CLAIMS

1. An irrigation system for performing an irrigation process to supply water across one or more zones of at least one level comprising

a server (110) having a processor for managing operation of the irrigation system through wireless communication;

a piping system including one or more pipelines (122), with each pipeline (122) being provided at each zone to deliver water from a water source (123), and having at least one valve (125);

an irrigation management module that runs an irrigation determining process, having one or more types of sensors for obtaining environmental data to determine watering needs for each zone; and

an irrigation controller configured to regulate water delivery through controlling opening and closing of the valve (125) based on the environmental data;

wherein the irrigation determining process is configured to run for each valve (125), in a one-by-one manner when there is more than one valve (125) in a same pipeline (122); and

wherein the irrigation determining process of the valve (125) is configured to end when the irrigation controller fails to instruct opening or closing of the valve (125) or when the valve (125) fails to respond to an instruction from the irrigation controller to open or close, and the irrigation management module moves on to run the irrigation determining process on a subsequent valve (125) within the same pipeline (122).

2. The irrigation system according to claim 1, wherein the irrigation system is configured to customize the irrigation process including any one or a combination of the irrigation determining process, frequency of irrigation,

irrigation time, and duration of irrigation, for each zone, level, or a combination thereof based on their watering needs.

3. The irrigation system according to claim 1 or 2, wherein the types of sensors include a soil moisture sensor (131), current rain sensor (132), weather forecasting apparatus (133), wind speed sensor, wind direction sensor, air temperature sensor, humidity sensor, air pressure sensor, or a combination thereof.

4. The irrigation system according to any one of the preceding claims, wherein the types of sensors are configured to operate sequentially until an irrigation instruction is provided to open the valve (125) to supply water.

5. The irrigation system according to any one of the preceding claims, further comprising a water leakage detecting module having either or both of a water flow meter and pipe pressure sensor (126) that determine amount of water consumption and pipe pressure respectively to detect water leakage.

6. The irrigation system according to claim 5, wherein the valve (125) is incorporated with the water flow meter.

7. The irrigation system according to any one of the preceding claims, wherein the valve (125) is battery powered.

8. The irrigation system according to any one of the preceding claims, further comprising a valve power saving module configured to wake up the valve that is put into a sleep mode periodically with a non-active interval during non-watering period, and an active interval during watering period for receiving

instructions from the server (110), updating water consumption data, opening or closing the valve (125), or a combination thereof.

9. The irrigation system according to any one of the preceding claims, further comprising a fail-safe module for automatically closing the valve (125) after a predefined time during an emergency.

10. An irrigation method for supplying water across one or more zones of at least one level through an irrigation process using an irrigation system according to any one of the preceding claims, comprising the steps of

determining watering needs for each zone upon obtaining environmental data obtained from one or more types of sensors of an irrigation management module through an irrigation determining process; and

regulating water delivery by an irrigation controller through controlling opening and closing of one or more valves (125) of a pipeline (122) based on the environmental data;

wherein the irrigation system, that operates through wireless communication, comprises a piping system having one or more pipelines (122), with each pipeline (122) being provided at each zone to deliver water from a water source (123), and the irrigation determining process is configured to run for each valve (125), in a one-by-one manner when there is more than one valve (125) in a same pipeline; and

wherein the irrigation determining process of the valve (125) is configured to end when the irrigation controller fails to instruct opening or closing of the valve (125) or when the valve (125) fails to respond to an instruction from the irrigation controller to open or close, and the irrigation management module moves on to run the irrigation determining process on a subsequent valve (125) within the same pipeline (122).

11. The irrigation method according to claim 10, wherein the irrigation process including any one or a combination of the irrigation determining process, frequency of irrigation, irrigation time, and duration of irrigation, is customized for each zone, level, or a combination thereof based on their watering needs.

12. The irrigation method according to claim 10 or 11, wherein the irrigation determining process for determining watering needs for each zone comprises the steps of

detecting soil moisture level by a soil moisture sensor (131) at the zone;

detecting rain by a current rain sensor (132) when soil moisture level is lower than a predetermined soil moisture level; and

predicting occurrence of rain at a predetermined time, by a weather forecasting apparatus (133), when rain is not detected by the current rain sensor (132);

wherein the irrigation controller sends a signal to instruct the valve (125) to open for supplying water to the zone when rain is not expected to happen as predicted by the weather forecasting apparatus (133).

13. The irrigation method according to claim 12, wherein the irrigation determining process ends when rain is detected by the current rain sensor (132), or when rain is expected at the predetermined time by the weather forecasting apparatus (133).

14. The irrigation method according to any one of claims 10 to 13, wherein the irrigation determining process repeats at a predetermined irrigation time or when instructed by a user.

15. The irrigation method according to any one of claims 10 to 14, wherein the irrigation determining process further comprises the step of determining whether the valve (125) is a last valve of the pipeline (122) upon detecting the soil moisture level to be equal or higher than the predetermined soil moisture level, upon closing the valve (125) after supplying water to the zone, or a combination thereof.

16. The irrigation method according to claim 15, wherein the irrigation determining process repeats for the subsequent valve (125) of the same pipeline (122) when the valve (125) being a preceding valve of the subsequent valve (125) is determined to be a non-last valve.

17. The irrigation method according to claim 15 or 16, wherein the irrigation controller is deactivated to end the irrigation determining process when the valve (125) is determined to be the last valve.

18. The irrigation method according to any one of claims 10 to 17, further comprising the step of detecting water leakage by a water leakage detecting module, upon closing the valve (125) after supplying water, based on either or both amount of water consumption and pipe pressure that are measured by a water flow meter and pipe pressure sensor (126) respectively.

19. The irrigation method according to any one of claims 10 to 18, further comprising the step of waking up the valve (125) that is put into a sleep mode periodically, by a valve power saving module, with a non-active interval during non-watering period, and with an active interval during watering period for receiving instructions from the server (110), updating water consumption data, opening or closing the valve (125), or a combination thereof.

20. The irrigation method according to any one of claims 10 to 19, further comprising the step of automatically closing the valve (125) after a predefined time during an emergency by a fail-safe module.