate, and a fourth input button stops the system and cuts off flow.

88. The system of claim 86, wherein the buttons light up to guide an operator through the process of adjusting at least one of parameters and operations of the system through use of the buttons.

89. The system of claim 57, further comprising a display configured to display information pertaining to the system.

90. An apparatus for controlling fluid flow comprising:

an apparatus casing comprising a body and a door, wherein the door and body are pivotally connected and configured to form an enclosure when the door is in a closed configuration;

a drip chamber holder connected to an outside of the casing body;

an image sensor, operatively connected to the apparatus casing, oriented so the drip chamber is in a field of view of the image sensor;

a light emitting device, operatively connected to the apparatus casing, configured to emit at least one beam of light at the drip chamber and into the field of view of the imaging device;

a valve housed within the apparatus casing, the valve comprising:

a first valve housing component and a second valve housing component pivotally connected to complementarily align forming an enclosure when in the closed position, wherein the valve housing defines an

inlet hole and an outlet hole when closed, wherein the first valve housing component has a plunger hole;

a male latch component coupled to the second valve housing component opposite the pivot connection;

a female latch component coupled to the first valve housing component opposite the pivot connection;

a substantially incompressible filler enclosed within the valve casing, the filler comprising:

a conduit, defined within the filler, sized for a specific tube, wherein the conduit connects the inlet hole and outlet hole of the valve casing; and

a plurality of layers of varying stiffness;

a plunger longitudinally aligned with the plunger hole; and

an actuator operatively connected to the plunger, configured to persuade the plunger in and out of the plunger hole.

91. The apparatus of claim 90, further comprising at least one operator input device disposed within an aperture in the door of the apparatus casing to thereby allow an operator to manually input information, including a desired flow rate, into the apparatus.

92. The apparatus of claim 91, wherein at least one component of the operator input device is a series of buttons.

93. The apparatus of claim 91, wherein at least one component of operator input device is a touch screen display.

94. The apparatus of 91, wherein a processor is configured to receive and process data from the input device and send the data to the respective component of the system.

95. The apparatus of claim 90, further comprising a display disposed within an aperture in the door of the apparatus casing, configured to display infusion information.

96. The apparatus of claim 90, further comprising a processor in communication with the image sensor and the actuator, wherein the processor is configured to:

receive imaging data from the image sensor;

estimate a flow rate based on the imaging data;

compare the estimated flow rate to a desired flow rate; and

adjust the actuator to create the desired flow rate.

97. The apparatus of claim 90, further comprising a safety cutoff comprising:

occluding arms configured to compress the tube into a backstop and reduce the lumen formed by the tube;

at least one spring configured to urge the occluding arms towards the backstop; and

a trigger mechanism configured to retain the occluding arms and when triggered releases the occluding arms.

98. The apparatus of claim 97, wherein a solenoid triggers the trigger mechanism by applying force to the occluding arms to thereby release them from their restrained position.

99. The apparatus of claim 98, further comprising a safety sensor configured to sense unplanned events and transmit data related to the unplanned events.

100. The apparatus of claim 99, wherein a processor is configured to receive safety data from the safety sensor and engage the solenoid by comparing the safety data to predetermined criteria.

101. The apparatus of claim 97, further comprising a resetting arm with a first end pivotally connected to the outer casing door and a second end configured to operatively reset the trigger mechanism when the door is opened.

102. The apparatus of claim 90, wherein:

the female latch component comprises a lever pivotally coupled to the valve housing at a point offset from the end creating a lever, the lever has an input end and an opposite output end;

the male latch component defines a flange; and

the latch components are positioned to allow the output end of the lever to engage an opposing side of the flange when the valve casing is in a closed position, and apply a force to the flange compressing the first and second valve casing components together when the input side of the lever is rotated in a direction that pushes the output of the lever into the flange.

