WIRED SENSOR SYSTEMS FOR WATER QUALITY MONITORING

GUIDE:

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ABSTRACT

- We provide Energy Efficient Solutions in Wired Sensor Systems for Water Quality Monitoring.
- We built an IOT based sensor which monitors the pH, temperature, conductivity, dissolved oxygen, turbidity,bacteria,etc present in the water stored.
- The sensors collect data and send it to the server.
- The server will then upload the data to the cloud.
- The remote water station will collect the data and determine the quality of water.
- This system can be used on bigger scales, saves time and man-power.

OBJECTIVE

- Object of this project is to reduce the effort and manpower its takes to measure or monitor the quality of water.
- In that process measurements of the parameters are done.
- If the parameters are in the safe range then the water is allowed for distribution.
- If the water is not qualified for distribution then water treatment measures can be taken to purify the water and then it can be distributed.
- We use Wired Sensor Systems to do so, which reduces the human effort by a lot and is very accurate at the same time.

EXISTING SYSTEM

- The system was facing the problem regarding Battery, where the battery may get discharge at any point of time. This may lead to inconsistency at times where the input from the sensor is necessary to do the whole process of water quality and quantity management.
- The sensors are not synchronised with each other which may lead to possible redundancy in data management
- If water found polluted or unfit for drinking , no solution given as to what steps should be taken to make it suitable for drinking.
- If any part of the system gets damaged, it will affect the whole system, on that basis, no such major measures are taken into consideration.
- The cloud data and sensor model data are not safe, as no security measure is mentioned in the system.

PROPOSED SYSTEM

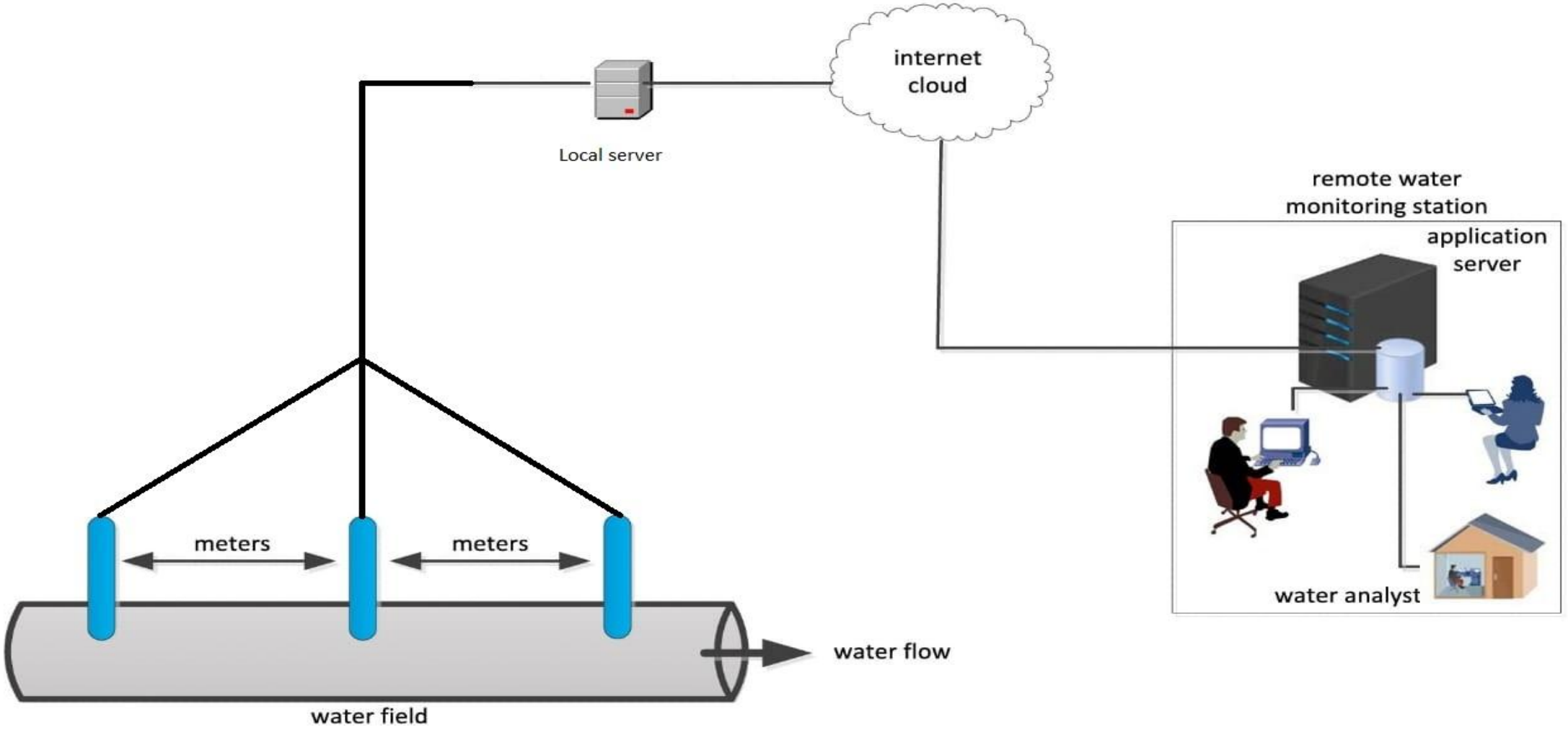
- Wired sensor system for water quality system offer a variety of advantages over the traditional water quality system. It makes the water quality determination very easy while maintaining the same accuracy that the traditional laboratory method have.

