

CLAIMS

What is claimed is:

1. A method for operating a three-dimensional printer coupled to a data network, the method comprising:
 - receiving a print job from a requester over the data network at the three-dimensional printer, the three-dimensional printer including a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer; and
 - evaluating an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors.
2. The method of claim 1 wherein evaluating the availability includes evaluating the availability for the print job based upon an identity of a user associated with the print job.
3. The method of claim 1 wherein evaluating the availability includes assessing the availability according to a receiving state for the three-dimensional printer.
4. The method of claim 3 wherein the receiving state is selected from a group consisting of open, closed, or authenticated.
5. The method of claim 1 further comprising:
 - when the three-dimensional printer is available, adding the print job to a queue for the three-dimensional printer and initiating fabrication of an object according to the queue; and
 - when the three-dimensional printer is not available, electronically notifying the requester that the print job has been rejected.
6. The method of claim 1 further comprising providing information about a queue for the three-dimensional printer to the requester.

7. The method of claim 6 wherein evaluating the availability of the three-dimensional printer includes accepting the print job only if a supply of build material available for the three-dimensional printer exceeds an amount of build material required for the print job and one or more additional jobs ahead of the print job in the queue.
8. The method of claim 1 wherein evaluating the availability of the three-dimensional printer includes transmitting an image of the three-dimensional printer to the requester, and receiving a manual confirmation to proceed with the print job from the requester.
9. The method of claim 1 wherein evaluating the availability of the three-dimensional printer includes determining a percentage completion of a current print job at the three-dimensional printer.
10. The method of claim 1 wherein evaluating the availability of the three-dimensional printer includes estimating a wait time until the three-dimensional printer will be available and transmitting the wait time to the requester.
11. The method of claim 1 wherein evaluating the availability of the three-dimensional printer includes determining whether the three-dimensional printer is immediately available.
12. The method of claim 1 wherein the plurality of sensors includes a video camera directed toward a working volume of the three-dimensional printer.
13. The method of claim 1 wherein the plurality of sensors includes an optical sensor that detects obstructions within a working volume of the three-dimensional printer.
14. The method of claim 1 wherein the plurality of sensors includes a sensor that

detects a quantity of build material available.

15. The method of claim 1 wherein the plurality of sensors includes a sensor that detects a presence of build material in a material supply feed.

16. The method of claim 1 further comprising identifying one or more alternative three-dimensional printers coupled to the data network as resources available for the print job when the three-dimensional printer is not available.

17. The method of claim 1 further comprising, when the three-dimensional printer is not available, identifying an alternative three-dimensional printer coupled to the data network and redirecting the requester to the alternative three-dimensional printer.

18. The method of claim 17 wherein redirecting includes automatically redirecting the print job without user intervention.

19. The method of claim 17 wherein redirecting includes transmitting a suggestion to the requester to use the alternative three-dimensional printer.

20. The method of claim 1 wherein the print job includes a plurality of objects, the method further comprising identifying a plurality of printers in proximity to the three-dimensional printer and allocating the plurality of objects for concurrent fabrication among the plurality of printers.

21. The method of claim 1 further comprising transmitting status information from one or more of the plurality of sensors to the requester during an execution of the print job.

22. The method of claim 21 further comprising notifying the requester of a successful completion of the print job.

23. The method of claim 21 further comprising notifying the requester if the print job fails to complete.
24. The method of claim 21 wherein the status information includes at least one photograph, and wherein transmitting the status information includes submitting the at least one photograph to a social networking platform.
25. The method of claim 24 wherein the social networking platform includes one or more of Flickr, Twitter, LinkedIn, Google+, and Facebook.
26. The method of claim 1 further comprising securing the print job using a digital rights management technique that restricts execution of the print job to one or more predetermined three-dimensional printers, wherein evaluating the availability of the three-dimensional printer includes determining whether the three-dimensional printer is one of the one or more predetermined three-dimensional printers.
27. A three-dimensional printer comprising:
a network interface configured to receive a print job from a requester over a data network;
a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer; and
a processor configured to evaluate an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors.
28. A computer program product embodied in a non-transitory computer readable medium that, when executing on one or more computing devices, performs the steps of: receiving a print job from a requester over a data network at a three-dimensional printer, the three-dimensional printer including a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer; and

evaluating an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors.

29. A device comprising:

a print server coupled through a data network to a plurality of three-dimensional printers, the print server configured to receive status information from one or more sensors for each one of the plurality of three-dimensional printers and the print server configured to manage a print queue for each one of the plurality of three-dimensional printers;

a database coupled in a communicating relationship with the print server and configured to store print queue data and status information for each one of the plurality of three-dimensional printers; and

a web server configured to provide a user interface over the data network to a remote user, the user interface adapted to present the status information and the print queue data for one or more of the plurality of three-dimensional printers to the user and the user interface adapted to receive a print job from the remote user for one of the plurality of three-dimensional printers.

