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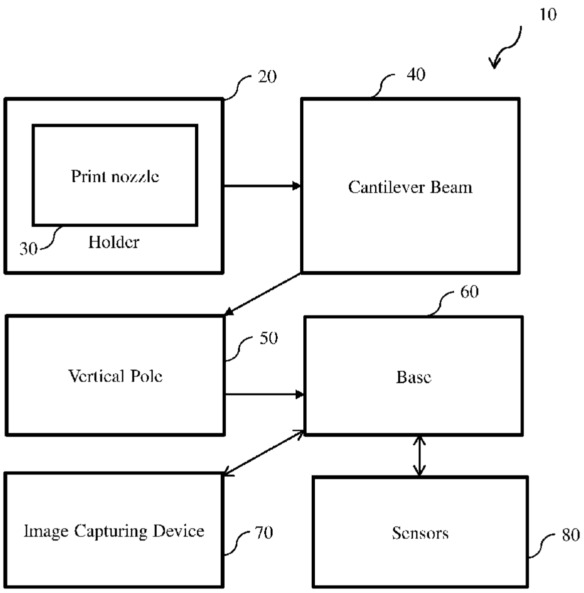

FIG.1

(57) Abstract: A robotic three-dimensional (3D) printer is provided. The robotic 3D printer includes a holder. The holder includes a plurality of print nozzles. The plurality of print nozzles is positioned in at least one of a parallel form and an adjacent form to each other. The plurality of print nozzles allows deposition of a mixture. The robotic 3D printer also includes a cantilever beam configured to allow a horizontal movement of the holder. The robotic 3D printer also includes a vertical pole. The vertical pole is configured to operate the holder, and the cantilever beam. The robotic 3D printer also includes the base. The base is configured to connect with at least one of one or more image capturing devices, and one or more sensors. The robotic 3D printer also includes a plurality of wheels configured to operate the robotic 3D printer at a predetermined direction on a platform.

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ROBOTIC THREE-DIMENSIONAL PRINTER

This International Application claims priority from a complete patent application filed in India having Patent Application No. 201941000103, filed on December 31, 2018 and titled "ROBOTIC THREE-DIMENSIONAL PRINTER"

FIELD OF INVENTION

Embodiments of a present disclosure relate to building construction, and more particularly to a robotic three-dimensional printer.

BACKGROUND

Construction is the process of constructing/making a building or infrastructure. Construction as an industry plays an important role in the economy of a country. A conventional approach needs labours in large number due to manual process which leads to a high production cost. Accidents at construction sites can be caused by several causes, but which makes the conventional technology unsafe. A lot of human intervention needs for the conventional technology which makes the conventional approach as slower.

In a new approach (three-dimensional (3D) construction printing), uses a 3D printing as a core method to build buildings or building components. The 3D printing on a construction industry will have a wide range of applications in private, commercial, industrial and public sectors. An organisation who construct buildings can reduce the number of labours, reduce the cost and increase the speed, safety by using the newer technology (3D printing). At the same time, when it comes to scalability, the newer technology (3D printing) is inefficient because the newer technology uses a gantry model. The gantry model can make structures only in large sizes, and the gantry model cannot place concrete in an edge of the floor where a structural element is built (usually a column with metal or fibre reinforcement).

In another new approach, uses arm-based printing technologies but the arm-based printing technologies are expensive. A yet another approach makes small size structures and assemble the small size structures in the construction sites. The small size structures may overcome the scalability issues, but it will increase the complexity level of a design, and production cost. The small structures make week points at building due to more joints which may affect the durability of the building.

Hence, there is a need for an improved robotic three-dimensional printer to address the aforementioned issues.

BRIEF DESCRIPTION

In accordance with one embodiment of the disclosure, a robotic three-dimensional (3D) printer is provided. The robotic 3D printer includes a holder. The holder includes a plurality of print nozzles. The plurality of print nozzles is positioned in at least one of a parallel form and an adjacent form to each other. The plurality of print nozzles is configured to allow deposition of a mixture on a platform. The robotic 3D printer also includes a cantilever beam operatively coupled to the holder. The cantilever beam is configured to allow a horizontal movement of the holder by using a plurality of rollers. The robotic 3D printer also includes a vertical pole mechanically coupled to a base. The vertical pole is horizontally coupled with the cantilever beam. The vertical pole includes a plurality of bars, and configured to operate the holder, and the cantilever beam. The robotic 3D printer also includes the base operatively coupled with the vertical pole. The base includes at least one of one or more controllers, one or more power supplies, one or more actuator, and one or more gearboxes. The base is configured to connect with at least one of one or more image capturing devices, and one or more sensors.

In accordance with another embodiment of the disclosure, a robotic 3D printer is provided. The robotic 3D printer includes a holder. The holder includes a plurality of print nozzles. The plurality of print nozzles is positioned in at least one of a parallel form and an adjacent form to each other. The plurality of print nozzles is configured to allow deposition of a mixture on a platform. The robotic 3D printer also includes a cantilever beam operatively coupled to the holder. The cantilever beam is configured to allow a horizontal movement of the holder by using a plurality of rollers. The robotic 3D printer also includes a vertical pole mechanically coupled to a base. The vertical pole is horizontally coupled with the cantilever beam. The vertical pole includes a plurality of bars and, configured to operate the holder, and the cantilever beam. The robotic 3D printer also includes the base operatively coupled with the vertical pole. The base includes at least one of one or more controllers, one or more power supplies, one or more actuator, and one or more gearboxes. The base is configured to connect with at least one of one or more image capturing devices, and one or more sensors. The robotic 3D printer includes a processing subsystem. The processing subsystem includes a retrieval module configured to retrieve at least one set of instructions. The processing subsystem also includes a transmission module operatively coupled to the retrieval module, and configured to transmit a retrieved at least one set of instructions to a control module. The processing subsystem also includes a control module operatively coupled to the retrieval module. The control module includes one or more predefined set of instructions. The control module is configured to remotely control the plurality of print nozzles based on the at least one set of instructions. The control module is also configured to enable the plurality of print nozzles to deposit the mixture on the platform based on the one or more predefined set of instructions. The processing subsystem also includes a monitoring module operatively coupled to the at least one of one or more image capturing devices, and one or more sensors. The monitoring module is configured to monitor a deposited mixture on the platform.