103. The apparatus of claim 102, further comprising a valve closing arm pivotally connected to the apparatus casing door at a first end, and pivotally connected to the input end of the female latch lever at an opposite second end, wherein the guide arm is configured to persuade the output end of the lever to engage with the male latch flange and then rotate the lever to compress the first and second casing components together, by closing the outer casing door.

104. The apparatus of claim 90, further comprising:

a compression tab disposed within an aperture in the body of the apparatus casing, the tab creates a high enough compressive force with the body of the outer casing to deform an IV tube positioned therebetween; and

a wedge projecting out from the casing door, wherein the wedge is configured to align with the tab when the door is closed and wedge the tab open relieving its compressive force directed towards the apparatus casing body.

105. The apparatus of claim 90, wherein the portion of the filler material proximate the tube is stiffer than the surrounding filler.

106. The apparatus of claim 90, wherein the plunger head has an area smaller than the longitudinal cross-section of the tube disposed within the housing.

107. The apparatus of claim 90, further comprising:

an at least one cutoff spring to urge the actuator and the attached plunger towards the valve housing;

a threaded drive shaft with a first end coupled to an output shaft of the actuator and a second end operatively connected to the plunger allowing for rotational freedom between the plunger and drive shaft; and

a threaded engaging member, coupled to the valve housing, having the capability to engage the threaded drive shaft to control position of the plunger and disengage the engaging member from the driveshaft to allow the engaging springs to drive the plunger towards the valve, substantially deforming the tube.

108. The system of claim 107, further comprising a spring configured to urge the engaging member towards the drive shaft.

109. The system of claim 108, further comprising an arm with a first end pivotally connected to the door and a second end configured to persuade the threaded engaging member away from the drive shaft when the door is open.

110. The apparatus of claim 90, further comprising a status light attached to an outer surface of the apparatus in a position where an operator can readily see it.

111. The apparatus of claim 110, wherein a first color of light is emitted when there is fluid flowing through the drip chamber and a second light color is emitted when there is no fluid flow.

112. The apparatus of claim 110, wherein a first color of light is emitted when the apparatus if functioning properly, a second color of light is emitted when a problem has been detected, and a third color is emitted when the apparatus is paused.

113. The apparatus of claim 110, wherein the light flashes every time a drop of fluid falls in the drip chamber.

114. The apparatus of claim 90, further comprising an audio output device configured to emit audio relating to the status of the pump.

115. The apparatus of claim 90, further comprising an audio output device configured to emit audio to assist an operator with operating the pump.

116. The apparatus of claim 90, further comprising a battery configured to supply power to the apparatus.

117. A passive data broadcast apparatus comprising:

first and second metallic structures;

an impedance-matching structure coupled with the first metallic structure and the second metallic structure, wherein the impedance-matching structure is configured to essentially match an interrogator frequency; and

a shorting mechanism coupled with the first metallic structure and the second metallic structure.

118. The passive data broadcast apparatus described in Claim 117, wherein the first metallic structure is a pre-existing component of an assembly.

119. The passive data broadcast apparatus described in Claim 118 wherein the second metallic structure is a pre-existing component of the assembly.

120. The passive data broadcast apparatus described in Claim 117, wherein the impedance-matching structure is an inductor.

121. The passive data broadcast apparatus described in Claim 117, wherein the impedance-matching structure is a capacitor.

122. The passive data broadcast apparatus described in Claim 117, wherein the impedance-matching structure is a combination of an inductor and a capacitor.

123. The passive data broadcast apparatus described in Claim 117, wherein the shorting mechanism is a transistor.

124. The passive data broadcast apparatus described in Claim 117, wherein the shorting mechanism is a switch.

125. The passive data broadcast apparatus described in Claim 117, wherein the shorting mechanism is controlled by a microprocessor.

126. The passive data broadcast apparatus described in Claim 117, further comprising a low pass filter, the low pass filter coupled with the first metallic structure and the second metallic structure.

127. The passive data broadcast apparatus described in Claim 126 wherein the low pass filter has a cutoff frequency sufficiently below an interrogator frequency.

