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Waste Water Management System for Smart Cities through IoT based Technology

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ABSTRACT

Our Invention Waste Water Management System for Smart Cities through IoT based Technology is a smart water management system fixture device is positioned on a different location water line and also the device includes a measuring unit, an electronics unit, location unit, GPS unit, Programming unit, controlling unit and an energy unit associated with a housing. The Invented device also includes an impeller of a turbine disposed in a water chamber and rotatable and the water chamber is positioned between an inlet and an outlet to define a fluid flow path and the measurement unit is in communication with the electronics unit. The invented technology electronics unit received information from one or more sensors and harvests electricity using the motion of the turbine and is in communication with an energy unit for story electricity. The invention also provides a quantity of a water consumption control system based on NB-IoT (Narrowband Internet of Things) which highly comprises an operation application layer, a data gathering layer , a location layer , a GPS layer , a testing layer and an analysis control layer, wherein the operation application layer is used for a water consumption device, a sensor is arranged on the water consumption device, the sensor gathers corresponding parameters, and the parameters are transmitted to the data gathering layer through the NB-IoT. The Invented devise also includes and controlled data gathering layer gathers the data transmitted from the operation application layer and the data are uploaded to the analysis control layer and the analysis control layer analyzes and processes the data and corresponding operation processing is given. The Invented devise also includes with a water dispenser necessary for an ordinary family a hotel, an office and so on a water heater a PC and an intelligent mobile phone as basic components, corresponding interactive terminals are matched respectively, intelligent control on daily water consumption is realized, and the purpose of energy-saving health and convenient water consumption can be realized.

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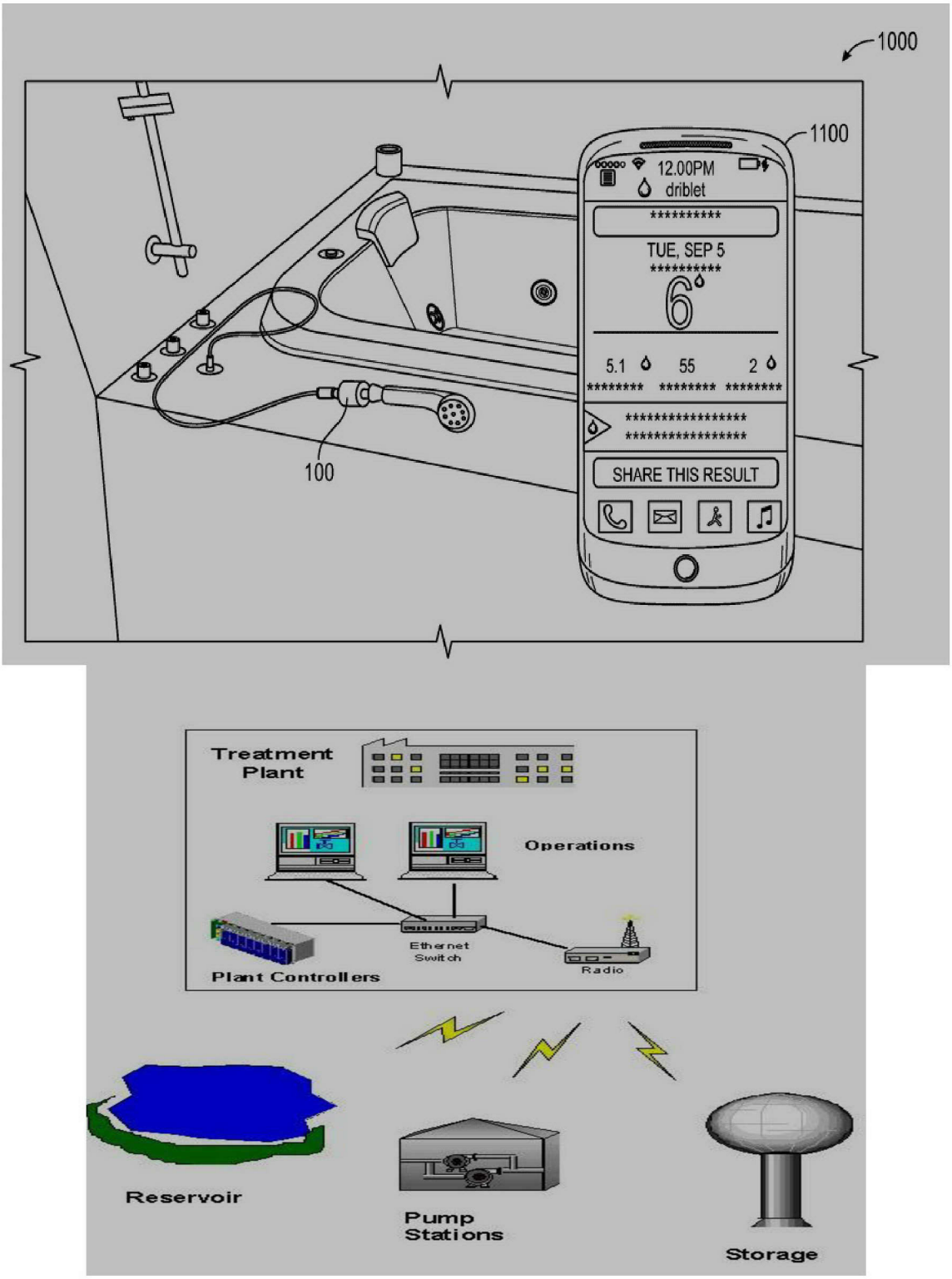


FIG.1: ILLUSTRATES ONE OR MORE EXAMPLES OF EMBODIMENTS OF A SMART WATER MANAGEMENT SYSTEM, SHOWING A FIXTURE DEVICE ON A FIXTURE AND A COMPUTING APPLICATION LINKED THERETO.

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Waste Water Management System for Smart Cities through IoT based Technology

FIELD OF THE INVENTION

My invention is related to Waste Water Management System for Smart Cities through IoT based Technology and also relate to the field of water consumption and management using smart devices.

BACKGROUND OF THE INVENTION

Sustainability of current and future water resource allocation is a growing concern to the public. Finding a balance between what is needed by humans and what is needed in the environment is an important step in the sustainability of water resources. In addition, water usage and water properties have a significant impact on costs incurred by residential consumers and businesses. As a result, new management strategies are needed.

Some businesses and consumers attempt to implement water-efficiency best management practices to help understand and better manage their water use. Actively monitoring water use and effectively educating individuals about facility water use and water management planning goals are key components of properly managing and reducing commercial facility and residential water use. Monitoring and education set the stage for the relative success of a water management program, providing the ability to track and measure progress to increase awareness and build support for specific projects or user behavior changes.

Attempts have been made to accomplish these goals through various devices, but each suffers from various drawbacks. For example, some existing commercial systems used to monitor or control water usage involve a complex network of water lines, cords, and cables that require a skilled technician to install, maintain, and in some instances use. As a result, such systems are often not properly used or effectively used and are not widely adopted.

Other examples include large industrial devices designed for use by municipal utilities. Unfortunately, such devices cannot measure water at the fixture level (e.g., at the faucet), and due to large size are not versatile or useable by commercial and residential water users.

Smaller examples of water flow monitoring devices include devices which include a display directly on the device attached to the water line, requiring the individual user to obtain data from the display and manually record the data for further use. Alternative

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examples include devices that are attachable in limited locations, such as to a shower, and only provide an estimate of the volume of water. Unfortunately, these systems have limited accuracy and are not user friendly.

Accordingly, what is needed is a smart water management system which is small and versatile so as to permit management of water consumption at the fixture level, but also capable of being scaled to commercial uses. What is also needed is a smart water management system which communicates with a user to provide real time information and allow the user to monitor and control water usage.

For example, Chinese Patent Application No. 201510919830.9 discloses a kind of drinking water supply device and its controlling party Method. Drinking water supply device includes, Clean water pipe, clean water flows, wherein Flow sensor, for sensing the stream of clean water Amount, Water supply pipe, for discharging clean water, Mineral matter supply pipe, for mineral matter to be fed into water supply pipe, it is provided with mineral Matter supply valve, the valve depends on whether that to produce mineral water selects to open and close.

Mineral matter box, it is connected to mineral matter confession Ying Guan, Mineral water generation unit, it is connected to water supply pipe and mineral matter supply pipe, Pump, for mineral matter box or mineral Matter supply pipe pressurizes and causes mineral matter to be fed to mineral water generation unit, and pump is configured to the output voltage based on pump and changes pump Motor rotation number, Delivery pipe, it is connected to mineral water generation unit, for discharging clean water or mineral water.

The control Device processed, for changing the output voltage of pump based on the flow sensed by flow sensor to adjust the ore deposit for being fed to water supply pipe Amount of substance. Such as, Chinese Patent Application No. 201520033568.3 discloses a kind of drinking water safety control system, the drinking water peace Full control system filters the heavy metals such as copper, lead, cadmium by precipitating large granular impurity, adjusts the pH value of water, filter water is carried out many Secondary osmosis filtration, the sequence of operations such as sterilizing are carried out to filter water, then by 13 pairs of whole filter processes of central processing unit Security control management is carried out, its operating efficiency and reliability is improved, high-precision purification is finally completed to raw water.