30. The device of claim 29 further comprising a processor configured to store a plurality of print jobs submitted to the web server in a log and to provide an analysis of print activity based on the log.

31. The device of claim 29 wherein the print queue is managed according to one or more criteria from the remote user for the print job.

32. The device of claim 29 wherein the one or more sensors include at least one video camera, the user interface adapted to present a video feed from the at least one video camera to the remote user through the user interface.

33. The device of claim 29 wherein the one or more sensors include one or more of a

heat sensor, a volume flow rate sensor, a sound sensor, a light sensor, and a weight sensor.

34. The device of claim 29 wherein the print queue includes one or more print jobs for one of the plurality of three-dimensional printers and the print queue is stored in the database.

35. The device of claim 29 wherein the print queue includes one or more print jobs for one of the plurality of three-dimensional printers and the print queue is stored locally at the one of the plurality of three-dimensional printers.

36. The device of claim 29 wherein the print queue includes a plurality of print jobs for one of the plurality of three-dimensional printers and the print queue is allocated between the database and a local memory of the one of the plurality of three-dimensional printers.

37. The device of claim 29 wherein the print server stores a predetermined alternative three-dimensional printer to execute the print job from the remote user in the event of a failure by the one of the plurality of three-dimensional printers.

38. The device of claim 29 wherein the print server maintains exclusive control over at least one of the plurality of three-dimensional printers.

39. The device of claim 29 wherein the print server submits the print job to a first available one of the plurality of three-dimensional printers.

40. The device of claim 29 wherein the user interface is adapted to receive a manual selection of one of the plurality of three-dimensional printers from the remote user to execute the print job.

41. The device of claim 29 wherein the user interface is adapted to receive a batch print job from the remote user, the batch print job including a plurality of related print jobs.
42. The device of claim 41 wherein the user interface is further adapted to receive a specification of permissible allocations of the plurality of related print jobs among the plurality of three-dimensional printers.
43. The device of claim 29 wherein the user interface is adapted to display a current tool path of one of the plurality of three-dimensional printers that executes the print job.
44. The device of claim 29 wherein the user interface is adapted to display a three-dimensional model depicting a current state of completion of an object fabricated according to the print job.
45. The device of claim 29 wherein the status information presented in the user interface includes an image of a working volume of one of the three-dimensional printers that is executing the print job.
46. The device of claim 29 wherein the status information presented in the user interface includes a video image of a working volume of one of the three-dimensional printers that is executing the print job.
47. A system comprising:
a plurality of three-dimensional printers, each one of the plurality of three-dimensional printers including a network interface;
a server configured to manage execution of a plurality of print jobs by the plurality of three-dimensional printers; and
a data network that couples the server and the plurality of three-dimensional printers in a communicating relationship.

48. The system of claim 47, the server further comprising a web-based user interface configured for a user to submit a new print job to the server and to monitor progress of the new print job.

49. The system of claim 48 wherein the web-based user interface permits video monitoring of each one of the plurality of three-dimensional printers.

50. The system of claim 48 further comprising a database of three-dimensional models, wherein the server provides a search engine for locating a particular three-dimensional model in the database of three-dimensional models.

51. The system of claim 50 wherein the search engine is a text-based search engine.

52. The system of claim 50 wherein the search engine is an image-based search engine.

53. A system comprising:

a web server configured to provide a user interface over a data network, the user interface adapted to receive user preferences from a user including a subscription to a plurality of sources of a plurality of three-dimensional models, a prioritization of content from the plurality of sources, and an identification of one or more fabrication resources coupled to the data network and suitable for fabricating objects from the plurality of three-dimensional models;

a database to store the user preferences, and to receive and store the plurality of three-dimensional models as they are issued by the plurality of sources;

a processor configured select a selected one of the plurality of three-dimensional models for fabrication based upon the prioritization; and

a print server configured to communicate with the one or more fabrication resources through the data network, to determine an availability of the one or more

fabrication resources, and to transmit the selected one of the plurality of three-dimensional models to one of the one or more fabrication resources.

54. The system of claim 53 wherein the one or more fabrication resources include a private fabrication resource, and wherein the user provides, as a user preference prior to use of the private fabrication resource, credentials for accessing the private fabrication resource.

55. The system of claim 53 wherein the one or more fabrication resources include a commercial fabrication resource, and wherein the user provides, as a user preference prior to use of the commercial fabrication resource, an authorization to pay for use of the commercial fabrication resource.