To further clarify the advantages and features of the present disclosure, a more particular description of the disclosure will follow by reference to specific embodiments thereof, which are illustrated in the appended figures. It is to be appreciated that these figures depict only typical embodiments of the disclosure and are therefore not to be considered limiting in scope. The disclosure will be described and explained with additional specificity and detail with the appended figures.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure will be described and explained with additional specificity and detail with the accompanying figures in which:

FIG. 1 is a block diagram representation of a robotic three-dimensional (3D) printer in accordance with an embodiment of the present disclosure;

FIG. 2 is an isometric diagram representation of a robotic three-dimensional (3D) printer in accordance with an embodiment of the present disclosure;

FIG. 3 is a block diagram representation of the robotic 3D printer comprising a control module in accordance with an embodiment of the present disclosure;

FIG. 4 is a block diagram representation of an embodiment of the robotic 3D printer of FIG. 3 in accordance with an embodiment of the present disclosure; and

FIG. 5 block diagram of a computer or a server in accordance with an embodiment of the present disclosure.

Further, those skilled in the art will appreciate that elements in the figures are illustrated for simplicity and may not have necessarily been drawn to scale. Furthermore, in terms of the construction of the device, one or more components of the device may have been represented in the figures by conventional symbols, and the figures may show only those specific details that are pertinent to understanding the embodiments of the present disclosure so as not to obscure the figures with details that will be readily apparent to those skilled in the art having the benefit of the description herein.

DETAILED DESCRIPTION

For the purpose of promoting an understanding of the principles of the disclosure, reference will now be made to the embodiment illustrated in the figures and specific language will be used to describe them. It will nevertheless be understood that no limitation of the scope of the disclosure is thereby intended. Such alterations and further modifications in the illustrated system, and such further applications of the principles of the disclosure as would normally occur to those skilled in the art are to be construed as being within the scope of the present disclosure.

The terms "comprise", "comprising", or any other variations thereof, are intended to cover a non-exclusive inclusion, such that a process or method that comprises a list of steps does not include only those steps but may include other steps not expressly listed or inherent to such a process or method. Similarly, one or more devices or sub-systems or elements or structures or components preceded by "comprises... a" does not, without more constraints, preclude the existence of other devices, sub-systems, elements, structures, components, additional devices, additional sub-systems, additional elements, additional structures or additional components. Appearances of the phrase "in an embodiment", "in another embodiment" and similar language throughout this specification may, but not necessarily do, all refer to the same embodiment.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by those skilled in the art to which this disclosure belongs. The system, methods, and examples provided herein are only illustrative and not intended to be limiting.

In the following specification and the claims, reference will be made to a number of terms, which shall be defined to have the following meanings. The singular forms “a”, “an”, and “the” include plural references unless the context clearly dictates otherwise.

Embodiments of the present disclosure relate to a robotic three-dimensional (3D) printer. The robotic 3D printer includes a holder. The holder includes a plurality of print nozzles. The plurality of print nozzles is positioned in at least one of a parallel form and an adjacent form to each other. The plurality of print nozzles is configured to allow deposition of a mixture on a platform. The robotic 3D printer also includes a cantilever beam operatively coupled to the holder. The cantilever beam is configured to allow a horizontal movement of the holder by using a plurality of rollers. The robotic 3D printer also includes a vertical pole mechanically coupled to a base. The vertical pole is horizontally coupled with the cantilever beam. The vertical pole includes a plurality of bars, and configured to operate the holder, and the cantilever beam. The robotic 3D printer also includes the base operatively coupled with the vertical pole. The base includes at least one of one or more controllers, one or more power supplies, one or more actuator, and one or more gearboxes. The base is configured to connect with at least one of one or more image capturing devices, and one or more sensors.

FIG. 1 is a block diagram representation of a robotic three-dimensional (3D) printer (10) in accordance with an embodiment of the present disclosure. As used herein, the term ‘three-dimensional printing’ is defined as any of various processes in which material is joined or solidified under computer control to create a 3D object. Further, 3D printing is a computer-controlled sequential layering of materials to create 3D shapes. The 3D printing is particularly useful for prototyping and for the manufacture of geometrically complex components. In the construction industry, 3D printing can be used to create construction components or to 'print' entire buildings.

The robotic 3D printer (10) includes a holder (20) as shown in FIG. 2. The holder (20) includes a plurality of print nozzles (30) as shown in FIG. 2. The plurality of print nozzles (30) is configured to allow deposition of a mixture on a platform. In such embodiment, the plurality of print nozzles (30) may be replaced with one or more brushes, and one or more plastering pans for painting, plastering, cleaning windows and the like. In another such embodiment, the mixture may include, but not limited to, a geo-polymer cement concrete, a bituminous concrete, a polymer concrete and the like. In another such embodiment, the platform may be a floor or a predetermined area that needs to be built. Each of the plurality of print nozzles (30) is positioned in at least one of a parallel form and an adjacent form to each other. In one embodiment, a shape of the plurality of nozzles (30) may be at least one of a circular shape, an elliptical shape, a conical shape, and a polygonal shape.

The robotic 3D printer (10) also includes a cantilever beam (40) as shown in FIG. 2. The cantilever beam (40) operatively coupled to the holder (20). The cantilever beam (40) is configured to allow a horizontal movement of the holder (20) by using a plurality of rollers. In one embodiment, cantilever beam (40) is equipped with the plurality of print nozzle (30) of interchangeable diameters. In one embodiment, the plurality of rollers is operated by a plurality of actuators. In such embodiment, the plurality of actuators includes at least one of one or more stepper motors, one or more servo motors, one or more pneumatic machines, and one or more of hydraulic pistons. Furthermore, the robotic 3D printer (10) also includes a vertical pole (50) as shown in FIG. 2. The vertical pole (50) mechanically coupled to a base (60). The vertical pole (50) is horizontally coupled with the cantilever beam (40). The vertical pole (50) includes a plurality of bars, and configured to operate the holder (20) and the cantilever beam (40). In one embodiment, the base (60) may be composed of at least one of steel aluminium, hard plastic and fibre reinforced composite material.