For example, China Number of patent application 201520107540.X proposes a kind of drinking water temperature control equipment, its heating unit and temperature detecting unit It is placed in inside heating water tank, Temperature detecting unit is connected with temperature control unit, and temperature detecting unit is being detected plus hot water When water temperature in case meets pre-conditioned, to

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temperature control unit electric signal is sent, Temperature control unit is electrically connected with heating unit Connect, the "on" position of the heating unit is controlled according to the electric signal that the temperature detecting unit for receiving sends. This device Can be used for various drinking equipments, thoroughly solve the problems, such as that existing drinking equipment heating is insufficient.

For another example, Chinese patent application Number : 201310416446.8 disclose a kind of manufacture and supply hot water control method, open type hot water tank are applied to, using control Device processed, and liquid level sensing device is set, heating combined equipment temperature sensor, supply hot water temperature sensor etc. is left, detecting and Control hot water amount in open type hot water tank, heat coolant-temperature gage and supply hot water temperature, and its water-head and temperature difference of setting Value, and coordinate.

The heatings such as heat pump or recuperation of heat, make-up water, heat water circulating pump and supply heat-exchanger pump equal controller, according to Difference supply hot water amount and energy saving requirement control, have hot water supply apparatus and quickly heat supply hot water function, meet hot water Requirement scheduling supplies hot water function and three kinds from peak electricity consumption period full dose water heating function etc. supply hot water methods, makes hot water supply There is device the heat release efficiency and heat pump that improve expansion hot water tank supply hot water to heat the heating operation efficiency of circulation.

Above-mentioned each art solutions, though respectively there is its advantage, each art solutions are a certain of solution water Aspect problem, its function is more single, and in the daily water consumption of people, the purposes for being related to water is very more, prior art but without Method integral type is solved. With the development in epoch, the progress of science and technology, health is easily lived, outstanding intelligent household, increasingly into for the target that people pursue., in this, the present invention is proposed and a kind of uses water control system based on NB-IoT technologies for this.

Hydrology-water quality monitoring is for national rational exploitation and utilization and protection water and soil resources provide one of system hydrology-water quality data important element task, is the basis of Ecology, water resource, water security scientific management and protection. The object of water quality monitoring reflects quality of water environment current status and prospect trend in time, accurately, for monitoring water environment, management, planning, prevention and cure of pollution, ecology language etc. provide scientific basis.

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Hydrology-water quality online auto monitoring system be a set of with on-line automatic analyzer device for core, use the comprehensive online auto monitoring system that Modern Sensor Technology, automatic measurement technology, automatic control technology, Computer Applied Technology, GIS technology and relevant dedicated analysis software and communication network form. Water quality online auto monitoring system is that a set of analysis meter multinomial monitoring index is combined, from sampling, the system analyzing record, disposal data (comprising tele data), center remote measurement composition, in conjunction with corresponding monitoring and analysis software, realize real-time online automatically to monitor, meet reliable stable, the requirement that maintenance is few, and realize unmanned.

Along with the development of water quality technology in the world, the high integrated equipment of multipara meter has been widely recognized. Utilize the integral multi-parameter water quality monitor that external advanced height is integrated, me is coordinated to gather telemetry system and general Water Environment And Water Resources management and monitoring platform software by company data, the water quality automatic on-line monitoring of the different water bodies such as surface water, underground water, source water, potable water, floss hole, ocean can be realized very easily, the situation of change of effective Real-Time Monitoring water quality, the effective management for Ecology, water environment, water security provides to be analyzed and monitoring reliably.

The index of monitoring mainly comprises water level, flow, water temperature, dissolved oxygen DO, pH, conductance, salinity, turbidity, blue-green algae, the many kinds of parameters such as ammonia nitrogen ion. All kinds of indexes monitored are sent to Surveillance center by wired or wireless transmission mode, also can at monitoring field reading data in real-time, but the large-scale water quality online auto monitoring system of complete set, due to its system complex, construction cost is high, the reasons such as the construction period is long, and operation maintenance cost is high. Carry out large-area layouting and build the larger difficulty of existence. Therefore, just at present, develop a kind of small-sized water quality monitoring system, be applied to vast rural area, the leading indicator of at-once monitor water quality, ensure the safety of potable water, significant.

Along with expanding economy, and industrialized acceleration, problem of environmental pollution is more and more abominable, and particularly water pollution problems seriously restricts Chinese society and expanding economy, thereby day by day causes people's concern. Therefore, effectively water conservation is not contaminated, for promote socio-economic development, uplifting the people's living standard and safeguarding national security all has great strategic importance.

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Industrial sewage is processed all will pass through several procedures, so general plant of water disposal all occupies very large zone, in so large zone, lay cable control if adopt, consider the stability of signal, cable trench and the cost that adopts the high-performance wire to bring then must adopt the cable of band shielding, so will occupy greatly construction budget. And for the abominable area of some geographical environment, it is very inconvenient to connect up.

The tradition supervisory system is to judge the behaviour in service of field instrument by the patrol record of checking the scene, and this wherein 90% intelligence instrument self all with the equipment self-diagnosis function, in other words, the self-diagnosis information of 90% field apparatus is not read, the scene that just is placed on is not used, and causes the waste of resource.

Sewage treatment industry, as one of national emerging strategic industry, is also China《Water prevention and cure of pollution action plan》(with One of lower abbreviation " ten, water ") industry paid close attention to Ten, water explicitly points out the water pollution problems that control China comprehensively, Ask reinforcing urban life pollution control. Accelerate urban wastewater treatment Facilities Construction with transformation.

Existing urban wastewater treatment facility, Treatment in accordance with local conditions is transformed, and corresponding discharge standard or regeneration requirement are reached before the year two thousand twenty bottom. Sensitizing range (emphasis lake, Emphasis reservoir, immediate offshore area watershed) urban wastewater treatment facility should comprehensively reach before the end of the year 2017 one-level.

A discharge mark It is accurate. Built-up areas water quality does not reach the city of the class standard of surface water IV, and newly-merged university sewage treatment facility will perform one-level A Row Put standard. According to national new urbanization planning requirement, to the year two thousand twenty, national all county towns and emphasis town possess at sewage collecting Reason ability, county town, treatment rate of domestic sewage respectively reach 85%, 95% or so.

For a long time, the operation and management level of domestic urban wastewater treatment firm is relatively low, and sewage disposal energy consumption is higher, sewage The too high problem of processing cost. This aspect is that equipment technology more falls behind, and causes sewage because I spend sewage disposal starting evening System is unstable, the thorny problem such as operating cost is higher. On the other hand, it is the sewage disposal operation because our automatic control levels are low The

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cultivation mechanism disappearance of managerial talent, causes its intelligent zed development to be subject to serious restriction.

The intelligent pipe of sewage treatment plant Manage and calculate analysis by means of modern monitoring device and big data, can provide the most accurate for sewage treatment plant's technique and equipment Control program, and digitized management is realized to its daily operation, save labour cost. It can be said that sewage treatment plant's intelligence Operation level can be changed and have become decision large-scale water affair group company enterprise entirety operation management level, reply gradually fierceness Market Competition, obtain maximum economic benefit key.

At present, the characteristics of multivariate, non-linear, time variation and randomness for having due to sewage disposal process, present Instability and uncertainty, using conventional control method preferable control effect is difficult to. Meanwhile, it is most widely used Wastewater Treated by Activated Sludge Process system sludge bulking is frequently encountered in actual moving process, second pond Mud up-floating and foam etc. are asked Topic, if dispose be not good at, it will have a strong impact on the normal operation of Sewage Plant. This also to Sewage Plant operation personnel propose it is huge Big challenge.

Sewage treatment plant's intellectualized management system is using information system management technology, by the enforcement of field operational data Monitoring and the scientific analysis of historical data, the daily operation to sewage treatment plant carries out management and control. One side intelligent management system Failure appeared in day-to-day operation process can be analyzed, rational solution is formulated according to fault analysis tree and detection data certainly scheme, has evaded to greatest extent the error in judgment caused by anthropic factor. On the other hand, can be according to trend analysis system Accomplish to give warning in advance, take measures in advance, the normal operation of sewage disposal items technique is ensured, so that it is guaranteed that the row up to standard of sewage Put.

PRIOR ART SEARCH

US5721383A *1995-11-201998-02-24Water Savers, Inc. Flow meter system and method of using same.
US6079280A *1998-04-282000-06-27Data Industrial Corporation Insertion paddle wheel flow sensor for insertion into a fluid conduit.
US20110203364A1 *2008-08-232011-08-25Amphiro Ag Method and Apparatus for Determining Resource Consumption.
US20120305113A1 *2009-07-312012-12-06Capstone Metering Llc Water meter

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US20130080081A1 *2011-03-182013-03-28Soneter, LLC Methods and apparatus for fluid flow measurement.
US20130116941A1 *2011-11-042013-05-09Watersignal, Llc Fluid pipe monitoring and reporting system.