56. The system of claim 53 wherein prioritizing content includes prioritizing the content according to source.

57. The system of claim 53 wherein each one of the plurality of sources has a type, and wherein prioritizing content includes prioritizing the content according to the type.

58. The system of claim 53 wherein each one of the three-dimensional models has a type, and wherein prioritizing the content includes prioritizing the content according to the type.

59. The system of claim 53 wherein the processor is further configured to select two or more of the plurality of three-dimensional models for concurrent fabrication by two or more of the plurality of fabrication resources based upon the prioritization when a priority of the two or more of the plurality of three-dimensional models exceeds a predetermined threshold.

60. The system of claim 53 wherein the processor is further configured to adjust the

prioritization based upon a history of fabrication when a number of objects fabricated from one of the plurality of sources exceeds a predetermined threshold.

61. The system of claim 53 wherein one of the plurality of sources includes a source of paid content.

62. The system of claim 53 wherein one of the plurality of sources includes a source of promotional content.

63. The system of claim 53 wherein one of the plurality of sources includes a source of product support content.

64. The system of claim 63 wherein the source of product support content provides at least one of replacement parts and upgrade parts.

65. The system of claim 53 wherein one of the plurality of sources includes a source of contest prizes.

66. The system of claim 53 wherein the processor is further configured to identify one or more additional sources of content based upon a similarity to one of the plurality of sources of content.

67. The system of claim 53 wherein the processor is further configured to identify one or more additional sources of content based upon a social graph of the user.

68. A device comprising:
a three-dimensional printer;
a network interface; and
a processor configured to subscribe to a plurality of sources of content selected by a user for fabrication by the three-dimensional printer through the network interface, to

receive one or more three-dimensional models from the plurality of sources, and to select one of the one or more three-dimensional models for fabrication by the three-dimensional printer according to a user preference for prioritization.

69. The device of claim 68 further comprising a memory configured to store a queue of one or more additional ones of the one or more three-dimensional models not selected for immediate fabrication.

70. The device of claim 69 wherein the processor is further configured to evaluate a new three-dimensional model based upon the user preference for prioritization and to place the new three-dimensional model at a corresponding position in the queue.

71. The device of claim 68 wherein the processor is configured to retrieve content from at least one of the plurality of sources by providing authorization credentials for the user.

72. The device of claim 68 wherein the processor is configured to retrieve content from at least one of the plurality of sources by authorizing a payment from the user to a content provider.

73. The device of claim 68 wherein the processor is configured to search a second plurality of sources of content according to one or more search criteria provided by the user.

74. The device of claim 73 wherein the one or more search criteria include demographic information for the user.

75. The device of claim 73 wherein the one or more search criteria include contextual information for the user.

76. A method for operating a three-dimensional printer comprising:
coupling the three-dimensional printer to a data network;
locating one or more sources of content for fabrication by the three-dimensional printer on the data network according to one or more user-provided criteria;
subscribing to new content from the one or more sources of content;
receiving at least one three-dimensional model from one of the one or more sources of content; and
fabricating an object from the at least one three-dimensional model.
77. The method of claim 76 further comprising:
receiving a plurality of three-dimensional models;
prioritizing fabrication of the plurality of three-dimensional models into an order of fabrication; and
fabricating the plurality of three-dimensional models in the order.
78. A computer program product embodied in a non-transitory computer-readable medium that, when executing on a three-dimensional printer, performs the steps of:
coupling the three-dimensional printer to a data network;
locating one or more sources of content for fabrication by the three-dimensional printer on the data network according to one or more user-provided criteria;
subscribing to new content from the one or more sources of content;
receiving at least one three-dimensional model from one of the one or more sources of content; and
fabricating an object from the at least one three-dimensional model.
79. The computer program product of claim 78 further comprising code that performs the steps of:
receiving a plurality of three-dimensional models;
prioritizing fabrication of the plurality of three-dimensional models into an order of fabrication; and

fabricating the plurality of three-dimensional models in the order.

80. A device comprising:
a three-dimensional printer including a build volume;
a network interface coupled to a data network;
a video camera positioned to capture video of the build volume from a point of view; and
a processor configured to receive a three-dimensional model through the network interface, and to control operation of the three-dimensional printer to fabricate the three-dimensional model as an object within the build volume of the three-dimensional printer, the processor further configured to provide a user interface to a remote user accessing the device through the network interface, and to present in the user interface an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.
81. The device of claim 80 wherein the two-dimensional projection is obtained from a three-dimensional scanner coupled to the processor.
82. The device of claim 80 wherein the two-dimensional projection is simulated based upon operation of the three-dimensional printer.
83. The device of claim 82 wherein the processor is configured to monitor operation of the three-dimensional printer based upon a comparison of the two-dimensional projection with the image of the build volume.
84. The device of claim 80 wherein the two-dimensional projection is dynamically updated to correspond to a state of physical completion of the object.
85. The device of claim 80 wherein the two-dimensional projection is a video image from the video camera.