The robotic 3D printer (10) also includes the base (60) as shown in FIG. 2. The base (60) operatively coupled with the vertical pole (50). As used herein, the term ‘base’ is defined as a part on which a vertical pole (130) is placed. The base (60) includes at least one of one or more controllers, one or more power supplies, one or more actuator and one or more gearboxes. The base (60) is positioned on the plurality of wheels which allows the robotic 3D printer to print the mixture layer by layer at a predetermined direction on the platform.

The base (60) is configured to connect with at least one of one or more image capturing devices (70) and one or more sensors (80). In one embodiment, the one or more image capturing devices (70) may include at least one of a still camera and a video camera to determine the area in which the printing needs to be done. In such embodiment, the at least one of a still camera and a video camera may be placed on the floor. In one exemplary embodiment, the one or more sensors (80) may include at least one of a position sensor, a proximity sensor, an infrared (IR) sensor and the like. The robotic 3D printer (10) includes a plurality of wheels configured to operate the robotic 3D printer (10) at the predetermined direction on the platform. The robotic 3D printer (10) includes a flat surface (66) as shown in FIG. 2. The flat surface (66) may be used to place the computing device. In such embodiment, the computing device may be a hand-held device may be a laptop, a desktop, a notebook, a tablet, a smartphone and the like. In such another embodiment, the computing device may be a portable device. The base (60) is positioned on the plurality of wheels which allows the robotic 3D printer to print the mixture layer by layer at a predetermined direction on the platform.

Furthermore, the robotic 3D printer (10) includes a plurality of metal plates (62) as shown in FIG. 2. The cantilever beam (40) is joined to the vertical pole (50) by using a plurality of metal plates (62). The robotic 3D printer (10) includes a plurality of wheels (64) configured to operate the robotic 3D printer (10) at the predetermined direction on the platform. The flat surface (66) is configured to place a computing device on the robotic 3D printer (10). In such embodiment, the computing device may be a hand-held device may be a laptop, a desktop, a notebook, a tablet, a smartphone and the like. In such another embodiment, the computing device may be a portable device.

FIG. 3 is a block diagram representation of the robotic three-dimensional (3D) printer comprising a control module in accordance with an embodiment of the present disclosure. The robotic 3D printer (90) includes a holder (100). The holder (100) includes a plurality of print nozzles (110) configured to allow deposition of a mixture on a platform. In such embodiment, the plurality of print nozzles (110) may be replaced with one or more brushes, and one or more plastering pans for painting, plastering, cleaning windows and the like. In another such embodiment, the mixture may include, but not limited to, a geo-polymer cement concrete, a bituminous concrete, a polymer concrete and the like. In yet another such embodiment, the platform may be a floor or a predetermined area that needs to be built.

Each of the plurality of print nozzles (100) is positioned in at least one of a parallel form and an adjacent form to each other. In one embodiment, a shape of the plurality of nozzles (110) may be at least one of a circular shape, an elliptical shape, a conical shape, and a polygonal shape. The robotic 3D printer (90) also includes a cantilever beam (120) operatively coupled to the holder (100). The cantilever beam (120) is configured to allow a horizontal movement of the holder (100) by using a plurality of rollers. In one embodiment, cantilever beam (120) is equipped with the plurality of print nozzle (30) of interchangeable diameters. In one embodiment, the plurality of rollers operated by a plurality of actuators. In such embodiment, the plurality of actuators includes at least one of one or more stepper motors, one or more servo motors, one or more pneumatic machines, and one or more of hydraulics pistons.

Furthermore, the robotic 3D printer (90) also includes a vertical pole (130) mechanically coupled to a base (140). The vertical pole (130) is horizontally coupled with the cantilever beam (120). The vertical pole (130) includes a plurality of bars and, configured to operate the holder (100), and the cantilever beam (120). In one embodiment, the base (140) may be composed of at least one of steel aluminium, hard plastic and fibre reinforced composite material.

The robotic 3D printer (90) also includes the base (140) operatively coupled with the vertical pole (130). As used herein, the term ‘base’ is defined as a part on which a vertical pole (130) is placed. The base (140) includes at least one of one or more controllers, one or more power supplies, one or more actuator, and one or more gearboxes. The base (140) is positioned on the plurality of wheels (218) which allows the robotic 3D printer (90) to print the mixture layer by layer at a predetermined direction on the platform. The base (140) is configured to connect with at least one of one or more image capturing devices (150), and one or more sensors (160). In one embodiment, the one or more image capturing devices (150) may include at least one of a still camera and a video camera to determine the area in which the printing needs to be done. In such embodiment, the at least one of a still camera and a video camera may be placed on the floor.

In one exemplary embodiment, the one or more sensors (160) may include at least one of a position sensor, a proximity sensor, IR sensor and the like. The robotic 3D printer (90) includes a plurality of wheels (218) configured to operate the robotic 3D printer (90) at a predetermined direction on the platform.

Furthermore, the robotic 3D printer (90) includes a processing subsystem (170), wherein the processing subsystem (170) includes a retrieval module (180). The retrieval module (180) is configured to retrieve at least one set of instructions. In one embodiment, the at least one set of instructions may include a design that needs to be print by the robotic 3D printer. In one embodiment, the set of instructions may be a 'G-Code' (G-Programming Language). In another embodiment, the set of instructions may be an 'M-Code' (Machine Code). In such embodiment, the G-Code and M-Code are received from one or more users. As used herein, the term 'G-code' is defined as a language in which people instruct a computerized machine tools one or more procedure to make the product.