OBJECTIVES OF THE INVENTION

1. The objective of the invention is to a smart water management system fixture device is positioned on a different location water line and also the device includes a measuring unit, an electronics unit, location unit, GPS unit, Programming unit, controlling unit and an energy unit associated with a housing.
2. The other objective of the invention is to an impeller of a turbine disposed in a water chamber and rotatable and the water chamber is positioned between an inlet and an outlet to define a fluid flow path and the measurement unit is in communication with the electronics unit.
3. The other objective of the invention is to an quantity of a water consumption control system based on NB-IoT (Narrowband Internet of Things) which highly comprises an operation application layer, a data gathering layer , a location layer , a GPS layer , a testing layer and an analysis control layer, wherein the operation application layer is used for a water consumption device, a sensor is arranged on the water consumption device, the sensor gathers corresponding parameters, and the parameters are transmitted to the data gathering layer through the NB-IoT.
4. The other objective of the invention is to adevise also includes and controlled data gathering layer gathers the data transmitted from the operation application layer and the data are uploaded to the analysis control layer and the analysis control layer analyzes and processes the data and corresponding operation processing is given.
5. The other objective of the invention is to a water dispenser necessary for an ordinary family a hotel, an office and so on a water heater a PC and an intelligent mobile phone as basic components, corresponding interactive terminals are matched respectively, intelligent control on daily water consumption is realized, and the purpose of energy-saving health and convenient water consumption can be realized.

SUMMARY OF THE INVENTION

Accordingly, a smart water management system and device are disclosed. The smart water management system includes a fixture device and a computer system which are electronically coupled or in communication to track water consumption and properties to allow monitoring and control of water.

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The smart water management system described is small and versatile so as to permit management of water consumption at the fixture level, but is also capable of being scaled to commercial uses. The smart water management system includes a communication system which communicates with a user to provide real time information as well as data storage and reporting, allowing the user to effectively monitor and control water usage.

For the above-mentioned present situation of prior art, the present invention builds one based on the communication module using NB-IoT technologies Water control system is entirely used, and it is on the basis of traditional water dispenser etc., plus corresponding sensor is loaded onto, for drinking water etc. Quality make in real time monitoring with control, to guarantee the quality of drinking water, enable users to trust, safely use.

One of purpose of preferred version of the present invention is : For other domestic waters, the present invention is by adding smart mobile phone The mode such as control and the control of PC ends, realizes intelligent zed safe water mode.

A further object of preferred version of the present invention is : Enter by the water yield of daily water consumption, with water time etc. key parameter Rack end sorting-out in statistics, intellectual analysis control water habits better control over domestic water, have both saved water resource, reduce again Family's expense, facilitates life, meets the demand of Modern Live.

To reach above-mentioned purpose, the present invention is adopted the following technical scheme theta kind of use water control system based on NB-IoT, including operation application layer, data gathering layer, analysis and Control Layer Its in, application is operated to water equipment, the install sensor in water equipment, the corresponding parameter of sensor collection, and pass through NB-IoT is transferred to data gathering layer ;

Data gathering layer collects the data that operation application layer is transmitted to, and is uploaded to analysis and Control layer ; Analysis and Control layer is analyzed process to data, and provides corresponding operation process. Preferably, water equipment includes one or more in water dispenser, water heater, tap. Preferably, water quality sensor is installed, water quality sensor is used for detection includes that pH value, ORP, fluorescence method is molten on water dispenser Solution oxygen concentration, conductance, salinity, temperature.

Preferably, install on water heater and include Temperature Humidity Sensor, Temperature Humidity Sensor is used for water temperature detection, pressure, consumption Parameter, and it is provided with low water level, low hydraulic pressure warning function.

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Preferably, water sensor is installed on tap. Preferably, data gathering layer includes one or more in PC, smart mobile phone. Preferably, analysis and Control layer realized by described PC and/or smart mobile phone, by the control software of PC or the APP of smart mobile phone is analyzed process to data.

Preferably, data gathering layer also includes Cloud Server, and described PC or smart mobile phone is simultaneously uploaded to data Cloud Server. Preferably, analysis and Control layer collects the Cloud Server also including the high in the clouds data statistics function of Cloud Server Data be analyzed process. Preferably, high in the clouds data statistics is write based on Python.

Preferably, analysis and Control layer include place an order automatically, APP inquiry with control function operation in one or more. NB-IoT technologies are a kind of technology hand of M2M (machine terminal is to the machine terminal) agreement for serving instantly popular Section, with many clear advantages such as narrow frequency, low-power consumption, wide coverage, low time delay, holding equipment enormous amounts. The present invention It is based on currently domestic booming NB-IoT (arrow band Internet of Things) technology, one kind water control system of proposition, It goes for family, hotel, office space etc.

The present invention is based on NB-IoT (arrow band Internet of Things) this technology, indispensable with average family, hotel, office space etc. Water dispenser, water heater, PC (PC), smart mobile phone is basic module, and corresponding interactive terminal of arranging in pairs or groups respectively is realized daily with the Based Intelligent Control of water such that it is able to realize energy-conservation, health, easily use water purpose.

For the defect that prior art exists, the small-sized water quality monitoring system that the present invention proposes, total system cost is low, and group station flexibly, fast, can realize the real-time online continuous coverage to all kinds of parameter of source water, unmanned, non-maintaining, handling cost is low.

The technical scheme of small-sized water quality monitoring system of the present invention, system comprises bubbler gage, Ultrasonic Doppler Flowmeter, multi-parameter water quality analyzer, data acquisition telemetering device, electric supply installation and monitoring management module. Bubbler gage wherein, Ultrasonic Doppler Flowmeter, multipara meter water quality analyzer is connected with monitoring management module respectively by data acquisition telemetering device, realize its monitoring function; Electric supply installation provides electric energy for each device.

Further, described data acquisition telemetering device adopts OTTDuoSens data acquisition recorder; Further, described data acquisition telemetering device, by

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GSM/GPRS network, adopts short message mode directly to carry out data transmission, or adopts GPRS channel; Further, described electric supply installation adopts solar powered mode, adopts 12V/55W/30W/12W many kinds of solar panels that OTT company produces; Further, monitoring management module adopts the software kit Hydras3 groupware of OTT company.

Its principle of work is: the Nimbus bubbler gage of employing, SLD Ultrasonic Doppler Flowmeter and Hydrolab multi-parameter water quality monitoring equipment are in real time or gather every water quality parameter by trigger mode, by remote unit, data are reported and submitted in real time to Surveillance center or mobile monitoring terminal; Organize station mode flexibly Zu Zhanshangyou land station and buoy dump etc. are multiple, communication modes supports the various modes such as note/GPRS, wired, satellite; System works mainly triggers by three kinds of modes, the response of the clocked flip of system, system incremental trigger and system queries.

From the above technical solution of the present invention shows that, beneficial effect of the present invention is that the producing level of equipment is high, and same equipment can monitor multiple parameter, and entirety cost of building a station is low, and group station flexibly, fast; The real-time online continuous coverage to all kinds of parameter of source water can be realized; Unmanned, non-maintaining, handling cost is low; Adopt international advanced monitoring technology, cannot secondary pollution be produced.

The invention is achieved by the following technical solutions: A kind of sewage treatment process supervisory system based on wireless network comprises: industrial wireless sensing network, wireless industrial LAN and radio wide area network. Described industrial wireless sensing network comprises a plurality of monitoring slave stations, sensing equipment and secondary radio station transmission system;

Described each monitoring slave station adopts the PLC control system, comprise digital quantity input module, digital output module, analog input module, analog output module and CPU module, to connect between each module by hardware configuration, the monitoring slave station is Ethernet protocol by Ethernet gateway with the MPI protocol conversion, be connected to the secondary radio station transmission system, Ethernet gateway adopts the net LINK gateway of HILSCHER company.

Described sensing equipment comprises sensor (such as flow of inlet water, pH value, temperature, liquid level and dissolved oxygen concentration etc.), manual operator and the wireless HART adapter with HART agreement; The wireless HART adapter becomes wireless HART protocol with common HART protocol conversion, consists of a wireless network, and any instrument that manual operator can enter the gateway the inside is configured it.

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Described wireless industrial LAN comprises master station and wireless main website transmission system; Described master station comprises Monitor Computer Control System, large-screen display, client and Ethernet switch; Client is by Ethernet switch and wireless main website transmission system interaction data, and client is set up opc server based on Ethernet, opc server and client interactive information that Monitor Computer Control System is set up by client, utilize the split screen technology to realize the many interface display of host computer, large-screen display technological process real time modeling shows.

Described Monitor Computer Control System mainly monitors the real time modeling of several different process processes in the sewage disposal process (comprising: pre-service, biological treatment, Treatment of Sludge, go out water treatment and press filtration treatment process) and to the monitoring of remote measurement, remote control, process data analysis and the Radio Network System state of field apparatus, the process data according to monitoring carries out Based Intelligent Control to system's aerating system and medicine system simultaneously;

Described supervisory system interface is comprised of sewage treatment process interface, real-time data curve interface, history curve interface, fault alarm interface, report generation interface and Based Intelligent Control interface, wherein the sewage treatment process interface adopts Dynamic Graph form real time modeling to process the scene, click interface equipment and can enter corresponding appliance control interface, show the accumulative total duration that motor had started, can select host computer to control manually or automatically simultaneously; The real-time data curve interface shows the value of current in-site modeling amount in real time by curve form; The history curve interface is by the process data history value in the form demonstration query context of curve and list box.

Current all the ongoing technological parameters of fault alarm interface display are reported to the police and the fault alarm of system hardware, and the mode that is accompanied by pilot lamp and sound reminds, and can select according to demand to generate the fault alarm form; Press report generation and current technological parameter can be generated form automatically, have WORD, EXCLE and hypertext form selective; The Based Intelligent Control interface is carried out Based Intelligent Control according to the process data of monitoring to system's aerating system and medicine system, and described Based Intelligent Control adopts Fuzzy Adaptive PID Control.