- This system directly measures the water parameters using sensors and gives real-time transmission of water data to control centres.

- We can timely analyse the data, then we can make decisions very quickly by seeing the data collected by the sensors and determine if the water is distributable or not.

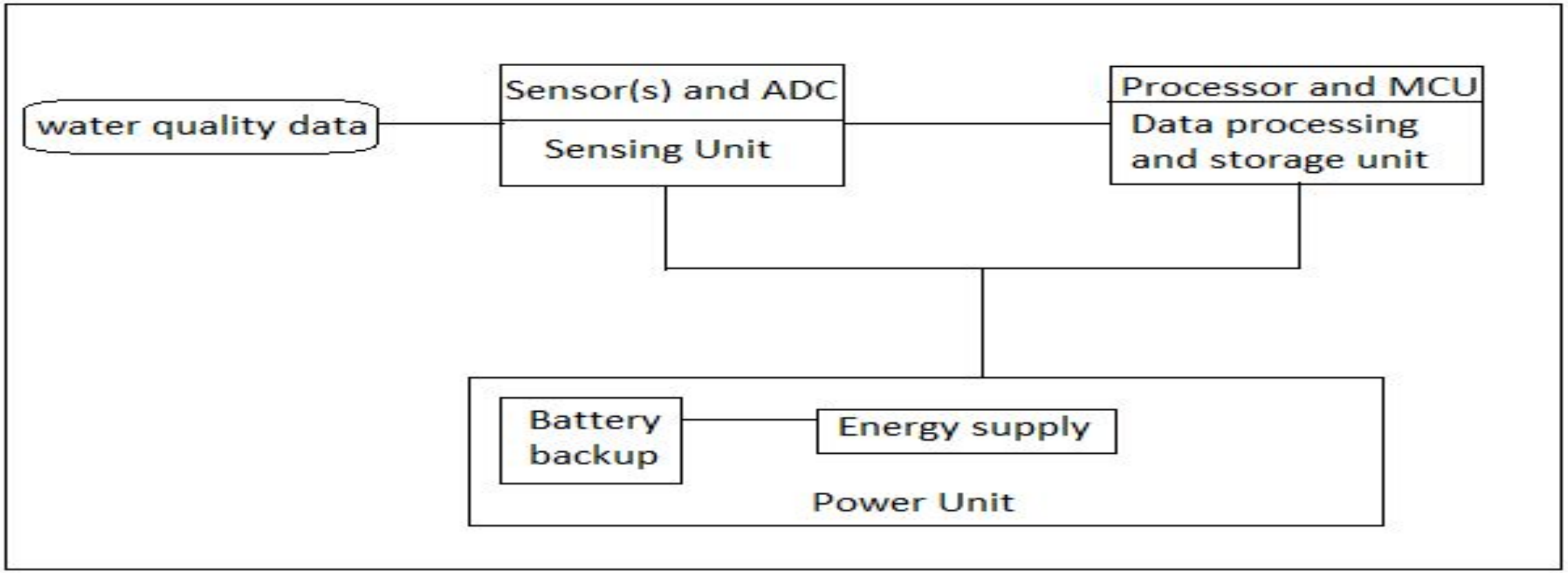
- This system saves a lot of time and it saves a lot of man-power . This system can also tell if the water is treatable or not , by seeing the stats we can determine what should be done to make the water usable for everyday use.