As used herein, the term 'M-Code' is defined as codes that tell a machine how to perform an action. Further, M-Codes allow a user to create programming calls for complex processes, activating or deactivating outputs, reading inputs, performing math. In one embodiment, the one or more users provide the at least one set of instructions via a computing device. In such embodiment, the computing device may be a hand-held device may be a laptop, a desktop, a notebook, a tablet, a smartphone and the like. In such another embodiment, the computing device may be a portable device.

The processing subsystem (170) also includes a transmission module (190) operatively coupled to the retrieval module (180). The transmission module (190) is configured to transmit a retrieved at least one set of instructions to a control module (200). The processing subsystem (170) also includes a control module operatively coupled to the retrieval module (180). The control module (200) includes one or more predefined set of instructions. The control module (200) is configured to remotely control the plurality of print nozzles (100) based on the at least one set of instructions upon comparing with the one or more predefined set of instructions.

The control module (200) is also configured to enable the plurality of print nozzles (100) to deposit the mixture on the platform based on the at least one set of instructions upon comparing with the one or more predefined set of instructions. The processing subsystem (170) also includes a monitoring module (210) operatively coupled to the one or more image capturing devices (150), and the one or more sensors (160). The monitoring module (210) is configured to monitor a deposited mixture which is deposited on the platform.

FIG. 4 is a block diagram representation of an embodiment of the robotic 3D printer of FIG. 3 in accordance with an embodiment of the present disclosure. A user 'X' (230) sends at least one set of instructions to a retrieval module (260) via a user hand-held device (240). The at least one set of instructions includes a design of a building that needs to be built. The set of instructions is in G-Code and M-Code. The transmission module (270) transmits the at least one set of instructions from the retrieval module (260) to a control module (280). The control module (280) is connected to a plurality of nozzles (310).

The control module (280) includes one or more predefined set of instructions. The control module (280) controls the plurality of print nozzles (310) remotely based on at least one set of instructions upon comparing the one or more predefined set of instructions. The control module (280) enables the plurality of print nozzles (310) to deposit a concrete cement mixture on a platform based on the at least one set of instructions upon comparing the one or more predefined set of instructions. A monitoring module (290) is communicatively connected to a camera 'Y' (350) and one or more sensors (360). The monitoring module (290) monitors a deposited concrete cement mixture on the platform, and determines the area in which needs to be built. The camera “Y” (350) is placed on the floor. The user hand-held device (240) receives an output of the 3D printing by using the camera ‘Y’ (350) and the one or more sensors (360). The robotic 3D printer (220) includes a plurality of wheels (368) that operates at a predetermined direction on the platform.

The retrieval module (260), transmission module (270), the control module (280), the monitoring module (290), the plurality of print nozzles (310), the camera ‘Y’ (350), and the one or more sensors (360) in the FIG. 3 are substantially similar to a retrieval module (180), a transmission module (190), a control module (200), a monitoring module (210), a plurality of nozzles (110), one or more image capturing devices (150), and one or more sensors (160) of FIG. 2.

FIG. 5 is a block diagram of a computer or a server in accordance with an embodiment of the present disclosure. The system (370) includes a processor(s) (400), and a memory (380) coupled to the processor(s) (400).

The processor(s) (400), as used herein, means any type of computational circuit, such as, but not limited to, a microprocessor, a microcontroller, a complex instruction set computing microprocessor, a reduced instruction set computing microprocessor, a very long instruction word microprocessor, an explicitly parallel instruction computing microprocessor, a digital signal processor, or any other type of processing circuit, or a combination thereof.

Computer memory elements may include any suitable memory device(s) for storing data and executable program, such as read only memory, random access memory, erasable programmable read only memory, electrically erasable programmable read only memory, hard drive, removable media drive for handling memory cards and the like. Embodiments of the present subject matter may be implemented in conjunction with program modules, including functions, procedures, data structures, and application programs, for performing tasks, or defining abstract data types or low-level hardware contexts. Executable program stored on any of the above-mentioned storage media may be executable by the processor(s).

The memory (380) includes a plurality of modules stored in the form of executable program which instructs the processor to perform designated steps. The memory (380) has following modules: a retrieval module (180), a transmission module (190), a control module (200), and a monitoring module (210). The retrieval module (180) is configured to retrieve at least one set of instructions. The transmission module (190) operatively coupled to the retrieval module (180) and configured to transmit a retrieved at least one set of instructions to the control module (200). The control module (200) is operatively coupled to the retrieval module (180). The control module (200) includes one or more predefined set of instructions. The control module (200) is configured to remotely control the plurality of print nozzles (110) based on the at least one set of instructions upon comparing with the one or more predefined set of instructions. The control module is also configured to enable the plurality of print nozzles to deposit the mixture on the platform based on the at least one set of instructions upon comparing with the one or more predefined set of instructions. The monitoring module (210) operatively coupled to the one or more image capturing devices (150), and the one or more sensors (160). The monitoring module (210) is configured to monitor a deposited mixture on the platform.

Various embodiments of the present disclosure enable the robotic 3D printer to reduce number of labours due to automation process. The present disclosure enables the robotic 3D printer to decrease cost of construction, and increase speed & safety because of no human intervention. Further, the present disclosure can print structures and buildings in any predetermined direction on the platform. The present disclosure solves the scalability issues because the present disclosure can make/print small and big structures/buildings anywhere based on a requirement of the one or more users.

While specific language has been used to describe the disclosure, any limitations arising on account of the same are not intended. As would be apparent to a person skilled in the art, various working modifications may be made to the method in order to implement the inventive concept as taught herein.

The figures and the foregoing description give examples of embodiments. Those skilled in the art will appreciate that one or more of the described elements may well be combined into a single functional element. Alternatively, certain elements may be split into multiple functional elements. Elements from one embodiment may be added to another embodiment. For example, order of processes described herein may be changed and are not limited to the manner described herein. Moreover, the actions of any flow diagram need not be implemented in the order shown; nor do all of the acts need to be necessarily performed. Also, those acts that are not dependant on other acts may be performed in parallel with the other acts. The scope of embodiments is by no means limited by these specific examples.