86. The device of claim 80 wherein the user interface provides at least one control for manual operation of the three-dimensional printer by the remote user.
87. The device of claim 80 wherein the processor is configured to provide credential-based access to the user interface.
88. The device of claim 80 wherein the user interface provides status information for the three-dimensional printer.
89. The device of claim 80 wherein the user interface provides status information for a build process executing on the three-dimensional printer.
90. The device of claim 80 wherein the user interface displays a two-dimensional tool path for the three-dimensional printer, the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer.
91. The device of claim 80 wherein the user interface supports remote access for technical support during local operation of the three-dimensional printer.
92. The device of claim 80 wherein the processor is configured to fabricate a test object, capture an image of the test object, and compare the image to the test object to validate operation of the three-dimensional printer.
93. The device of claim 80 wherein the user interface includes at least one control to capture a frame of data from the video camera as a video image and to transmit the video image to a remote location through the data network.
94. The device of claim 93 wherein the remote location is a social networking site.

95. The device of claim 93 wherein the device is configured to transmit the video image in an electronic mail communication.
96. The device of claim 80 wherein the user interface includes at least one control to capture a stop-motion animation of a fabrication of the object using the video camera.
97. The device of claim 80 wherein the processor is configured to couple the three-dimensional printer in a communicating relationship with a remote print server through the data network.
98. A method comprising:
 providing a three-dimensional printer including a build volume, a network interface coupled to a data network, and a video camera positioned to capture video of the build volume from a point of view;
 receiving a three-dimensional model through the network interface;
 fabricating the three-dimensional model as an object within the build volume of the three-dimensional printer; and
 providing a user interface to a remote user accessing the device through the network interface, wherein the user interface presents an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.
99. The method of claim 98 further comprising transmitting status information over the data network upon completion of the object.
100. The method of claim 99 wherein the status information includes data presented through the user interface.
101. The method of claim 99 wherein the status information includes a digital image

from the video camera.

102. The method of claim 101 wherein the digital image is transmitted with an electronic mail communication confirming completion of the object.

103. A system comprising:

a three-dimensional printer including a build volume;

a video camera directed toward the build volume and configured to provide a video feed of the build volume;

a processor coupled to the three-dimensional printer, the processor configured to provide a web server that serves a web page displaying the video feed; and

a network interface configured to couple the three-dimensional printer and the processor in a communicating relationship with a data network.

104. The system of claim 103 wherein the three-dimensional printer is a fused deposition modeling printer.

105. The system of claim 103 wherein the three-dimensional printer is a stereolithography printer.

106. The system of claim 103 wherein the web server is configured to host a remote user of the three-dimensional printer through the network interface.

107. The system of claim 103 wherein the web server displays status information from one or more sensors of the three-dimensional printer.

108. The system of claim 107 wherein the one or more sensors include a temperature sensor positioned to sense a temperature of a surface of a build platform of the three-dimensional printer.

109. The system of claim 103 wherein the web server is configured to provide queue information for the three-dimensional printer.

110. The system of claim 103 wherein a queue for the three-dimensional printer is stored locally at the three-dimensional printer.

111. The system of claim 103 wherein a queue for the three-dimensional printer is stored at a remote database.

112. The system of claim 103 further comprising a second video camera directed toward other hardware associated with the printer, and to provide a second video feed for display in the web page.

113. The system of claim 103 wherein the network interface includes hardware for short range data communications.

114. The system of claim 113 wherein the network interface include a wired or wireless Ethernet interface.

115. The system of claim 103 wherein the network interface includes a cellular network interface.

116. The system of claim 103 wherein the processor is configured to autonomously connect to a data network to retrieve printable content.

117. The system of claim 103 wherein the processor is configured to respond to a remote request for status of the three-dimensional printer.

118. The system of claim 103 wherein the processor is configured to respond to a remote request for availability of the three-dimensional printer.

119. The system of claim 103 wherein the processor is configured to provide authenticated access to a remote user.

120. The system of claim 103 wherein the processor is configured to provide open access to a remote user.

121. The system of claim 103 further comprising a three-dimensional scanner directed toward the build volume and configured to extract three-dimensional information from the build volume.

122. The system of claim 121 wherein the processor is further configured to obtain status information for the working volume and display the status information on the web page.