Described radio wide area network comprises: wireless remote transmission system and remote monitoring end, wherein the wireless remote transmission system comprises: the remote control network of Base on Web server and based on message search and the warning net of GSM.

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Described remote control network is open network, open computing machine and be connected to wide area network by browser, operating personnel apply for control in the strange land, obtain just can obtaining the operation power of system after the home server mandate, thereby realize remote monitoring and the whole sewage disposal process of control.

Described message search and warning net are only open to the technician of appointment, can inquire about the treatment process data message by the mode of editing short message, simultaneously can the Long-distance Control field apparatus by specific instruction; Technique breaks down during fault solves at the scene, automatically failure message is sent at regular intervals the technician of appointment.

Compared with prior art, the present invention has following beneficial effect

1, described wireless supervisory control system adopts wireless sense network and wireless Ethernet to communicate; The multichannel formula wireless network of network using band redundancy, system does not need the wiring of long distance, has greatly saved cable cost, and wireless device installs easily and flexibly, management maintenance is very convenient.

2, described client modules and network access module adopt the SCALANCE W wireless telecommunication system of SIEMENS company, have the degree of protection of firmly design and IP65, therefore are particularly suitable for using in abominable industrial environment.

3, described wireless HART network can not only gather the process variable of transmission sensor; and can also send the self-diagnosis information of sensing equipment to host computer; for periodic the maintenance provides very important facility information; the efficient of production and the quality of water outlet have been improved; reduced the time of shutting down; avoid simultaneously some unnecessary machine halt troubles, greatly saved the cost of plant maintenance.

4, described intelligence control system automatically adjusts to aerating system and medicine system based on intelligent algorithm, guarantees that effluent quality is qualified, and system is automatically reliable, and dynamic property is good.

5, described remote control network and short message network are processed on-the-spot just can obtain important real-time process data and the operation conditions of equipment so that operating personnel needn't come to personally, can the very first time when fault obtain failure message, avoid hindering for some reason and the energy loss that causes.

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6, described supervisory system adopts LabVIEW to develop software based on the virtual instrument technique of America NI company, has succinct graphic programming environment and powerful data processing function; Utilize the split screen technology to realize the many interface display of host computer, large-screen display technological process real time modeling shows, the unification of control monitoring and processing field monitoring function in the realization, and expansion and centralized management are convenient in system.

To solve above-mentioned technical problem, the technical solution adopted in the present invention is：A kind of sewage treatment plants intelligent management system, including： Sensing layer for by being acquired to critical process data, and by the data transfer of collection to Internet； Internet for storing and processing the critical process data of sensing layer collection；

Application layer for accessing Internet, the running situation of sewage treatment plant is understood in time. The sensing layer includes Data acquisition and Transmission System for to entering to the real-time parameter during process operation Row collection and transmission.

The Internet includes

Equipment state intelligent analysis system for realizing the information-based and intelligent management of sewage disposal plant； Multi parameter trend analysis system for carrying out trend analysis to the crucial service data of sewage treatment plant, work is judged Skill running status；

Expert diagnosis center Waste Water Management with IoT

For carrying out shape to the overall operation situation and each installations and facilities of each dispersion waterworks State analysis, problem early warning and fault diagnosis； Daily operational system for arranging different access rights according to identity, different contents are accessed, realize differentiation Management.

The data acquisition is gathered with Transmission system and the data of transmission include Water quality index is analyzed, intellectuality operation prison The arrangement of prosecutor case, sample collecting. The daily operational system is divided into APP ends and WEB terminal.

Compared with prior art, the present invention have the advantage that for using the system of the present invention, operation personnel can be with By computer or mobile device APP software interview Web ends, 1) in real time inspection factory every

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technique running status, respectively set Standby essential information, the information such as major function and operation guide ; 2) operation personnel can patrol and examine program using mobile device, to factory The each technique in area, each equipment is patrolled and examined. Software attendant 1) information of equipment can be checked, running status safeguards note The content such as record and Maintenance Guide, realizes the information system management of equipment data ; 2) plant maintenance shape can be checked using mobile device State, and the maintenance of key position is carried out to equipment according to Maintenance Guide.

BRIEF DESCRIPTION OF THE DIAGRAM

FIG.1: illustrates one or more examples of embodiments of a smart water management system, showing a fixture device on a fixture and a computing application linked thereto.

FIG.2: is a screen shot of one or more examples of a software application for use with a computing system in association with the smart water management system shown in FIG. 1, showing examples of a monitoring screen and a menu for selection of different functions.

FIG. 3: is a flow diagram illustrating one or more screen shots of a software application for use with a computing system in association with the smart water management system shown in FIG. 1, showing examples of monitoring screens, a graphic representation of data collected by the system, and a social media connection.

FIG. 4: is a flow diagram illustrating one or more screen shots of a software application for use with a computing system in association with the smart water management system shown in FIG. 1, showing examples of goals and alert setting screens.

FIG. 5: illustrates one or more screen shots of a software application for use with a computing system in association with the smart water management system shown in FIG. 1, showing examples of a wireless communication linking, and a data report on comparing multiple water management systems.

FIG.6: illustrates a computer system for use with certain implementations.

DESCRIPTION OF THE INVENTION

Referring to the Figures, a smart water management system 1000 and device 100 are illustrated and described. The smart water management system 1000 according to one or more examples of embodiments includes a fixture device 100 and computer system 1100 which are electronically coupled, or are in communication, to track water consumption and properties to allow monitoring and control of water.

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In one or more particular examples of embodiments, the system is embodied in a smart wireless device and a mobile application that track water consumption volumes and trigger or encourage or control actions. An example of a smart water management system is illustrated and disclosed in Applicant's prior filed U.S. Provisional Patent Application Ser. No. 61/873,837, the entire contents of which is hereby incorporated herein by reference.

As seen in the figures, a user interface 1020 can provide information regarding grouping of devices 1021, information about a selected group 1022, and information for individual devices within the group 1023. A drill-down interface 1031 may be provided for water consumption, such as water volume for a device for a selected time. Further, an information interface 1032 can be provided for each device with information such as battery status, last sync date, signal strength.

The system or portions thereof as described herein are linked to a distributed computing environment, where tasks are performed by remote processing devices that are linked through a communications network. To this end, the system may be configured or linked to multiple computers in a network, including, but not limited to a local area network, a wide area network, a wireless network, and the Internet. Accordingly, information and data is transferred within the network or system by wireless means. Such wireless means include any now known or future developed system, examples of which include Wi-Fi, Bluetooth, GPRS, RF, and cellular data systems. It is also contemplated that certain aspects of the system may be implemented through hardwire connection, such as computer to computer communication.

The computer can also include a display, provision for data input and output, etc. Furthermore, the computer or computers may be operatively or functionally connected to one or more mass storage devices, such as, but not limited to a database or cloud storage medium. The memory storage can be volatile or non-volatile and can include removable storage media. The system may also include computer-readable media which may include any computer readable media or medium that may be used to carry or store desired program code that may be accessed by a computer.

The invention can also be embodied as computer readable code on a computer readable medium. To this end, the computer readable medium may be any data storage device that can store data which can be thereafter read by a computer system. Examples of computer readable medium include read-only memory, random-access memory, CD-ROM, CD-R, CD-RW, magnetic tapes, and other optical data storage devices. The computer readable medium can also be distributed over a network coupled computer system so that the computer readable code is stored and executed in a distributed fashion.

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These devices may include a graphical user interface (GUI) or a communication means by which commands may be entered and content may be displayed or communicated. For example, the computer may include a user interface that allows navigation of objects. The computer may implement or include an application that enables a user to display and interact with text, images, videos, data, and other information and content.

Aspects of the method, system, and devices described herein can be implemented on software running on a computer system. The system or method herein, therefore, may be operated by computer-executable instructions, such as but not limited to program modules, executable on a computer. Examples of program modules include, but are not limited to, routines, programs, objects, components, data structures and the like which perform particular tasks or implement particular instructions. The software system may also be operable for supporting the transfer of information within a network.

The smart water management system described herein tracks water consumption volumes and triggers or encourages actions. The mechanisms used by the fixture device provide precision measurement of the characteristics of the water (e.g., flow, volume, quality, temperature). In this way, the system helps users monitor and control the amount of water used so action can be taken to correct usage. Such usage can be monitored and controlled in real time. In addition, data can be collected and stored on usage and other water properties, such as temperature and/or quality.

As a result, users can obtain additional information about water and water use, permitting the users to make educated decisions on how to effectively manage such usage, ultimately leading to cost savings for the user and environmental benefits associated with reduced water consumption and corresponding waste. The smart water system described herein has additional advantages in that it can be small in size and versatile in that it can be scaled for residential or commercial use. The system, and in particular the fixture device described herein, further powers itself, therefore creating a self-sustaining system.

Accordingly, the smart water management system described herein is easy to use, versatile, and achieves cost savings for the user, thereby increasing the competitive advantage of the user, particularly in the instance of commercial use. The smart water management system further provides environmental advantages by reducing risks associated with water scarcity.