ARCHITECTURE DIAGRAM



MODULE

HARDWARE:



- 1. **Sensor**– These sensors will be responsible for sensing all the parameters that are needed to be examined. The water quality parameters estimated incorporate pH, dissolvedoxygen(DO), oxidationreductionpotential(ORP), conductivity(salinity), turbidity,temperature and dissolvedions (Fluoride(F),Calcium(Ca2+),Nitrate(NO3),Chloride(Cl),Iodide(I),Cupric(Cu2+),Bromide(Br),Silver(Ag+),Fluoroborate(BF4),Ammonia(NH4),Lithium(Li+),Magnesium(Mg2+),Nitrite(NO2),Perchlorate(ClO4),Potassium(K+),Sodium(Na+).Usually we have various sensors for every one of the parameter however we can introduce different sensors in our one unit.

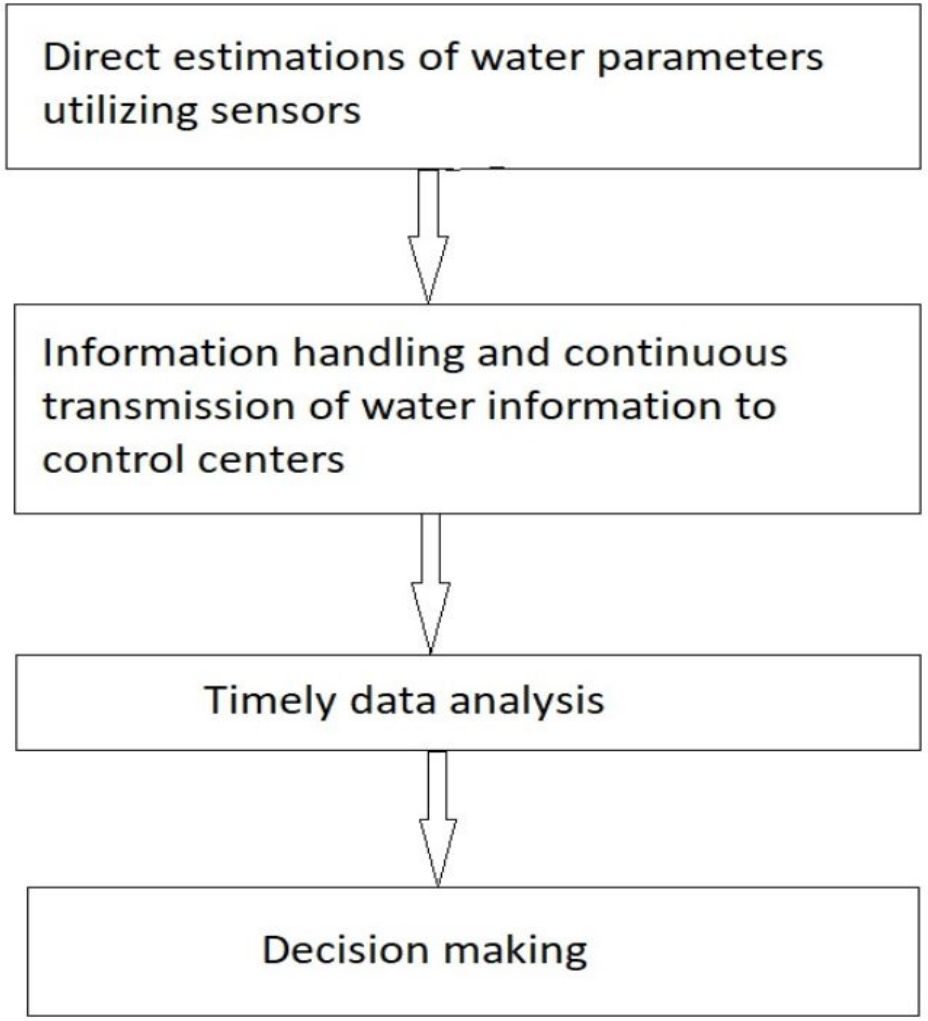
- 2**. AC PS** –We will be using Alternate Current Power Supply as our power supply as it will be better than regularly charging the batteries of the wireless sensors and it will become that much more convenient, just switch on a switch and the sensors will start working.