123. A three-dimensional printer including a build volume, the three-dimensional printer comprising:

- a three-dimensional scanner configured to capture three-dimensional information from the build volume;

- a machine vision system configured to capture and analyze image content from the three-dimensional scanner, thereby providing a status of a print job executing on the three-dimensional printer;

- a network interface configured to couple the three-dimensional printer in a communicating relationship with a data network; and

- a web server configured to transmit the status of the print job for display at a remote client through the network interface.

124. The system of claim 123 wherein the three-dimensional printer is a fused deposition modeling printer.

125. The system of claim 123 wherein the three-dimensional printer is a stereolithography printer.
126. The system of claim 123 wherein the web server is configured to host a remote user of the three-dimensional printer through the network interface.
127. The system of claim 123 wherein the web server displays status information from one or more sensors of the three-dimensional printer.
128. The system of claim 123 wherein the three-dimensional scanner obtains three-dimensional data using stereoscopic imaging.
129. The system of claim 123 wherein the three-dimensional scanner obtains three-dimensional data using shape from motion.
130. The system of claim 123 wherein the three-dimensional scanner obtains three-dimensional data using structured light techniques.
131. The system of claim 123 wherein the machine vision system provides automatic inspection of an object within the build volume.
132. The system of claim 123 wherein the machine vision system provides a robotic guidance function for the three-dimensional printer.
133. The system of claim 123 wherein the machine vision system provide a pass/fail evaluation of a fabricated object within the build volume.
134. The system of claim 123 wherein the machine vision system provides error detection for an object within the build volume.

135. The system of claim 134 wherein the machine vision system creates an audible alert when an error is detected.
136. The system of claim 134 wherein the machine vision system creates a visual alert when an error is detected.
137. The system of claim 123 wherein the machine vision system tracks actual progress of a print job against a predicted progress of the print job.
138. The system of claim 123 wherein the machine vision system compares an actual three-dimensional result in the build volume with an expected three-dimensional result based upon a source model.
139. The system of claim 138 wherein the machine vision system is configured to abort a fabrication process of the three-dimensional printer upon detection of an unrecoverable error in the fabrication process.
140. The system of claim 138 wherein the machine vision system is configured to detect a misalignment of layers.
141. The system of claim 138 wherein the machine vision system is configured to detect an unexpected surface hole.
142. The system of claim 123 further comprising a processor configured to respond to a remote request for status from the machine vision system.
143. A system comprising:
a print server coupled through a data network to a plurality of three-dimensional printers, the print server configured to receive status information from each one of the plurality of three-dimensional printers and to manage a print queue for each one of the

plurality of three-dimensional printers;

a database coupled in a communicating relationship with the print server and configured to store print queue data and status information for each one of the plurality of three-dimensional printers;

a web server configured to provide a virtual workspace for a user, the virtual workspace including a web-based design interface that permits a user to create and modify a model, and further configured to receive a user command to fabricate the model on one or more of the plurality of three-dimensional printers.

144. The system of claim 143 wherein the virtual workspace includes a search tool for searching one or more databases of printable objects.

145. The system of claim 143 wherein the virtual workspace includes a queue management tool for managing one or more pending prints.

146. The system of claim 143 wherein the virtual workspace includes a status tool for receiving a user specification of one or more preferences for receiving status updates.

147. The system of claim 146 wherein the one or more preferences include notification by electronic mail.

148. The system of claim 146 wherein the one or more preferences include notification by instant text message.

149. The system of claim 143 wherein the virtual workspace includes a tool for managing one or more subscriptions to content.

150. The system of claim 143 wherein the web server automatically selects one of the plurality of three-dimensional printers to fabricate the model according to the user command.

151. The system of claim 150 wherein the web server automatically selects one of the plurality of three-dimensional printers according to one or more user criteria for prioritization of resources.

152. The system of claim 143 wherein the web server receives a manual user selection of one of the plurality of three-dimensional printers to fabricate the model.

153. The system of claim 143 wherein the plurality of three-dimensional printers include a fused deposition modeling printer.

154. The system of claim 143 wherein the plurality of three-dimensional printers include a stereolithography printer.

155. The system of claim 143 wherein the web server displays status information from one or more sensors of the plurality of three-dimensional printer.

156. The system of claim 155 wherein the one or more sensors include a temperature sensor.

157. The system of claim 143 wherein the web server is configured to provide queue information for each of the plurality of the three-dimensional printers.

158. The system of claim 157 wherein a queue for one of the plurality of the three-dimensional printers is stored locally at the one of the plurality of three-dimensional printer.