As utilized herein, the terms “approximately,” “about,” “substantially”, and similar terms are intended to have a broad meaning in harmony with the common and accepted usage by those of ordinary skill in the art to which the subject matter of this disclosure pertains. It should be understood by those of skill in the art who review this disclosure that these

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terms are intended to allow a description of certain features described and claimed without restricting the scope of these features to the precise numerical ranges provided. Accordingly, these terms should be interpreted as indicating that insubstantial or inconsequential modifications or alterations of the subject matter described and claimed are considered to be within the scope of the invention as recited in the appended claims.

It should be noted that references to relative positions (e.g., "top" and "bottom") in this description are merely used to identify various elements as are oriented in the Figures. It should be recognized that the orientation of particular components may vary greatly depending on the application in which they are used.

For the purpose of this disclosure, the term "coupled" means the joining of two members directly or indirectly to one another. Such joining may be stationary in nature or moveable in nature. Such joining may be achieved with the two members or the two members and any additional intermediate members being integrally formed as a single unitary body with one another or with the two members or the two members and any additional intermediate members being attached to one another. Such joining may be permanent in nature or may be removable or releasable in nature.

It is also important to note that the construction and arrangement of the system, methods, and devices as shown in the various examples of embodiments is illustrative only. Although only a few embodiments have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited.

For example, elements shown as integrally formed may be constructed of multiple parts or elements show as multiple parts may be integrally formed, the operation of the interfaces may be reversed or otherwise varied, the length or width of the structures and/or members or connector or other elements of the system may be varied, the nature or number of adjustment positions provided between the elements may be varied (e.g. by variations in the number of engagement slots or size of the engagement slots or type of engagement). The order or sequence of any process or method steps may be varied or re-sequenced according to alternative embodiments. Other substitutions, modifications, changes and omissions may be made in the design, operating conditions and arrangement of the various examples of embodiments without departing from the spirit or scope of the present inventions.

Moreover, some portions of the detailed descriptions herein are presented in terms of procedures, steps, logic blocks, processing, and other symbolic representations of

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operations on data bits that can be performed on computer memory. These descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. A procedure, computer executed step, logic block, process, etc., is here, and generally, conceived to be a self-consistent sequence of steps or instructions leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the discussions herein, it is appreciated that throughout the present invention, discussions utilizing terms such as "receiving," "sending," "generating," "reading," "invoking," "selecting," and the like, refer to the action and processes of a computer system, or similar electronic computing device, including an embedded system, that manipulates and transforms data represented as physical (electronic) quantities within the computer system.

An input device such as a key-board, mouse, touch screen or other input device, and may be connected to additional systems via a logical network. Many of the embodiments described herein may be practiced in a networked environment using logical connections to one or more remote computers having processors. Logical connections may include a local area network (LAN) and a wide area network (WAN) that are presented here by way of example and not limitation. Such networking environments are commonplace in office-wide or enterprise-wide computer networks, intranets and the Internet and may use a wide variety of different communication protocols.

Those skilled in the art can appreciate that such network computing environments can typically encompass many types of computer system configurations, including personal computers, hand-held devices, multi-processor systems, microprocessor-based or programmable consumer electronics, network PCs, minicomputers, mainframe computers, and the like. Embodiments of the invention may also be practiced in distributed computing environments where tasks are performed by local and remote processing devices that are linked (either by hardwired links, wireless links, or by a combination of hardwired or wireless links) through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

Various embodiments are described in the general context of method steps, which may be implemented in one embodiment by a program product including computer-executable

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instructions, such as program code, executed by computers in networked environments. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Computer-executable instructions, associated data structures, and program modules represent examples of program code for executing steps of the methods disclosed herein. The particular sequence of such executable instructions or associated data structures represents examples of corresponding acts for implementing the functions described in such steps.

Software and web implementations of the present invention could be accomplished with standard programming techniques with rule based logic and other logic to accomplish the various database searching steps, correlation steps, comparison steps and decision steps. It should also be noted that the words "component" and "module," as used herein and in the claims, are intended to encompass implementations using one or more lines of software code, and/or hardware implementations, and/or equipment for receiving manual inputs.

While this invention has been described in conjunction with the examples of embodiments outlined above, various alternatives, modifications, variations, improvements and/or substantial equivalents, whether known or that are or may be presently foreseen, may become apparent to those having at least ordinary skill in the art. Accordingly, the examples of embodiments of the invention, as set forth above, are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit or scope of the invention. Therefore, the invention is intended to embrace all known or earlier developed alternatives, modifications, variations, improvements and/or substantial equivalents.

The technical effects and technical problems in the specification are exemplary and are not limiting. It should be noted that the embodiments described in the specification may have other technical effects and can solve other technical problems.

Described supervisory system interface is comprised of sewage treatment process interface, real-time data curve interface, history curve interface, fault alarm interface, report generation interface and Based Intelligent Control interface, wherein the sewage treatment process interface adopts Dynamic Graph form real time modeling to process the scene, click interface equipment and can enter corresponding appliance control interface, show the accumulative total duration that motor had started, can select host computer to control manually or automatically simultaneously; The real-time data curve interface shows the value of current in-site modeling amount in real time by curve form; The history curve interface is by the process data history value in the form demonstration query context of curve and list box.

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Current all the ongoing technological parameters of fault alarm interface display are reported to the police and the fault alarm of system hardware, and the mode that is accompanied by pilot lamp and sound reminds, and can select according to demand to generate the fault alarm form; Press report generation and current technological parameter can be generated form automatically, have WORD, EXCLE and hypertext form selective; The Based Intelligent Control interface is carried out Based Intelligent Control according to the process data of monitoring to system's aerating system and medicine system, and described Based Intelligent Control adopts Fuzzy Adaptive PID Control.

Described Monitor Computer Control System, virtual instrument technique based on America NI company, adopt LabVIEW to develop software, WEB service by LabVIEW can generate html document and embed front panel static state or dynamic image, so that front panel is checked and controlled to the remote monitoring end, the RS232 universal serial bus links to each other with the local GSM module simultaneously, utilizes the VISA Serial Communication Component, adopts the AT instruction to realize short message receiving-transmitting.

Described wireless remote transmission system comprises: the remote control network of Base on Web server and based on message search and the warning net of GSM. Described remote control network is open network, open computing machine and be connected to wide area network by browser, operating personnel apply for control in the strange land, obtain just can obtaining the operation power of system after the home server mandate, thereby realize remote monitoring and the whole sewage disposal process of control.

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WE CLAIM

1) My Invention Waste Water Management with IoT is a smart water management system fixture device is positioned on a different location water line and also the device includes a measuring unit, an electronics unit, location unit, GPS unit, Programming unit, controlling unit and an energy unit associated with a housing. The Invented device also includes an impeller of a turbine disposed in a water chamber and rotatable and the water chamber is positioned between an inlet and an outlet to define a fluid flow path and the measurement unit is in communication with the electronics unit. The invented technology electronics unit received information from one or more sensors and harvests electricity using the motion of the turbine and is in communication with an energy unit for story electricity. The invention also provides a quantity of a water consumption control system based on NB-IoT (Narrowband Internet of Things) which highly comprises an operation application layer, a data gathering layer , a location layer , a GPS layer , a testing layer and an analysis control layer, wherein the operation application layer is used for a water consumption device, a sensor is arranged on the water consumption device, the sensor gathers corresponding parameters, and the parameters are transmitted to the data gathering layer through the NB-IoT. The Invented devise also includes and controlled data gathering layer gathers the data transmitted from the operation application layer and the data are uploaded to the analysis control layer and the analysis control layer analyzes and processes the data and corresponding operation processing is given. The Invented devise also includes with a water dispenser necessary for an ordinary family a hotel, an office and so on a water heater a PC and an intelligent mobile phone as basic components, corresponding interactive terminals are matched respectively, intelligent control on daily water consumption is realized, and the purpose of energy-saving health and convenient water consumption can be realized.

2) According to claim1# the invention is to a is a smart water management system fixture device is positioned on a different location water line and also the device includes a measuring unit, an electronics unit, location unit, GPS unit, Programming unit, controlling unit and an energy unit associated with a housing.

3) According to claim1,2# the invention is to an impeller of a turbine disposed in a water chamber and rotatable and the water chamber is positioned between an inlet and an outlet to define a fluid flow path and the measurement unit is in communication with the electronics unit.

4) According to claim1,2,4# the invention is to a quantity of a water consumption control system based on NB-IoT (Narrowband Internet of Things) which highly comprises an operation application layer, a data gathering layer , a location layer , a GPS layer , a testing layer and an analysis control layer, wherein the operation application layer is used for a water consumption device, a sensor is arranged on

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the water consumption device, the sensor gathers corresponding parameters, and the parameters are transmitted to the data gathering layer through the NB-IoT.

5) According to claim1,2,3,4# the invention is to a devise also includes and controlled data gathering layer gathers the data transmitted from the operation application layer and the data are uploaded to the analysis control layer and the analysis control layer analyzes and processes the data and corresponding operation processing is given.
6) According to claim1,2,4,5# the invention is to a water dispenser necessary for an ordinary family a hotel, an office and so on a water heater a PC and an intelligent mobile phone as basic components, corresponding interactive terminals are matched respectively, intelligent control on daily water consumption is realized, and the purpose of energy-saving health and convenient water consumption can be realized.