128. A method for passive data broadcast comprising:

coupling a first metallic structure and a second metallic structure;

coupling an impedance matching structure with the first metallic structure and the second metallic structure, wherein the impedance-matching structure is configured to essentially match an interrogator frequency; and

shorting the coupled first metallic structure and the second metallic structure.

129. The method described in Claim 128 further comprising a step of coupling a low-pass filter with the first metallic structure and the second metallic structure.

130. The method described in Claim 128 wherein the shorting step is controlled by a microprocessor.

131. A system for regulating fluid flow, comprising:

a fluid reservoir for infusing fluid contained therein into a patient;

a drip chamber in fluid communication with the fluid reservoir, wherein the drip chamber is configured to allow a drop of the fluid to exit the fluid reservoir and travel through the drip chamber;

a backlight disposed near the drip chamber such that the backlight provides at least partial illumination to the drip chamber;

a valve configured to regulate the fluid flowing from the drip chamber to the patient; and

a flow meter for monitoring the flow rate of the fluid passing through the drip chamber, the flow meter including:

an image sensor configured to capture an image of the drip chamber;

a processor configured to determine whether the captured image of the drip chamber contains a match to a template; and

a set of processor-executable instructions configured to apply a blurring function to the image captured by the image sensor of the drip chamber such that the processor can determine if the captured image contains a match to the template.

132. The system of claim 131, wherein the blurring function is a low pass filter, the set of processor-executable instructions configured to apply the low pass filter to the image captured by the image sensor in either a vertical or a horizontal direction.

133. The system of claim 132, wherein the low pass filter includes a one-dimensional Gaussian Blur function.

134. The system of claim 131, wherein the blurring function is a low pass filter, the set of processor-executable instructions configured to apply the low pass filter to the image captured by the image sensor in both a vertical and a horizontal direction.

135. The system of claim 134, wherein the low pass filter includes a two-dimensional Gaussian Blur function.

136. The system of claim 131, wherein the template includes at least a partial image of a drop of the fluid forming within the drip chamber.

137. The system of claim 131, wherein the captured image includes an image of the drip chamber that is at least partially illuminated by the backlight.

138. The system of claim 137, wherein the desired pattern includes at least a partial image of a drop of the fluid forming within the drip chamber, the drop being at least partially illuminated by the backlight.

139. The system of claim 131, wherein the blurring function filters the captured image such that the processor can determine if the captured image contains a match to the template.

140. The system of claim 139, wherein the captured image is filtered to eliminate an amount of detail including images of at least one of condensation or splashes within the drip chamber.

141. A method of filtering a captured image of a drip chamber configured to allow a drop of fluid to fall within the drip chamber, the method comprising:

capturing an image of the drip chamber with an image sensor;

determining if the captured image contains a visual obstruction;

applying a blurring function to the captured image, the blurring function configured to eliminate an amount of detail in the captured image; and

determining if the captured image contains a match to a template.

142. The method of claim 141, wherein the desired pattern includes at least a partial image of a drop of fluid within the drip chamber.

143. The method of claim 141, wherein the blurring function is a low pass filter, the low pass filter being applied in either a vertical direction or a horizontal direction.

144. The method of claim 143, wherein the low pass filter includes a one-dimensional Gaussian Blur function.

145. The method of claim 141, wherein the blurring function is a low pass filter, the low pass filter being applied in both a horizontal direction and a vertical direction.

146. The method of claim 145, wherein the low pass filter includes a two-dimensional Gaussian Blur function.

147. The method of claim 141, wherein the eliminated amount of detail includes images of one of condensation or splashes within the drip chamber.

148. A method of capturing an image of a drip chamber, the method comprising:

illuminating at least a portion of a drip chamber;

capturing an image of the drip chamber with an image sensor;

determining if there is a visual obstruction in the captured image using a processor operatively coupled to the image sensor;

applying a blurring function, using the processor, to the captured image to filter the captured image upon a determination that there is a visual obstruction in the captured image; and

determining, using the processor, if there is a match to a template in the captured image.