WE CLAIM:

1. A robotic three-dimensional (3D) printer (10) comprising:

a holder (20) comprising a plurality of print nozzles (30), wherein each of the plurality of print nozzles (30) is positioned in at least one of a parallel form and an adjacent form to each other, wherein the plurality of print nozzles (30) is configured to:

allow deposition of a mixture on a platform;

a cantilever beam (40) operatively coupled to the holder (20), and configured to allow a horizontal movement of the holder (20) by using a plurality of rollers;

a vertical pole (50) mechanically coupled to a base (60), wherein the vertical pole (50) is horizontally coupled with the cantilever beam (40), wherein the vertical pole (50) comprises a plurality of bars, wherein the vertical pole (50) is configured to operate the holder (20), and the cantilever beam (40); and

the base (60) operatively coupled with the vertical pole (50), wherein the base (60) comprises at least one of one or more controllers, one or more power supplies, one or more actuator, and one or more gearboxes, wherein the base (60) is configured to connect with at least one of one or more image capturing devices (70), and one or more sensors (80).

2. The robotic three-dimensional (3D) printer (10) as claimed in claim **1**, wherein shape of the plurality of print nozzles (30) in at least one of a circular shape, an elliptical shape, a conical shape, and a polygonal shape.

3. The robotic three-dimensional (3D) printer (10) as claimed in claim **1**, wherein the base (60) is composed of at least one of steel, aluminium, hard plastic and fibre reinforced composite material.

4. The robotic three-dimensional (3D) printer (10) as claimed in claim **1**, wherein the plurality of actuators comprises at least one of one or more stepper

motors, one or more servo motors, one or more pneumatic machines, and one or more of hydraulics pistons.

5. The robotic three-dimensional (3D) printer (10) as claimed in claim **1**, further comprises a plurality of wheels configured to operate the robotic three-dimensional (3D) printer (10) at a predetermined direction on the platform.

6. A robotic three-dimensional (3D) printer (90) comprising:

a holder (100) comprising a plurality of print nozzles (110), wherein each of the plurality of print nozzles (110) is positioned in at least one of a parallel form and an adjacent form to each other, wherein the plurality of print nozzles (110) is configured to:

allow deposition of a mixture on a platform;

a cantilever beam (120) operatively coupled to the holder (100), and configured to allow a horizontal movement of the holder (100) by using a plurality of rollers;

the vertical pole (130) mechanically coupled to a base (140), wherein the vertical pole (130) is horizontally coupled with the cantilever beam (120), wherein the vertical pole (130) comprises a plurality of bars, wherein the vertical pole (130) is configured to operate the holder (100), and the cantilever beam (120);

the base (140) operatively coupled with the vertical pole (130), wherein the base (140) comprises at least one of one or more controllers, one or more power supplies, one or more actuator, and one or more gearboxes, wherein the base (140) is configured to connect with at least one of one or more image capturing devices (150), and one or more sensors (160);

a processing subsystem (170) comprising:

a retrieval module (180) is configured to retrieve at least one set of instructions;

a transmission module (190) operatively coupled to the retrieval module (180), wherein the transmission module (190) is configured to transmit a retrieved at least one set of instructions to a control module (200);

the control module (200) operatively coupled to the retrieval module (180), wherein the control module (200) comprises one or more predefined set of instructions, wherein the control module (200) is configured to:

remotely control the plurality of print nozzles (110) based on the at least one set of instructions upon comparing with the one or more predefined set of instructions;

enable the plurality of print nozzles (110) to deposit the mixture on the platform based on the at least one set of instructions upon comparing with the one or more predefined set of instructions; and

a monitoring module (210) operatively coupled to the one or more image capturing devices (150), and the one or more sensors (160), wherein the monitoring module (210) is configured to monitor the mixture on the platform.

7. The robotic three-dimensional (3D) printer (90) as claimed in claim **6**, wherein shape of the plurality of print nozzles (110) in at least one of a circular shape, an elliptical shape, a conical shape, and a polygonal shape.

8. The robotic three-dimensional (3D) printer (90) as claimed in claim **6**, wherein the base (140) is composed of at least one of steel, aluminium, hard plastic and fibre reinforced composite material.

9. The robotic three-dimensional (3D) printer (90) as claimed in claim **6**, wherein the plurality of actuators comprises at least one of one or more stepper motors, one or more servo motors, one or more pneumatic machines, and one or more of hydraulics pistons.

10. The robotic three-dimensional (3D) printer (90) as claimed in claim **6**, further comprises a plurality of wheels configured to operate the robotic three-dimensional (3D) printer (90) at a predetermined direction on the platform.