159. The system of claim 157 wherein a queue for one of the three-dimensional printers is stored in the database.

160. The system of claim 143 wherein the web server is configured to display a video feed from at least one of the plurality of three-dimensional printers.

161. The system of claim 143 further comprising a second database coupled in a communicating relationship with the print server, the database storing printable content for the plurality of three-dimensional printers.

162. The system of claim 161 wherein the web server includes a search tool for the printable content.

163. A system comprising:

a print server coupled through a data network to a plurality of three-dimensional printers, the print server configured to receive status information from each one of the plurality of three-dimensional printers and to manage a print queue for each one of the plurality of three-dimensional printers; and

a database coupled in a communicating relationship with the print server and configured to store print queue data, status information, and a printer location for each one of the plurality of three-dimensional printers;

wherein the print server is configured to determine a location of a mobile system transmitting a print request to the print server, and to select one of the plurality of three-dimensional printers for executing the print request based upon a proximity of the printer location to the location of the mobile system.

164. The system of claim 163 wherein the mobile system includes at least one of a laptop computer and a tablet.

165. The system of claim 163 wherein the mobile system includes at least one of a cellular phone and a smart phone.

166. The system of claim 163 wherein the mobile system includes location awareness

technology.

167. The system of claim 166 wherein the mobile system includes a Global Positioning System.

168. The system of claim 166 wherein the location awareness technology includes cellular network triangulation.

169. The system of claim 163 wherein the print server is configured to initiate a print job based upon the print request at one of the plurality of three-dimensional printers closest to the printer location.

170. The system of claim 163 wherein the plurality of three-dimensional printers include at least one fused deposition modeling system.

171. The system of claim 163 wherein the plurality of three-dimensional printers include at least one stereolithography system.

172. A system comprising:

a three-dimensional printer including a network interface, the three-dimensional printer configured to receive a request to execute a print job from a user through the network interface; and

a processor that controls the three-dimensional printer, the processor configured to conditionally authorize execution of the print job based upon a location of the user.

173. The system of claim 172 wherein the processor is local to the three-dimensional printer.

174. The system of claim 172 wherein the processor is on a print server remote from the three-dimensional printer.

175. The system of claim 172 wherein the location of the user is based upon a mobile system operated by the user.

176. The system of claim 175 wherein the mobile system includes at least one of a cellular phone and a smart phone.

177. The system of claim 175 wherein the mobile system includes at least one of a laptop computer and a tablet.

178. The system of claim 175 wherein the mobile system includes location awareness technology.

179. The system of claim 178 wherein the mobile device includes a Global Positioning System.

180. The system of claim 172 wherein the processor conditionally authorizes execution of the print job only when the user is near a predetermined location.

181. The system of claim 180 wherein the predetermined location includes a geofenced area.

182. The system of claim 172 wherein the processor conditionally authorizes execution of the print job only after a user has visited a predetermined location.

183. A system comprising:
a three-dimensional printer including a build volume;
a video camera directed toward the build volume; and
a user interface for the three-dimensional printer, the user interface including a first control to capture data from the video camera including a stop-motion animation of a

fabrication of an object on the three-dimensional printer, and the user interface including a second control to share the data with a social network platform.

184. The system of claim 183 wherein the user interface is deployed as a web page served by the three-dimensional printer.

185. The system of claim 183 wherein the user interface is deployed as a web page served by a remote print server.

186. The system of claim 185 wherein the user interface includes a group of controls for operation of the three-dimensional printer by a remote user.

187. The system of claim 183 wherein the user interface includes a second control for a frame rate of the stop-motion animation.

188. The system of claim 183 wherein the user interface includes a second control for a duration of the stop-motion animation.

189. The system of claim 183 wherein the three-dimensional printer is a fused deposition modeling printer.

190. The system of claim 183 wherein the three-dimensional printer is a stereolithography printer.

191. The system of claim 183 wherein the user interface includes a search tool for searching one or more databases of printable objects.

192. The system of claim 183 wherein the user interface includes a queue management tool for managing one or more pending prints.

193. The system of claim 183 wherein the user interface includes a status tool for receiving a user specification of one or more preferences for receiving status updates.

194. The system of claim 193 wherein the one or more preferences include notification by electronic mail.

195. The system of claim 193 wherein the one or more preferences include notification by instant text message.

196. The system of claim 183 wherein the user interface includes a tool for managing one or more subscriptions to content.

197. The system of claim 183 wherein the user interface includes a web page that displays status information from one or more sensors of the three-dimensional printer.

198. The system of claim 197 wherein the one or more sensors include a temperature sensor.

199. The system of claim 183 wherein the user interface includes a web page that displays a queue for the three-dimensional printer.