149. The method of claim 148, wherein the template includes at least a partial image of a drop of fluid within the drip chamber.

150. The method of claim 148, wherein the blurring function is a low pass filter, the processor applying the low pass filter to the captured image in either a horizontal direction or a vertical direction.

151. The method of claim 150, wherein the low pass filter includes a one-dimensional Gaussian Blur function.

152. The method of claim 148, wherein the blurring function is a low pass filter, the processor applying the low pass filter to the captured image in both a horizontal direction and a vertical direction.

153. The method of claim 152, wherein the low pass filter includes a two-dimensional Gaussian Blur function.

What is claimed is:

1. A valve comprising:

a housing configured to surround a tube, the housing defining a hole;

a filler disposed within the housing, the filler having at least two differing stiffness layers;

a plunger configured to engage the filler within the housing through the hole to thereby operatively deform the tube within the housing when engaging the filler; and

an actuator operatively coupled to the plunger and configured to actuate the plunger.

2. The valve according to claim 1, wherein the at least two differing stiffness layers includes a stiffer layer and a softer layer.

3. The valve according to claim 2, wherein the softer layer has a shore 00 hardness from about 20 to about 25.

4. The valve according to claim 2, wherein the softer layer has a shore OO hardness from 20 to 25.

5. The valve according to claim 2, wherein the stiffer layer has a shore A hardness of about 15.

6. The valve according to claim 2, wherein the stiffer layer has a shore A hardness of 15.

7. The valve according to claim 1, wherein the actuator is a linear actuator operatively coupled to the plunger to actuate the plunger at least one of into and away from the tube.

8. The valve according to claim 1, wherein the housing includes first and second clamshell portions.

9. The valve according to claim 8, wherein the first clamshell portion is pivotally coupled to the second clamshell portion, wherein the first and second clamshell portions have an open position and a closed position.

10. The valve according to claim 9, further comprising a latch configured to latch the first and second clamshell portions together in the closed position.

11. The valve according to claim 8, wherein the first clamshell portion includes the hole.

12. The valve according to claim 11 , further comprising a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

13. The valve according to claim 1, wherein:

the housing includes first and second clamshell portions,

the first clamshell portion is pivotally coupled to the second clamshell portion,

the first and second clamshell portions have an open position and a closed position, and

the first clamshell portion defines a first portion of a cavity and the second clamshell portion defines a second portion of the cavity such that the first and second clamshells form a cavity when in the closed position.

14. The valve according to claim 13, wherein the at least two differing hardness layers of the filler includes four layers.

15. The valve according to claim 14, wherein the four layers includes first, second, third, and fourth layers, and the first and second layers are within the first portion of the cavity and the third and fourth layers are within the second portion of the cavity.

16. The valve according to claim 15, wherein the first layer is disposed on an inner surface of the first clamshell portion that defines the first portion of the cavity and the second layer is disposed on the first layer.

17. The valve according to claim 16, wherein the second layer defines a channel to guide the tube.

18. The valve according to claim 16, wherein the fourth layer is disposed on an inner surface of the second clamshell portion that defines the second portion of the cavity and the third layer is disposed on the fourth layer.

19. The valve according to claim 18, wherein the third layer defines a channel to guide the tube.

20. The valve according to claim 18, wherein the second layer is stiffer than the first layer.

21. The valve according to claim 20, wherein the third layer is stiffer than the fourth layer.

22. The valve according to claim 1 , further comprising a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

23. The valve according to claim 22, further comprising at least one spring operatively coupled to the guide and the plunger to urge the plunger towards the housing.