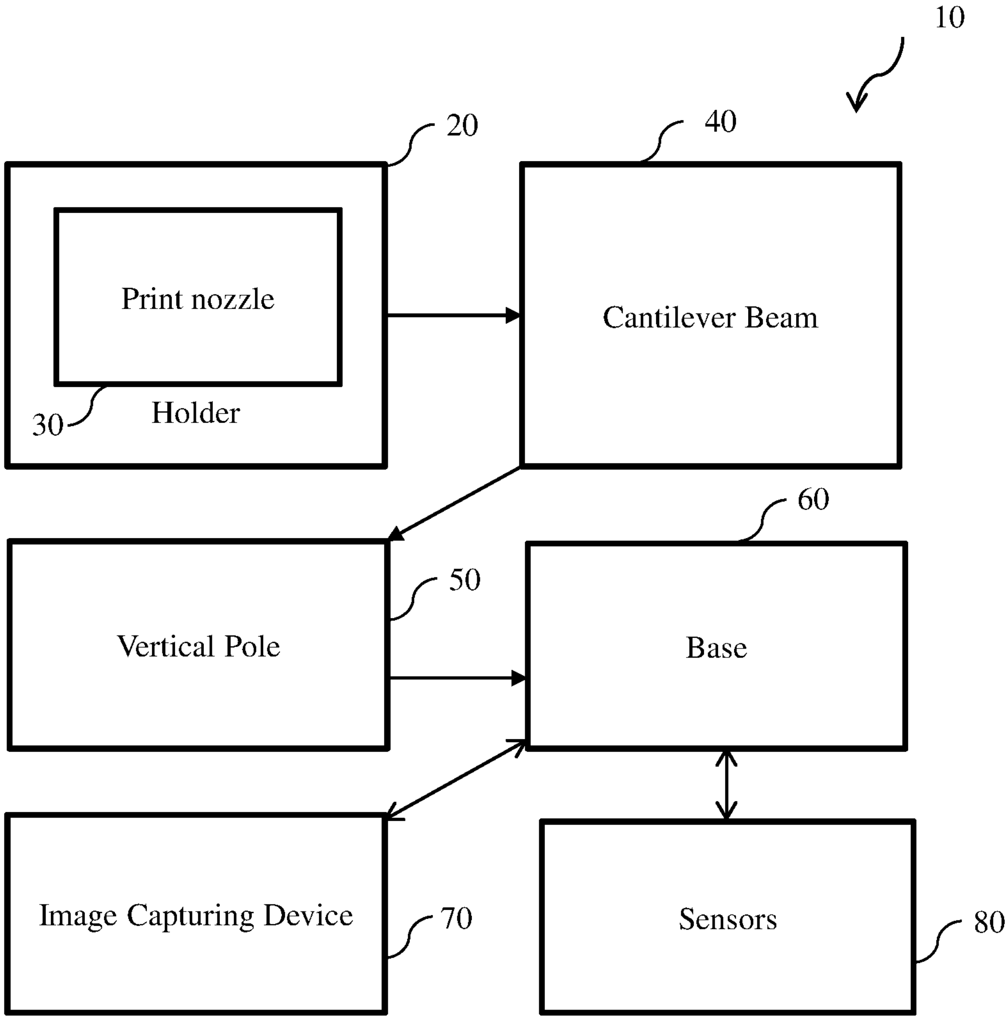
10
20
40
Print nozzle
Cantilever Beam
30
Holder
60
Vertical Pole
50
Base
Image Capturing Device
70
Sensors
80