200. The system of claim 183 wherein the user interface includes a web page configured to display a video feed from the video camera.

201. The system of claim 183 wherein the user interface includes a second tool to capture a photograph from the video camera and to forward the photograph to the social networking platform.

202. The system of claim 183 wherein the social networking platform includes at least one of Flickr, Twitter, LinkedIn, Google+, and Facebook.

203. A system comprising:

a print server coupled through a data network to a plurality of three-dimensional printers, the print server configured to receive status information from each one of the plurality of three-dimensional printers and to manage a print queue for each one of the plurality of three-dimensional printers, the print server coupled in a communicating relationship with one or more content sources of three-dimensional objects suitable for fabrication with one of the plurality of three-dimensional printers; and

a processor configured to execute a user interface for the print server, the user interface including a first display area showing available fabrication resources including the plurality of three-dimensional printers and a second display area showing one or more objects available from the one or more content sources, wherein the user interface includes a tool for requesting a fabrication of one of the one or more objects by dragging one of the one or more objects from the second display area to the first display area.

204. The system of claim 203 wherein the user interface includes a video feed from at least one of the plurality of three-dimensional printers.

205. The system of claim 203 wherein the user interface displays a status for at least one of the plurality of three-dimensional printers.

206. The system of claim 205 wherein the status includes an availability of the at least one of the plurality of three-dimensional printers.

207. The system of claim 206 wherein the availability includes an estimated wait time until the at least one of the plurality of three-dimensional printers is available.

208. The system of claim 205 wherein the status includes a percentage completion of a current print job on the one of the plurality of three-dimensional printers.

209. The system of claim 203 wherein at least one of the plurality of three-dimensional printers is a fused deposition modeling printer.

210. The system of claim 203 wherein at least one of the plurality of three-dimensional printers is a stereolithography printer.

211. The system of claim 203 wherein the print queue for at least one of the plurality of three-dimensional printers is stored on the at least one of the plurality of three-dimensional printers.

212. The system of claim 203 wherein the print queue for at least one of the plurality of three-dimensional printers is stored on the print server.

213. A system comprising:

a print server coupled through a data network to a plurality of three-dimensional printers, the print server configured to receive status information from each one of the plurality of three-dimensional printers and to manage a print queue for each one of the plurality of three-dimensional printers, the print server coupled in a communicating relationship with one or more content sources of three-dimensional objects suitable for fabrication with one of the plurality of three-dimensional printers; and

a processor configured to execute a user interface for the print server, the user interface including a first display area showing the print queue for one of the plurality of three-dimensional printers and a second display area showing one or more objects available from the one or more content sources, wherein the user interface includes a tool for requesting a fabrication of one of the one or more objects at the one of the plurality of three-dimensional printers by dragging one of the one or more objects from the second display area to the first display area.

214. The system of claim 213 wherein the user interface includes a video feed from at least one of the plurality of three-dimensional printers.

215. The system of claim 213 wherein the user interface displays a status for at least one of the plurality of three-dimensional printers.

216. The system of claim 215 wherein the status includes an availability of the at least one of the plurality of three-dimensional printers.

217. The system of claim 216 wherein the availability includes an estimated wait time until the at least one of the plurality of three-dimensional printers is available.

218. The system of claim 215 wherein the status includes a percentage completion of a current print job on the one of the plurality of three-dimensional printers.

219. The system of claim 213 wherein at least one of the plurality of three-dimensional printers is a fused deposition modeling printer.

220. The system of claim 213 wherein at least one of the plurality of three-dimensional printers is a stereolithography printer.

221. The system of claim 213 wherein the print queue for at least one of the plurality of three-dimensional printers is stored on the at least one of the plurality of three-dimensional printers.

222. The system of claim 213 wherein the print queue for at least one of the plurality of three-dimensional printers is stored on the print server.

CLAIMS

1. A device comprising:
 - a print server coupled through a data network to a plurality of three-dimensional printers, the print server configured to receive status information from one or more sensors for each one of the plurality of three-dimensional printers and the print server configured to manage a print queue for each one of the plurality of three-dimensional printers;
 - a database coupled in a communicating relationship with the print server and configured to store print queue data and status information for each one of the plurality of three-dimensional printers; and
 - a web server configured to provide a user interface over the data network to a remote user, the user interface adapted to present the status information and the print queue data for one or more of the plurality of three-dimensional printers to the user and the user interface adapted to receive a print job from the remote user for one of the plurality of three-dimensional printers.
2. The device of claim 1 further comprising a processor configured to store a plurality of print jobs submitted to the web server in a log and to provide an analysis of print activity based on the log.
3. The device of claim 1 wherein the print queue is managed according to one or more criteria from the remote user for the print job.
4. The device of claim 1 wherein the one or more sensors include at least one video camera, the user interface adapted to present a video feed from the at least one video camera to the remote user through the user interface.
5. The device of claim 1 wherein the one or more sensors include one or more of a heat sensor, a volume flow rate sensor, a sound sensor, a light sensor, and a weight sensor.
6. The device of claim 1 wherein the print queue includes one or more print jobs for one of the plurality of three-dimensional printers and the print queue is stored in the database.