24. The valve according to claim 1, wherein the actuator is configured for being controlled by a monitoring client.

25. A system, comprising:

a coupler adapted to couple to a drip chamber;

a support member operatively coupled to the coupler;

an image sensor having a field of view and operatively coupled to the support member, wherein the image sensor is positioned to view the drip chamber within the field of view;

a valve fluidly coupled to the drip chamber to regulate the flow of fluid through the drip chamber, wherein the valve comprises:

a housing configured to surround a tube fluidly coupled to the drip chamber, the housing defining a hole;

a filler disposed within the housing;

a plunger configured to engage the filler within the housing through the hole to thereby operatively deform the tube within the housing when engaging the filler; and

an actuator operatively coupled to the plunger and configured to actuate the plunger; and

at least one processor operatively coupled to the image sensor and to the actuator to operatively control the valve, wherein:

the at least one processor receives image data from the image sensor,

the at least one processor estimates at least one parameter of liquid within the drip chamber using the image data, and the at least one processor actuates the plunger to achieve a target parameter.

26. The system according to claim 25, wherein the at least one parameter is one of a type of formation of the liquid, a volume of the liquid, and a shape of the liquid.

27. The system according to claim 25, wherein the at least one processor determines an existence of a streaming condition using the image data.

28. The system according to claim 25, further comprising a background pattern positioned within the field of view of the image sensor, wherein the drip chamber is between the image sensor and the background pattern.

29. The system according to claim 25, wherein the target parameter is a target flow rate.

30. The system according to claim 25, wherein the target parameter is a target drop-growth rate.

31. The system according to claim 25, wherein the housing of the valve includes first and second clamshell portions.

32. The system according to claim 31, wherein the valve further comprises a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

33. The system according to claim 25,

the housing includes first and second clamshell portions,

the first clamshell portion is pivotally coupled to the second clamshell portion,

the first and second clamshell portions have an open position and a closed position, and

the first clamshell portion defines a first portion of a cavity and the second clamshell portion defines a second portion of the cavity such that the first and second clamshells form a cavity when in the closed position.

34. The system according to claim 33, wherein the at least two differing hardness layers of the filler includes first, second, third, and fourth layers, and the first and second layers are within the first portion of the cavity and the third and fourth layers are within the second portion of the cavity.

35. The system according to claim 34, wherein the first layer is disposed on an inner surface of the first clamshell portion that defines the first portion of the cavity and the second layer is disposed on the first layer.

36. The system according to claim 35, wherein the second layer defines a channel to guide the tube.

37. The system according to claim 35, wherein the fourth layer is disposed on an inner surface of the second clamshell portion that defines the second portion of the cavity and the third layer is disposed on the fourth layer.

38. The system according to claim 37, wherein the third layer defines a channel to guide the tube.

39. The system according to claim 37, wherein the second layer is stiffer than the first layer.

40. The system according to claim 39, wherein the third layer is stiffer than the fourth layer.

41. The system according to claim 25 wherein the valve further comprises a guide coupled to the actuator and to the first clamshell portion, wherein the guide is configured to guide the plunger through the hole of the first clamshell portion.

42. The system according to claim 41, wherein the valve further comprises a spring operatively coupled to the guide and the plunger to urge the plunger away from the housing.

43. The system according to claim 25, wherein the actuator is configured for being controlled by a monitoring client.

44. A system for controlling fluid flow comprising:

a drip chamber holster configured to receive and secure a drip chamber; an imaging device configured to capture images of the drip chamber thereby creating image data;

a light emitting device configured to emit at least at least one pattern of light onto the drip chamber and into the field of view of the imaging device;

a flexible tube defining a lumen operatively connected to the drip chamber, the lumen in fluid communication with the drip chamber; and

a valve axially disposed around a portion of the flexible tube to control flow through the drip chamber, the valve comprising:

a first clamshell portion and a second clamshell portion pivotally connected together to complementarily align to form an enclosure when in a closed position, wherein the enclosure defines an inlet hole and an outlet hole when closed, wherein the first clamshell portion defines a plunger hole; a male latch component coupled to the second housing component opposite the pivot connection;

a female latch component operatively coupled to the first housing component opposite the pivot connection;

a substantially incompressible filler enclosed within the casing, the filler comprising:

a conduit, defined within the filler, sized for a specific tube, wherein the conduit connects the inlet hole and outlet hole of the valve casing; and

a plurality of variations of stiffness in the filler;

a plunger longitudinally aligned with the plunger hole; and an actuator operatively connected to the plunger, to urge the plunger through the plunger aperture thereby engaging the filler and ultimately deform the tube.