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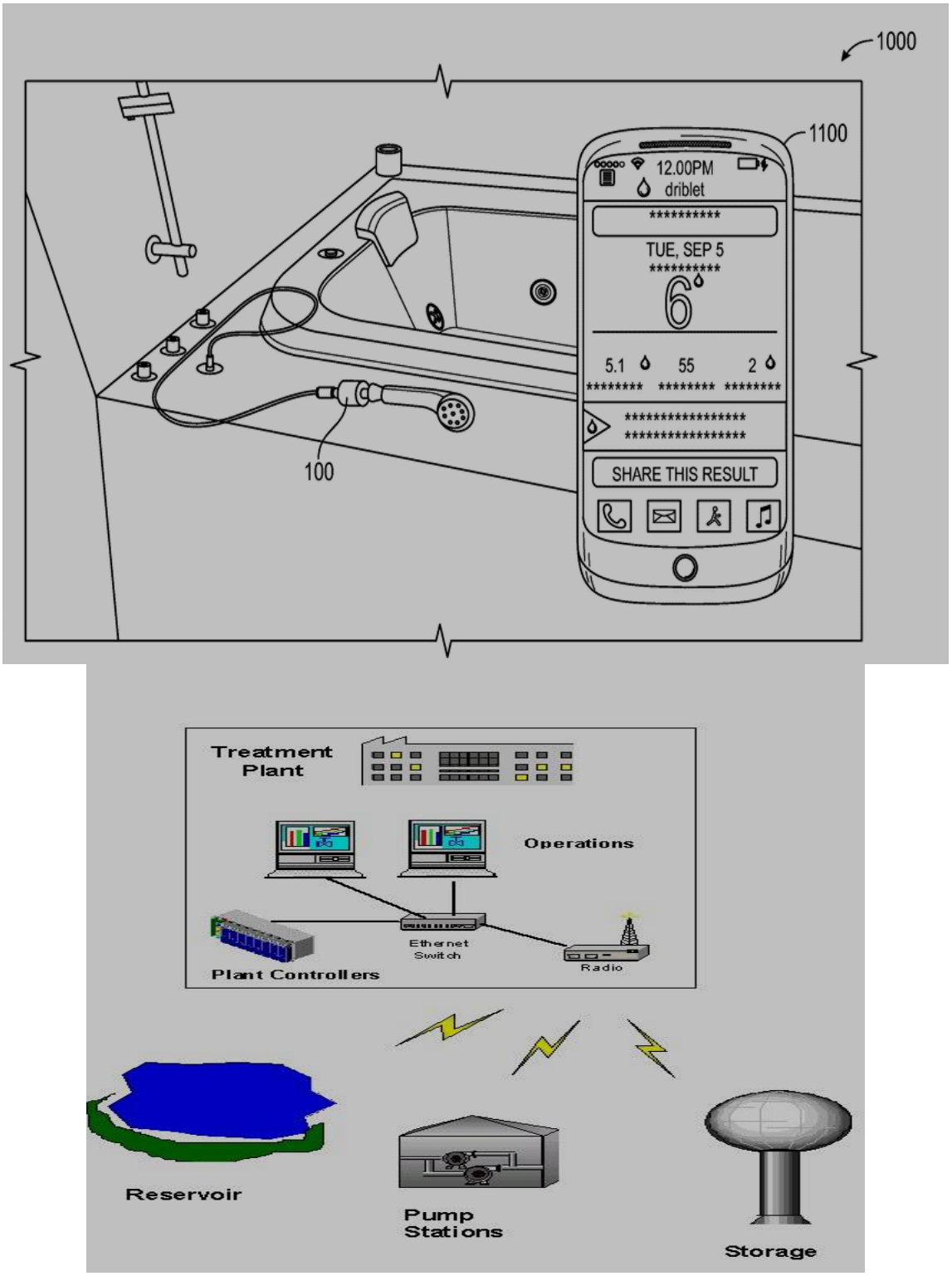
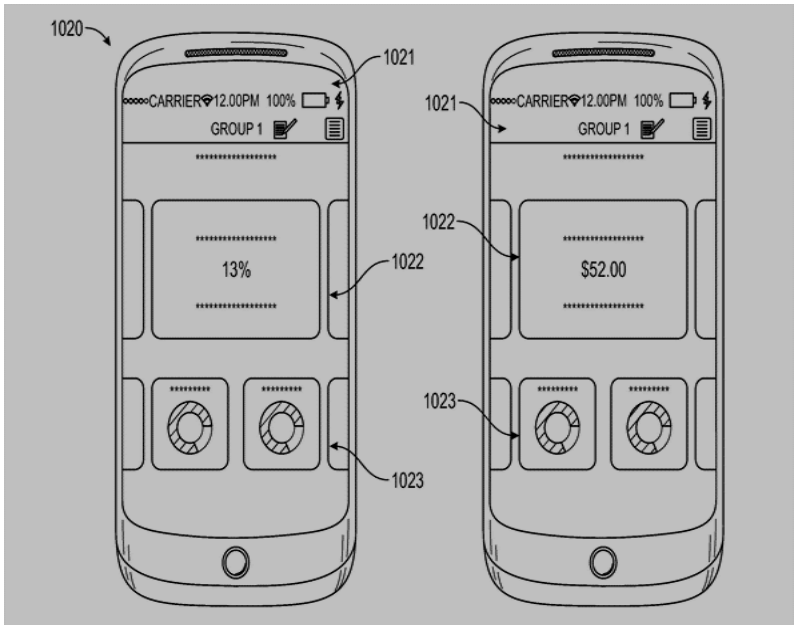


FIG.1: ILLUSTRATES ONE OR MORE EXAMPLES OF EMBODIMENTS OF A SMART WATER MANAGEMENT SYSTEM, SHOWING A FIXTURE DEVICE ON A FIXTURE AND A COMPUTING APPLICATION LINKED THERETO.



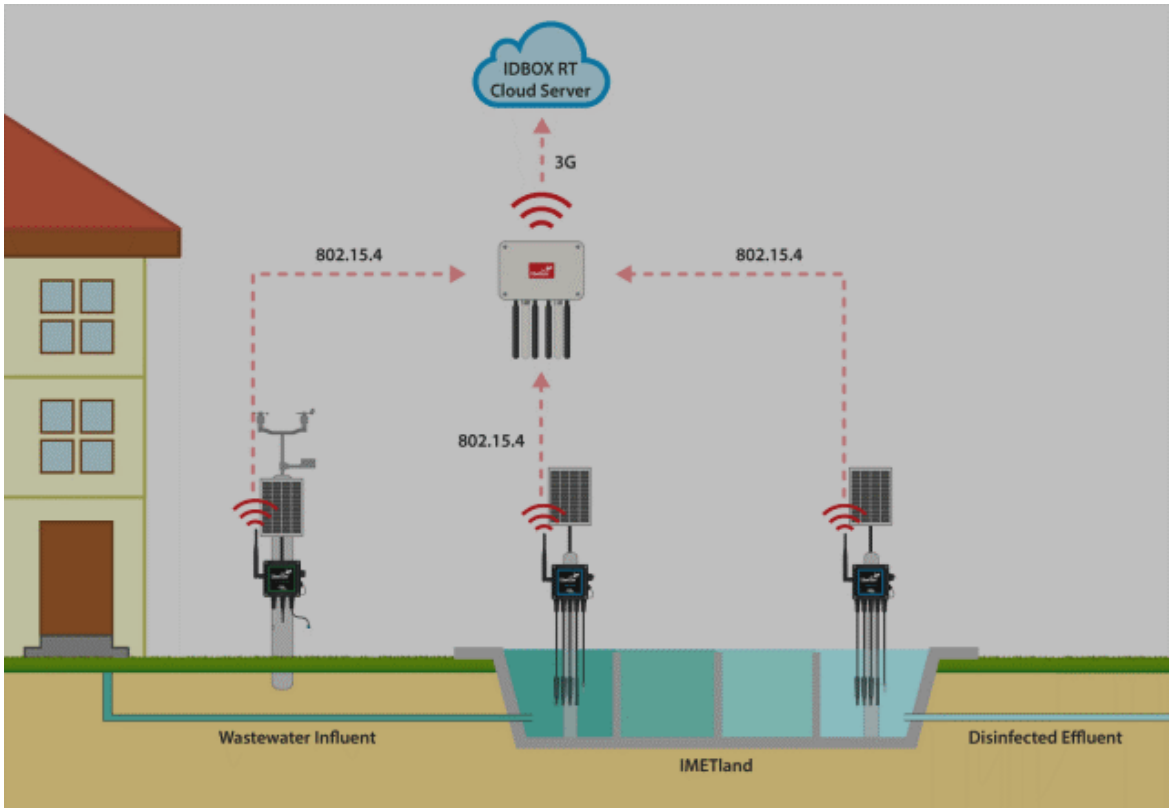
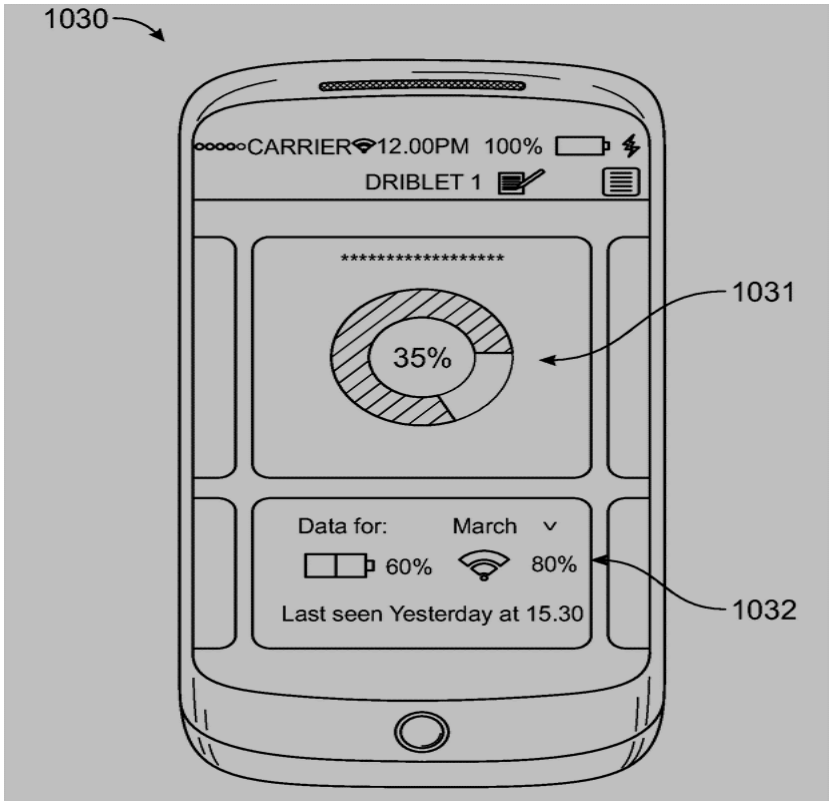