- 3. **ADC** - ADC is analog to digital to converter, as our sensors can only measure in analog it is there to convert the measurement into digital format.

- 4. **Microprocessor and a memory chip**-It's the processing power of our unit, processing of the data captured by the sensors will be done here. It will give a number or a measure to the parameter it is measuring and then the processed data will be stored in our memory chip. Then the stored data will be sent to the work stations where they will identify that if the parameter level is safe for distribution or not.

- 5. **A Small Battery** -It can be put into the node just in case if power cuts happen it will provide our unit a power supply for some amount of time. It will be useful for a couple of readings and our sensor will still be able to function

DATA FLOW DIAGRAM



- Our method is very simple and requires a lot less of man power.
- This ends up saving us a lot of time and energy.
- It comprises of Direct estimations of water parameters utilizing sensors then information preparing occurs and continuous transmission of water information to control focuses.
- There they can timely analyze the data and then make the decision of distributing the water.

CONCLUSION

The traditional technique for estimating water quality was somewhat moderate and required labour and numerous different assets which could be tedious and henceforth this new strategy for utilizing wired sensors to check the ongoing water quality is the most productive and cost-effective way. The problem of battery consumption and charging the sensors regularly is resolved and thus we get a system which is ready to work at any time.

LITERATURE SURVEY

S NO.	TITLE	AUTHOR	JOURNAL NAME	TECHNLOGY USED	ADVANTAGES	DISADVANTAGES
1	Dependable Structural Health Monitoring Using wireless Sensor Network	1.Md Zakirul Alam Bhijan 2.Guojun Wang 3.Jie Wang 4.Jianoj Cao 5.Xuefeng lies 6.Tian wang	IEEE Transactions on dependable and secure Computing	1.Wireless Sensor Networks. 2.SHM system	1.It can monitor damage, Crack and corrosion.	1.Less Range 2.Less battery backup 3.Faulty sensors can corrupt results and can cost life.
2	Smart water ATM in India using cloud computing.	1. Madhumathi R 2.Reshma Sultana 3. Dharshana R	IEEE 2017	1. Cloud Computing 2. Network security	1. Smart ATM 2. Automatic detection of water usage	1. Separate systems for cloud-based ATM and simple water ATM 2. Can't be implemented in rural areas.
3	A Wireless Sensor Network Platform for Water Quality Monitoring	1.Tomoaki Kageyama 2. Masashi Miura 3. Akihiro Maeda 4. Akihiro Mori 5.Sang-Seok Le	IEEE 2016	1. IoT 2. Wireless sensor network	1. Precise and accurate water quality monitoring. 2. Small and cheap, therefore many sensor can be implemented.	1. Under developed or incomplete. 2. Not mentioned the quantity of water that will be measured at a particular time.
4	On the Optimization Model for Multi-Hop Information Transmission and Energy Transfer in TDMA-Based Wireless Sensor Networks	1.Weiqiang Xu 2. Weiwei Cheng 3. Yushu Zhang 4. Qingjiang Shi 5.Xiaodong Wang	IEEE COMMUNICATIONS LETTERS, VOL. 21, NO. 5, MAY 2017	1. TDMA-based multi-hop routing 2. WET (wireless energy transfer)	1. Improvement in network performance. 2. Wireless energy transfer over wide ranges.	1.It is costly 2. It is complicated