45. The system of claim 44, further comprising a safety cutoff comprising:

an occluding mechanism configured to compress the tube into a backstop to thereby reduce area of the lumen defined by the tube;

at least one spring configured to force the occluding mechanism towards the backstop; and

a trigger mechanism configured to retain the occluding mechanism until it is triggered.

46. The system of claim 45, wherein a solenoid applies force to the trigger mechanism to thereby release the occluding mechanism.

47. The system of claim 46 wherein a current responsive material is coupled to the solenoid, the current responsive material applies force to the solenoid which applies force to the trigger mechanism to thereby release the occluding

mechanism.

48. The system of claim 45 wherein the trigger mechanism is comprised of first and second magnets configured to permit alignment of opposite magnetic poles of the first and second magnets.

49. The system of claim 48 wherein the first and second magnets are reconfigured to permit alignment of like magnetic poles of the first and second magnets which applies a repulsive magnetic force to the trigger mechanism to thereby release the occluding mechanism.

50. The system of claim 45 wherein the trigger mechanism is comprised of a magnet and a coil applying a magnetic force.

51. The system of claim 46, further comprising a safety sensor configured to sense unplanned events and transmit safety data related to the unplanned events.

52. The system of claim 51, further comprising a processor configured to receive safety data from the safety sensor and trigger the safety cutoff when predetermined criteria are met.

53. The system of claim 44, further comprising at least one processor operatively connected to the imaging device and the actuator wherein the at least one processor is configured to:

receive imaging data from the imaging device;

estimate a flow rate based on the imaging data;

compare the estimated flow rate to a desired flow rate; and

adjust the actuator to create the desired flow rate.

54. The system of claim 44, wherein portions of the filler material proximate the tube are stiffer than the surrounding filler.

55. The system of claim 44, wherein the plunger head has an area smaller than the longitudinal cross-section of the tube disposed within the housing.

56. The system of claim 44, further comprising an enclosure casing, the casing comprising:

a body; and

a door pivotally connected to the body that creates an enclosure when in the closed position, the enclosure houses the valve.

57. The system of claim 56, further comprising an arm with a first end pivotally connected to the door and a second end connected to the female latch component, wherein the arm is configured to latch closed the first and second valve housing components when the door is closed.

58. The system of claim 56, further comprising an arm pivotally connected to the door at a first end and to the female latch component at a second end, wherein the arm is configured to open the latch and valve housing components when the door is opened.

59. The system of claim 56, further comprising a safety cutoff comprising:

an occluding mechanism configured to compress the tube into a backstop to thereby reduce area of the lumen formed by the tube;

at least one spring forcing the occluding mechanism towards the backstop; and

a trigger mechanism configured to retain the occluding mechanism and release the occluding mechanism when the trigger mechanism is triggered.

60. The system of claim 59, further comprising a biasing means having a first end pivotally connected to the door and a second end configured to operatively reset the safety cutoff, allowing freeflow through the tube when the door is opened.

61. The system of claim 56, further comprising:

at least one cutoff spring to operatively urge the actuator and attached plunger towards the valve casing;

a threaded drive shaft with a first end coupled to an output shaft of the actuator and an opposite second end operatively connected to the plunger allowing for rotational freedom between the plunger and drive shaft; and

a threaded engaging member, operatively coupled to the valve casing, configured to engage the threads on the drive shaft to control position of the plunger and disengage the engaging member from the driveshaft to allow the plunger to drive towards the valve casing, substantially deforming the tube.

62. The system of claim 61, further comprising a spring configured to urge the engaging member towards the drive shaft.

63. The system of claim 62, further comprising an arm with a first end pivotally connected to the door and a second end configured to persuade the threaded engaging member away from the drive shaft when the door is open.