FIG.2: IS A SCREEN SHOT OF ONE OR MORE EXAMPLES OF A SOFTWARE APPLICATION FOR USE WITH A COMPUTING SYSTEM IN ASSOCIATION WITH THE SMART WATER MANAGEMENT SYSTEM SHOWN IN FIG. 1, SHOWING EXAMPLES OF A MONITORING SCREEN AND A MENU FOR SELECTION OF DIFFERENT FUNCTIONS.



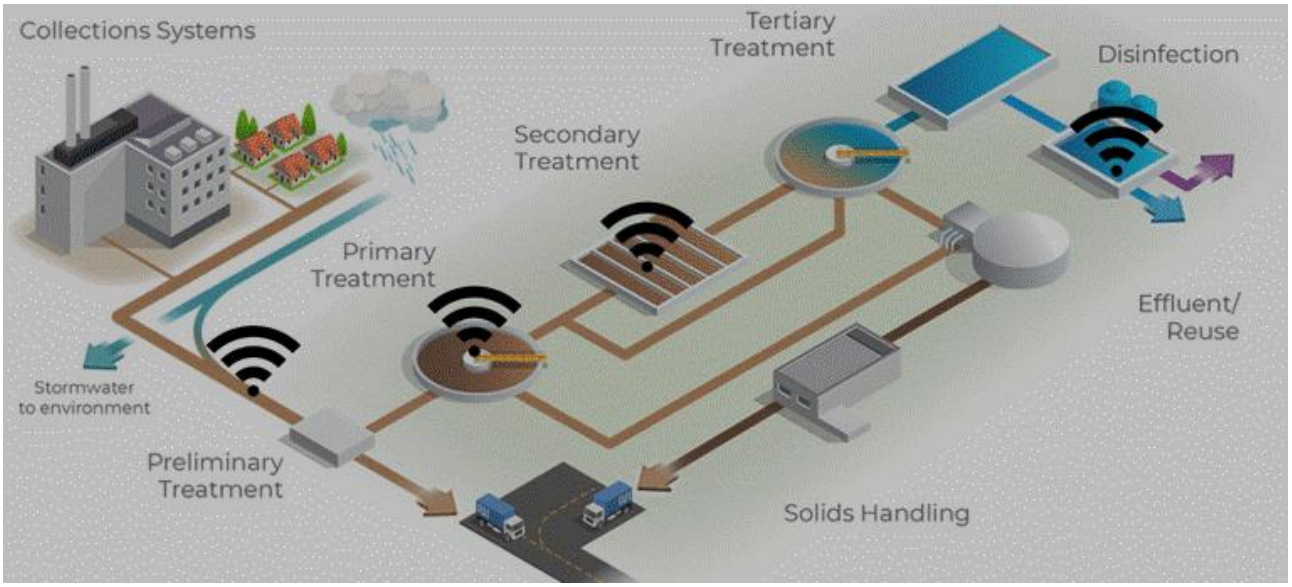
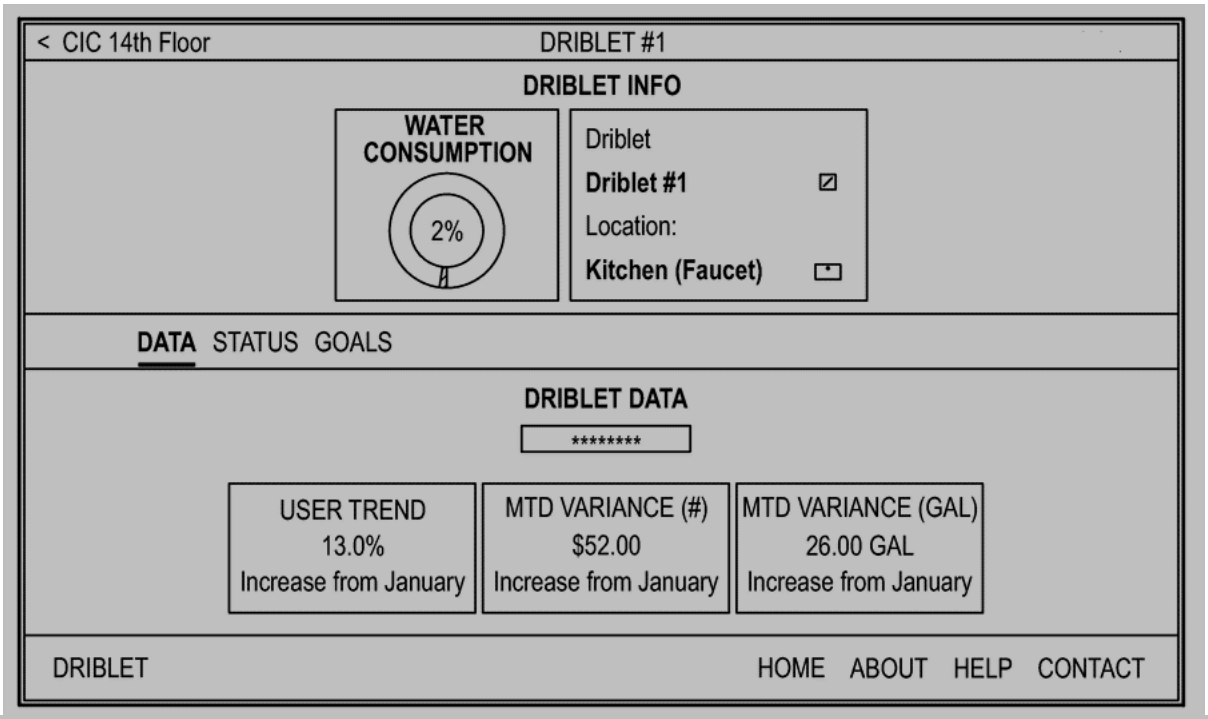


FIG. 3: IS A FLOW DIAGRAM ILLUSTRATING ONE OR MORE SCREEN SHOTS OF A SOFTWARE APPLICATION FOR USE WITH A COMPUTING SYSTEM IN ASSOCIATION WITH THE SMART WATER MANAGEMENT SYSTEM SHOWN IN FIG. 1, SHOWING EXAMPLES OF MONITORING SCREENS, A GRAPHIC REPRESENTATION OF DATA COLLECTED BY THE SYSTEM, AND A SOCIAL MEDIA CONNECTION.