S NO.	TITLE	AUTHOR	JOURNAL NAME	TECHNLOGY USED	ADVANTAGES	DISADVANTAGES
5	Smart Water Quality Monitoring and metering Using LORA for Smart villages.	1.Anto Merline Manoharan 2.Vimalathithan Rathinasabapathy	2nd international Conference on Smart grid and smart cities	1.M2M LORA 2.Smart meter	1.The system can be controlled from one common place where the entire water distribution system takes place. 2.It saves water and avoid excessive water flow and pollution.	1.Difficult for huge amount of data. 2.Water being stagnant for a long time make it lose its properties and gets polluted.
6	Smart Water Flow Monitoring and Forecasting System	1.Gaurav Gosavi 2.Gajanan Gawde 3.Gautam Gosavi	2017 2nd IEEE International Conference ON recent Trends in Electronics Information and communication Technology	1.ArdunioUNO 2.Raspberry pie 3.Hall effect sensor 4.Artificial neural network	1.It can predict precisely the consumption of water. 2.Demand management 3.Asset management. 4.Leakage management.	1.Sensor inaccuracy 2.Power mismanagement 3.Data insecurity 4.Deployed software
7	A Time-synchronized ZigBee Building Network for smart water management	1.Chung Kit Wu 2.Hongxu Zhu 3.Loi Lei Lai 4.Anna S.F. Chang 5.Fengjun Li 6.Kim Fung Tsung 7.Roy Kalawsky	2017 IEEE	1.Time-synchronized Zigbee 2.Wireless Control system	1.Scalable,flexible and reliable. 2.Time-synchronized water management.	1.Improper time synchronization. 2.Packet loss 3.Long latency. 4.Degraded network performance.
8	AN ENHANCED UNDERGROUND PIPELINE WATER LEAKAGE MONITORING AND DETECTION SYSTEM USING WIRELESS SENSOR NETWORK	1. M.JayaLakshmi 2. Dr.V.Gomathi	2015 International Conference on Soft-Computing and Network Security (ICSNS -2015), Feb. 25 – 27, 2015, Coimbatore, INDIA	1. IoT 2. Wireless sensor network	1. Measures the water flow and detect any changes 2. Better than traditional way of leakage detection	1. Sensors are not well protected and may get damage.

S NO.	TITLE	AUTHOR	JOURNAL NAME	TECHNLOGY USED	ADVANTAGES	DISADVANTAGES
9	Versatile Real-time Traffic Monitoring System Using Wireless Smart sensors Networks	1.Walid Balid 2.Hasan Tafish 3.Hazim H. Refai	IEEE Wireless Communication and networking conference	1.Magnetometer 2.Vechile detection 3.GPS synchronization 4.Wireless Networks	1.It provides reliable, accurate, and real-time traffic data. 2.It is cost effective.	1.Some sensors are very costly. 2.Only the costly sensors can withstand the tuff weather conditions, cheap ones can't.
10	Joint Optimal Placement, Routing, and Flow Assignment in wireless Sensor Networks for Structural Health Monitoring.	1.Mohamed Elsersy 2.Tarek Mohamed Elfouly 3.Mohamed Hossam Ahmed	IEEE SENSORS JOURNAL	1.Wireless sensor networks 2.Structural health monitoring 3.Sensor placement optimization.	1.The algorithm it uses has a reduced complexity. 2.This system also optimizes the energy consumption for efficient communication.	1.This approach does not guarantee of the optimality of the overall solution
11	Smart water for Leakage detection:Feedback about the use of automated meter reading technology	1.Elias farah 2.Isam shahrour	IEEE 2017	1.Automated meter reading. 2.Water distribution system 3.Minimum night flow(MNF)	1.Track and control Water usage. 2.Improved active leakage targeting. 3.Leak detection capability 4.Large scale application	1.Aging infrastructure loss 2.Soil movement. 3.Unauthorsied consumption related to water 4.Fire hydrants.
12	Application of wireless sensor network in water quality monitoring .	1.Yang xu 2.Fugui Liu	2017 IEEE international conference on computational science and engineering and IEEE international conference on embedded and ubiquitous computing.	1.Water quality monitoring system. 2.Wireless sensor networks	1.Wide range of area covered 2.Fast 3.No wiring related problem	1.Signal becomes weaker as distant increases. 2.No safety 3.Transmission stability is not high.