64. The system of claim 56, further comprising

a compression tab located within an aperture in the body of the enclosure casing, wherein the tab creates a high enough compressive force with the body of the outer casing to deform an IV tube positioned therebetween; and

a wedge projecting out of the door, wherein the wedge is configured to align with the tab when the door is closed to thereby wedge the tab open relieving its compressive forces against the tube.

65. The system of claim 44, further comprising a status light configured to inform an operator of the status of the pump by lighting up.

66. The system of claim 65, wherein a first light color indicates fluid flow and a second light color indicates no fluid flow.

67. The system of claim 65, wherein a first light color indicates the system is operational, a second light color indicates the system is paused, and a third light indicates the system has stopped.

68. The system of claim 65, wherein the light flashes every time a drip drops in the drip chamber.

69. The system of claim 44, further comprising an audio output device configured to emit audible information to thereby inform an operator or user of this system.

70. The system of claim 44, wherein the light emitting device uses a laser beam as its source.

71. The system of claim 44, wherein the light emitting device produces a first pattern to cast on an upper portion of the drip chamber and a second pattern to cast on a lower portion of the drip chamber.

72. The system of claim 71, wherein the patterns are created using binary optics.

73. The system of claim 44, further comprising input buttons configured to adjust at least one of parameters and the operations of the system.

74. The system of claim 73, wherein a first input button increases the desired flow rate, a second input button decreases the desired flow rate, a third input button pauses flow rate, and a fourth input button stops the system and cuts off flow.

75. The system of claim 73, wherein the buttons light up to guide an operator through the process of adjusting at least one of parameters and operations of the system through use of the buttons.

76. The system of claim 44, further comprising a display configured to display information pertaining to the system.

77. An apparatus for controlling fluid flow comprising:

an apparatus casing comprising a body and a door, wherein the door and body are pivotally connected and configured to form an enclosure when the door is in a closed configuration;

a drip chamber holder connected to an outside of the casing body;

an image sensor, operatively connected to the apparatus casing, oriented so the drip chamber is in a field of view of the image sensor;

a light emitting device, operatively connected to the apparatus casing, configured to emit at least one beam of light at the drip chamber and into the field of view of the imaging device;

a valve housed within the apparatus casing, the valve comprising:

a first valve housing component and a second valve housing component pivotally connected to complementarily align forming an enclosure when in the closed position, wherein the valve housing defines an inlet hole and an outlet hole when closed, wherein the first valve housing component has a plunger hole;

a male latch component coupled to the second valve housing component opposite the pivot connection;

a female latch component coupled to the first valve housing component opposite the pivot connection;

a substantially incompressible filler enclosed within the valve casing, the filler comprising:

a conduit, defined within the filler, sized for a specific tube, wherein the conduit connects the inlet hole and outlet hole of the valve casing; and

a plurality of layers of varying stiffness;

a plunger longitudinally aligned with the plunger hole; and an actuator operatively connected to the plunger, configured to persuade the plunger in and out of the plunger hole.

78. The apparatus of claim 77, further comprising at least one operator input device disposed within an aperture in the door of the apparatus casing to thereby allow an operator to manually input information, including a desired flow rate, into the apparatus.

79. The apparatus of claim 78, wherein at least one component of the operator input device is a series of buttons.

80. The apparatus of claim 78, wherein at least one component of operator input device is a touch screen display.

81. The apparatus of 78, wherein a processor is configured to receive and process data from the input device and send the data to the respective component of the system.

82. The apparatus of claim 77, further comprising a display disposed within an aperture in the door of the apparatus casing, configured to display infusion information.

83. The apparatus of claim 77, further comprising a processor in communication with the image sensor and the actuator, wherein the processor is configured to:

receive imaging data from the image sensor;

estimate a flow rate based on the imaging data;

compare the estimated flow rate to a desired flow rate; and

adjust the actuator to create the desired flow rate.