FIG.1

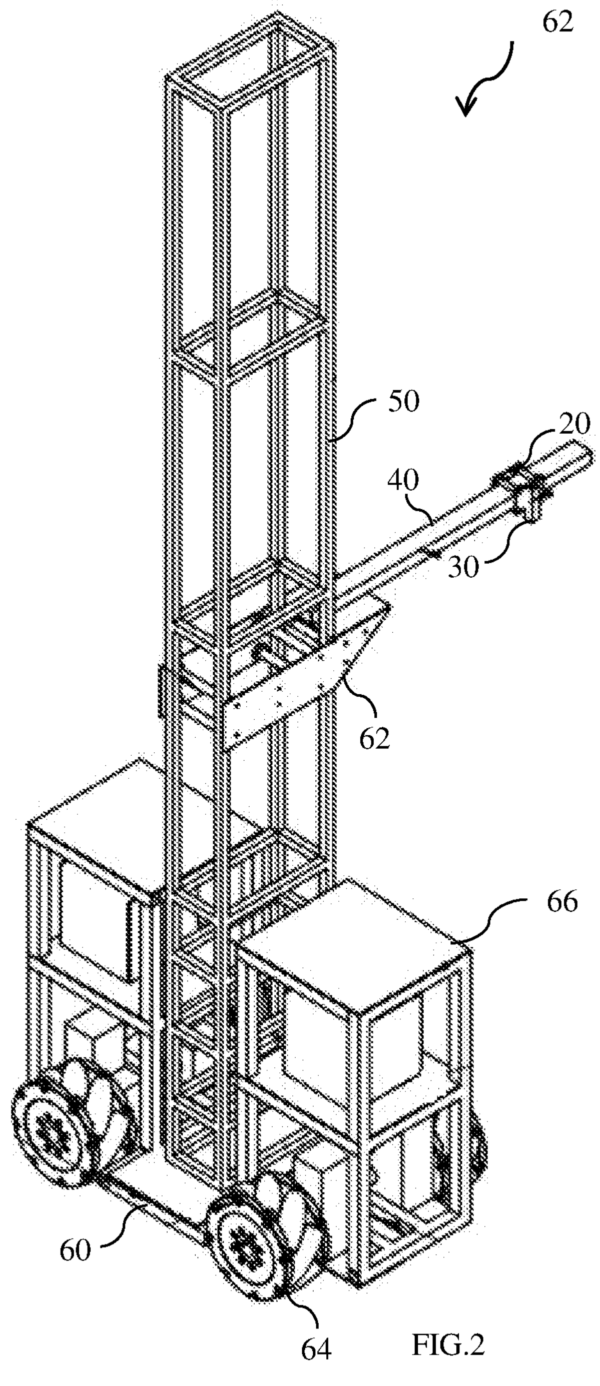

FIG.2

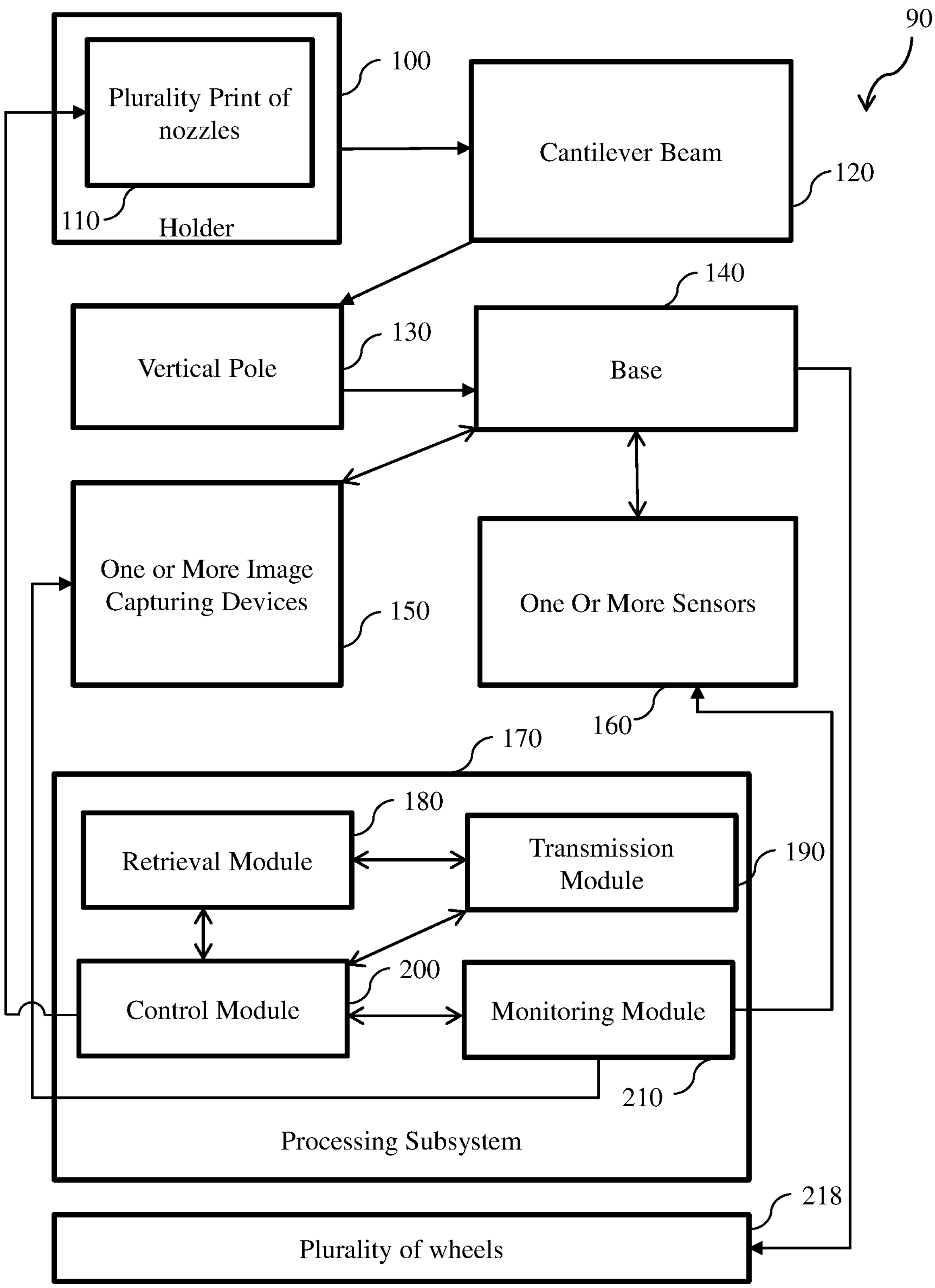
90
Plurality Print of nozzles
100
110
Holder
Cantilever Beam
120
140
Vertical Pole
130
Base
One or More Image Capturing Devices
150
One Or More Sensors
160
170
180
Retrieval Module
Transmission Module
190
200
Control Module
Monitoring Module
210
Processing Subsystem
218
Plurality of wheels

FIG.3

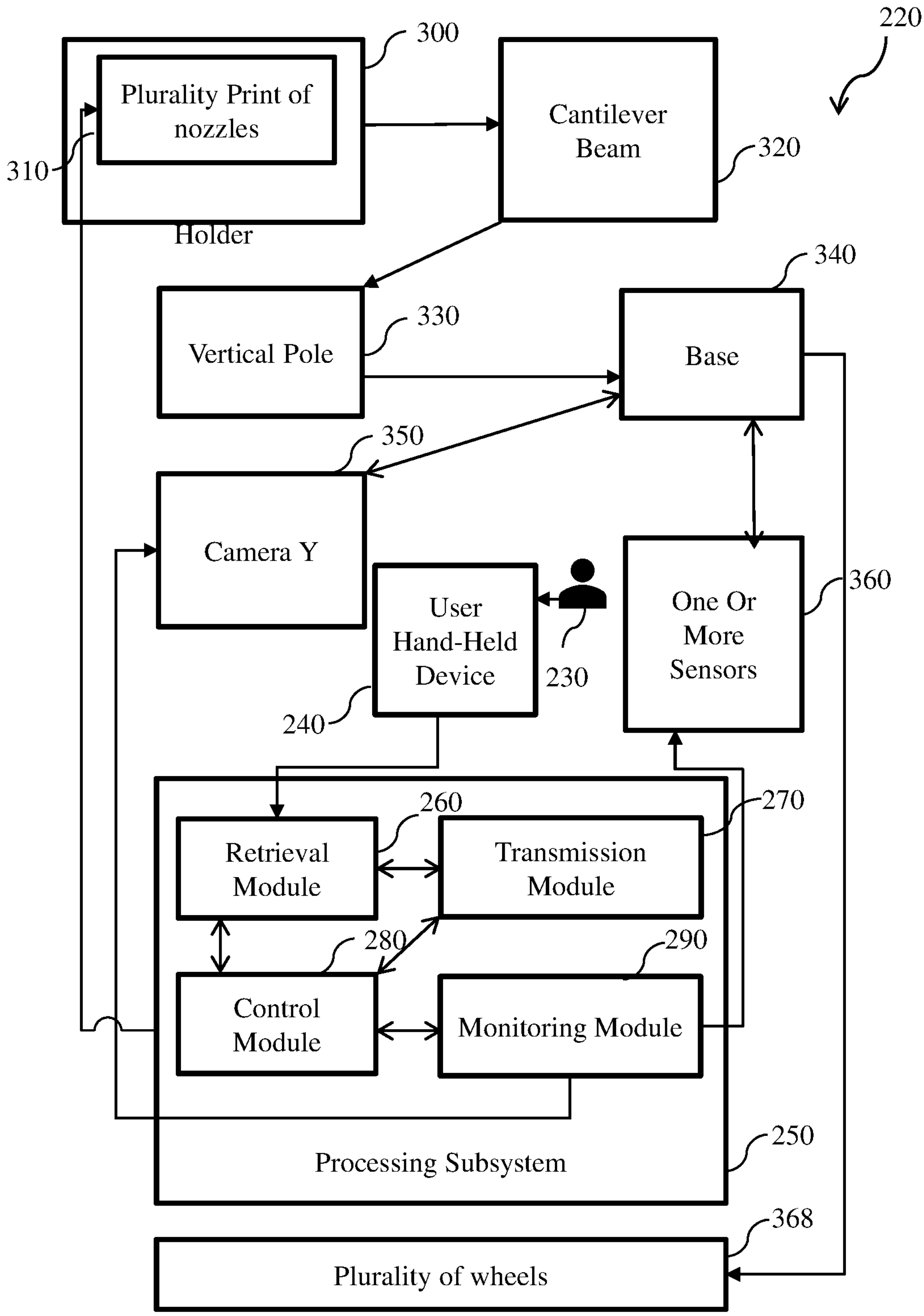
220
300
Plurality Print of nozzles
310
Holder
Cantilever Beam
320
Vertical Pole
330
Base
340
350
Camera Y
User Hand-Held Device
230
One Or More Sensors
360
240
Retrieval Module
260
Transmission Module
270
280
290
Control Module
Monitoring Module
Processing Subsystem
250
368
Plurality of wheels