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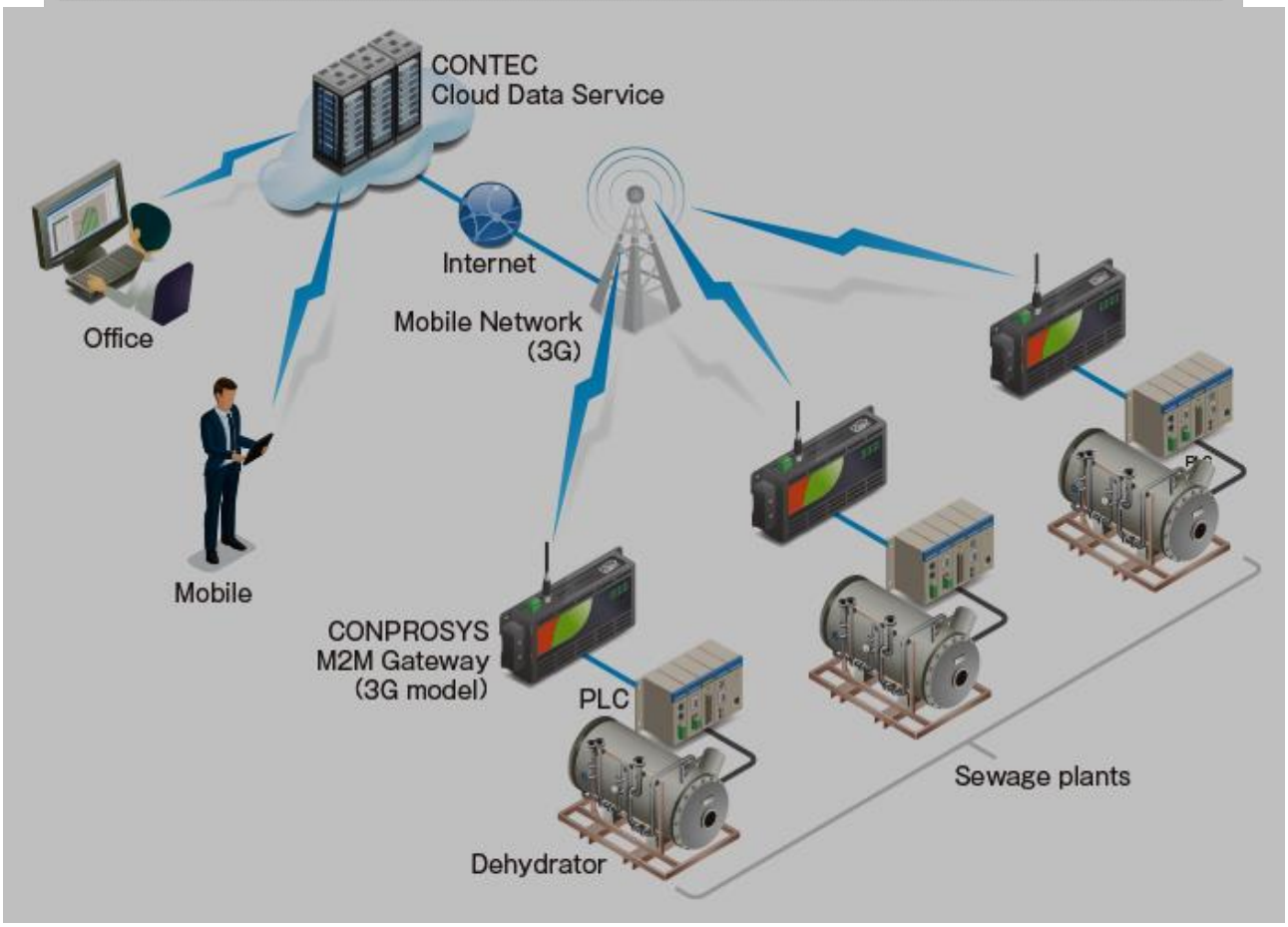
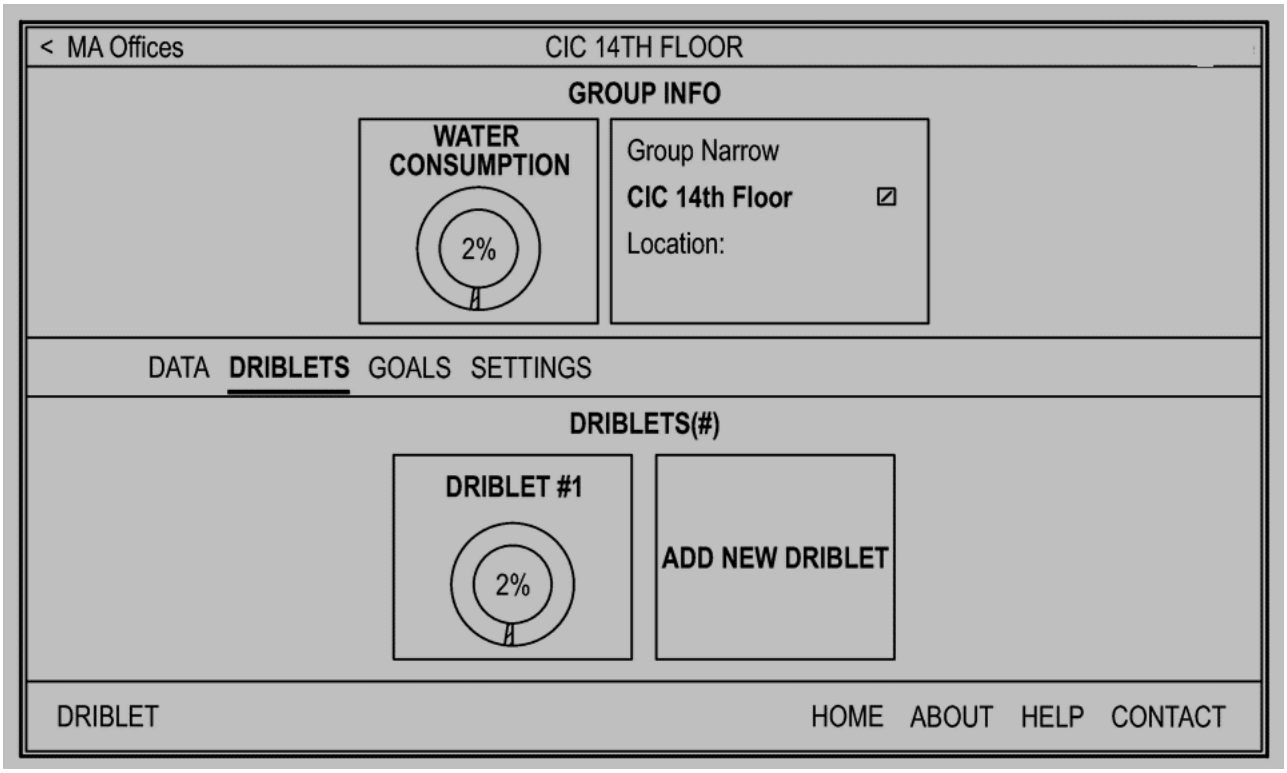


FIG. 4: IS A FLOW DIAGRAM ILLUSTRATING ONE OR MORE SCREEN SHOTS OF A SOFTWARE APPLICATION FOR USE WITH A COMPUTING SYSTEM IN ASSOCIATION WITH THE SMART WATER MANAGEMENT SYSTEM SHOWN IN FIG. 1, SHOWING EXAMPLES OF GOALS AND ALERT SETTING SCREENS.



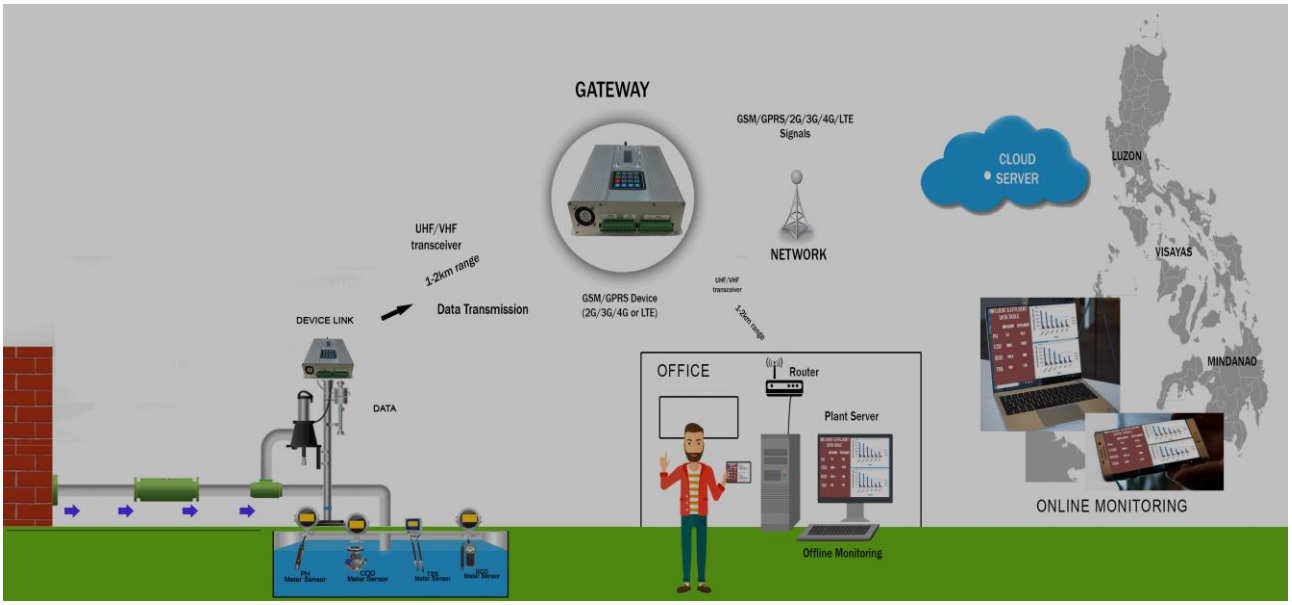


FIG. 5: ILLUSTRATES ONE OR MORE SCREEN SHOTS OF A SOFTWARE APPLICATION FOR USE WITH A COMPUTING SYSTEM IN ASSOCIATION WITH THE SMART WATER MANAGEMENT SYSTEM SHOWN IN FIG. 1, SHOWING EXAMPLES OF A WIRELESS COMMUNICATION LINKING, AND A DATA REPORT ON COMPARING MULTIPLE WATER MANAGEMENT SYSTEMS.

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FIG.6: ILLUSTRATES A COMPUTER SYSTEM FOR USE WITH CERTAIN IMPLEMENTATIONS