84. The apparatus of claim 77, further comprising a safety cutoff comprising:

occluding arms configured to compress the tube into a backstop and reduce the lumen formed by the tube;

at least one spring configured to urge the occluding arms towards the backstop; and

a trigger mechanism configured to retain the occluding arms and when triggered releases the occluding arms.

85. The apparatus of claim 84, wherein a solenoid triggers the trigger mechanism by applying force to the occluding arms to thereby release them from their restrained position.

86. The apparatus of claim 85, further comprising a safety sensor configured to sense unplanned events and transmit data related to the unplanned events.

87. The apparatus of claim 86, wherein a processor is configured to receive safety data from the safety sensor and engage the solenoid by comparing the safety data to predetermined criteria.

88. The apparatus of claim 84, further comprising a resetting arm with a first end pivotally connected to the outer casing door and a second end configured to operatively reset the trigger mechanism when the door is opened.

89. The apparatus of claim 77, wherein:

the female latch component comprises a lever pivotally coupled to the valve housing at a point offset from the end creating a lever, the lever has an input end and an opposite output end;

the male latch component defines a flange; and

the latch components are positioned to allow the output end of the lever to engage an opposing side of the flange when the valve casing is in a closed position, and apply a force to the flange compressing the first and second valve casing components together when the input side of the lever is rotated in a direction that pushes the output of the lever into the flange.

90. The apparatus of claim 89, further comprising a valve closing arm pivotally connected to the apparatus casing door at a first end, and pivotally connected to the input end of the female latch lever at an opposite second end, wherein the guide arm is configured to persuade the output end of the lever to engage with the male latch flange and then rotate the lever to compress the first and second casing components together, by closing the outer casing door.

91. The apparatus of claim 77, further comprising:

a compression tab disposed within an aperture in the body of the apparatus casing, the tab creates a high enough compressive force with the body of the outer casing to deform an IV tube positioned therebetween; and

a wedge projecting out from the casing door, wherein the wedge is configured to align with the tab when the door is closed and wedge the tab open relieving its compressive force directed towards the apparatus casing body.

92. The apparatus of claim 77, wherein the portion of the filler material proximate the tube is stiffer than the surrounding filler.

93. The apparatus of claim 77, wherein the plunger head has an area smaller than the longitudinal cross-section of the tube disposed within the housing.

94. The apparatus of claim 77, further comprising:

an at least one cutoff spring to urge the actuator and the attached plunger towards the valve housing;

a threaded drive shaft with a first end coupled to an output shaft of the actuator and a second end operatively connected to the plunger allowing for rotational freedom between the plunger and drive shaft; and

a threaded engaging member, coupled to the valve housing, having the capability to engage the threaded drive shaft to control position of the plunger and disengage the engaging member from the driveshaft to allow the engaging springs to drive the plunger towards the valve, substantially deforming the tube.

95. The system of claim 94, further comprising a spring configured to urge the engaging member towards the drive shaft.

96. The system of claim 95, further comprising an arm with a first end pivotally connected to the door and a second end configured to persuade the threaded engaging member away from the drive shaft when the door is open.

97. The apparatus of claim 77, further comprising a status light attached to an outer surface of the apparatus in a position where an operator can readily see it.

98. The apparatus of claim 97, wherein a first color of light is emitted when there is fluid flowing through the drip chamber and a second light color is emitted when there is no fluid flow.

99. The apparatus of claim 97, wherein a first color of light is emitted when the apparatus if functioning properly, a second color of light is emitted when a problem has been detected, and a third color is emitted when the apparatus is paused.

100. The apparatus of claim 97, wherein the light flashes every time a drop of fluid falls in the drip chamber.

101. The apparatus of claim 77, further comprising an audio output device configured to emit audio relating to the status of the pump.

102. The apparatus of claim 77, further comprising an audio output device configured to emit audio to assist an operator with operating the pump.

103. The apparatus of claim 77, further comprising a battery configured to supply power to the apparatus.