FIG.4

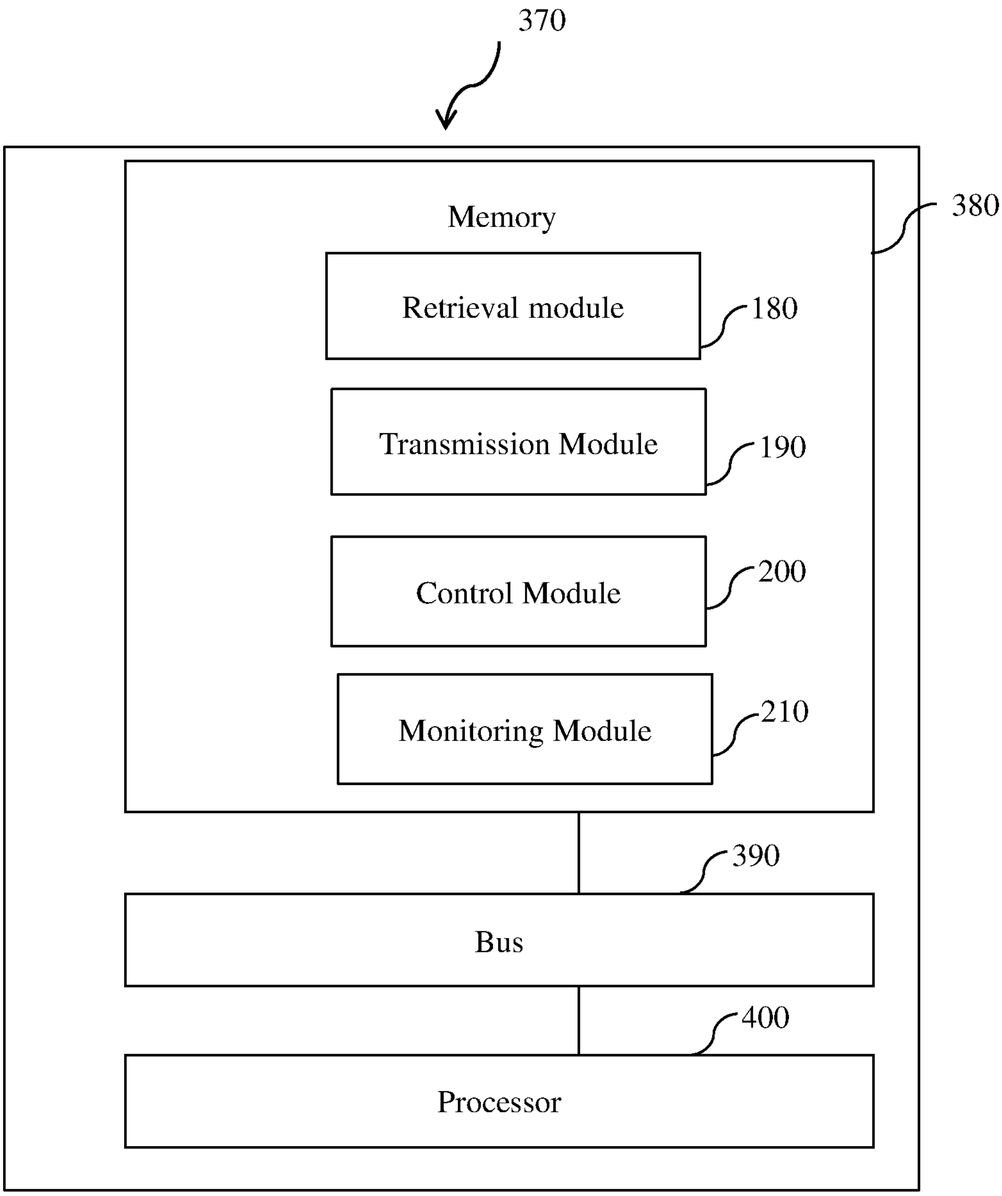
370
Memory
380
Retrieval module
180
Transmission Module
190
Control Module
200
Monitoring Module
210
390
Bus
400
Processor

FIG.5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2019/060424

A. CLASSIFICATION OF SUBJECT MATTER
E04G21/02,B33Y30/00 Version=2020.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04G21/02,B33Y30/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

TotalPatent One, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP2892708B1 Aprecia Pharmaceuticals LLC) 10 October 2018 (10.10.2018) Paragraphs 0010,0012,0013; Paragraph 0027 lines-39-43; Paragraph 0040 lines-18-22; Paragraph 0071, lines-10-12, lines-25-38	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18-02-2020	18-02-2020

Name and mailing address of the ISA/	Authorized officer
Indian Patent Office Plot No.32, Sector 14,Dwarka,New Delhi-110075 Facsimile No.	Sai Sandeep Venkata Palakolanu Telephone No. +91-1125300200

Citation	Pub.Date	Family	Pub.Date
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