7. The device of claim 1 wherein the print queue includes one or more print jobs for one of the plurality of three-dimensional printers and the print queue is stored locally at the one of the plurality of three-dimensional printers.
8. The device of claim 1 wherein the print queue includes a plurality of print jobs for one of the plurality of three-dimensional printers and the print queue is allocated between the database and a local memory of the one of the plurality of three-dimensional printers.
9. The device of claim 1 wherein the print server stores a predetermined alternative three-dimensional printer to execute the print job from the remote user in the event of a failure by the one of the plurality of three-dimensional printers.
10. The device of claim 1 wherein the print server maintains exclusive control over at least one of the plurality of three-dimensional printers.
11. The device of claim 1 wherein the print server submits the print job to a first available one of the plurality of three-dimensional printers.
12. The device of claim 1 wherein the user interface is adapted to receive a manual selection of one of the plurality of three-dimensional printers from the remote user to execute the print job.
13. The device of claim 1 wherein the user interface is adapted to receive a batch print job from the remote user, the batch print job including a plurality of related print jobs.
14. The device of claim 13 wherein the user interface is further adapted to receive a specification of permissible allocations of the plurality of related print jobs among the plurality of three-dimensional printers.
15. The device of claim 1 wherein the user interface is adapted to display a current tool path of one of the plurality of three-dimensional printers that executes the print job.

16. The device of claim 1 wherein the user interface is adapted to display a three-dimensional model depicting a current state of completion of an object fabricated according to the print job.

17. The device of claim 1 wherein the status information presented in the user interface includes an image of a working volume of one of the three-dimensional printers that is executing the print job.

18. The device of claim 1 wherein the status information presented in the user interface includes a video image of a working volume of one of the three-dimensional printers that is executing the print job.

19. A system comprising:

a web server configured to provide a user interface over a data network, the user interface adapted to receive user preferences from a user including a subscription to a plurality of sources of a plurality of three-dimensional models, a prioritization of content from the plurality of sources, and an identification of one or more fabrication resources coupled to the data network and suitable for fabricating objects from the plurality of three-dimensional models;

a database to store the user preferences, and to receive and store the plurality of three-dimensional models as they are issued by the plurality of sources;

a processor configured select a selected one of the plurality of three-dimensional models for fabrication based upon the prioritization; and

a print server configured to communicate with the one or more fabrication resources through the data network, to determine an availability of the one or more fabrication resources, and to transmit the selected one of the plurality of three-dimensional models to one of the one or more fabrication resources.

20. The system of claim 19 wherein the one or more fabrication resources include a private fabrication resource, and wherein the user provides, as a user preference prior to use of the private fabrication resource, credentials for accessing the private fabrication resource.

21. The system of claim 19 wherein the one or more fabrication resources include a commercial fabrication resource, and wherein the user provides, as a user preference prior to use of the commercial fabrication resource, an authorization to pay for use of the commercial fabrication resource.
22. The system of claim 19 wherein prioritizing content includes prioritizing the content according to source.
23. The system of claim 19 wherein each one of the plurality of sources has a type, and wherein prioritizing content includes prioritizing the content according to the type.
24. The system of claim 19 wherein each one of the three-dimensional models has a type, and wherein prioritizing the content includes prioritizing the content according to the type.
25. The system of claim 19 wherein the processor is further configured to select two or more of the plurality of three-dimensional models for concurrent fabrication by two or more of the plurality of fabrication resources based upon the prioritization when a priority of the two or more of the plurality of three-dimensional models exceeds a predetermined threshold.
26. The system of claim 19 wherein the processor is further configured to adjust the prioritization based upon a history of fabrication when a number of objects fabricated from one of the plurality of sources exceeds a predetermined threshold.
27. The system of claim 19 wherein one of the plurality of sources includes a source of paid content.
28. The system of claim 19 wherein one of the plurality of sources includes a source of promotional content.

29. The system of claim 19 wherein the processor is further configured to identify one or more additional sources of content based upon a similarity to one of the plurality of sources of content.

30. The system of claim 19 wherein the processor is further configured to identify one or more additional sources of content based upon a social graph of the user.