SURVEY ON ENVIRONMENT MONITORING SYSTEM

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Abstract— Health is most important thing in life. Nowadays people are facing lot of health issues. There are lot of diseases caused due to pollution such as malaria, asthma and so on. Due to these reasons lot of money, time and energy is lost. Health hazardous is mainly caused due to contamination in environment. Most of the people are not aware of their surroundings, so to make awareness among people make use of an advanced Environment Monitoring System. Environment Monitoring System describes procedures that need to monitor the quality of the environment. All observing procedures are regularly intended to set up the present status of environment. Wireless Sensor Network comprises of number of sensor nodes with detecting and processing abilities, which can sense and monitor parameters and transmit the gathered information to central location. Monitoring is possible by Internet of Things (IoT) Techniques. The Officials in that area gets notified.

Index Terms— Environment Monitoring, Wireless Sensor Network, Sensor node, Internet of things.

I. INTRODUCTION

In early times analog techniques were used to measure environment parameters, among some of them with capacity to record values on paper dish. The old systems record information at particular intervals and require human intervention. Old mechanisms were replaced by digital data loggers, which are easy to operate, inexpensive and easy to maintain but provide monitoring at one point only which is main disadvantage of it [1]. Wireless Sensor Network (WSN) is used for collecting information about environment. WSN consists of microcontroller, memory storage a power supply, sensors, transceiver [2]. The different sensors are attached to wireless sensor nodes. Each node in a WSN is fit for detecting the environment, processing the information and sending it to destination through wireless connection.
The analog signals obtained from sensors are converted into digitized signal by analog to digital converter and send to controller for more processing. The Internet of things (IoT) will be equipped with controller, transceiver for communication and with proper protocol stacks will able to communicate with user and others becoming an part of internet great.

WSN has various applications like environment observation, battlefield surveillance forecasting system and so on. The sensors have limited power source since battery recharging is main issue faced. Life span of batteries of sensors can be increased by using an effective energy balancing methods. This paper surveys available solutions to support Wireless Sensor network environment monitoring application.

II. WIRELESS SENSOR NODE

Wireless Sensor Node consists of sensor unit, processing unit, transceiver, and power supply, analogy to digital converter [4].
Sensing unit: The sensing unit consists of arrays of sensors which are used to measure characteristics of Environment.
Processing unit: A microcontroller performs tasks, Store information and processes it and controls most of the part in sensor node. It's inexpensive, portable, and easy for programming and consumes less power.
Transceiver: Transceiver is utilized to send and get messages remotely. The usefulness of both transmitter and receiver are in it. Sensor nodes uses ISM band. This gives free radio, spectrum allotment and accessibility.
Power supply unit: Energy required for all segments of a WSN is gotten from a power supply. Since the sensors are often situated in different places changing the battery consistently can be costly and tricky. The utilization in sensor is required for detecting, conveying and information preparing. The energy in sensor node is from power put away in batteries or capacitors.
Memory: In the Little size of a sensor brings about comparing limitations on memory too. Sensor utilize flash memories due to their cost and capacity limit. There are two classifications of memory taking into account the motivation behind capacity as client memory utilized for putting away application related information and program memory utilized for programming the devices on the design field. Loadable modules support is one of the key elements of SOS.

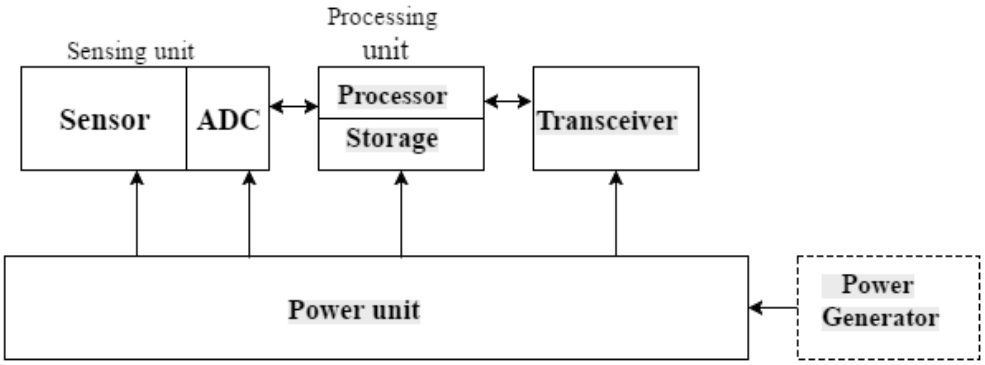

Fig. 1: Sensor Node

III. SYSTEM ARCHITECTURE

WSN architecture includes both the hardware and operating system. Main components are

Sensor field: the sensor field is the area where sensors are deployed.

Sensor node: the sensor nodes are responsible for collecting information and send information back to sink.

Sink: It is a sensor node and performs tasks like receiving, processing and storing data from sensor nodes.

Base station: It is a central point of control within the network used to extract information and send control information back to network.

Operating system: In the necessities of operating system are: little trace, next to no overhead, and, little power utilization [3].

TinyOS

The TinyOS is first operating system designed for WSNs. TinyOS has a segment based structure which empowers quick change and acknowledgment alongside minimizing code estimate important due to sever memory requirements in WSNs. Library of TinyOS permits modification for custom application and TinyOS is a type of open source OS, it is based on an event driven programming model.

LiteOS

LiteOS is an open source, interactively working

Operating System intended for WSNs. LiteOS, similar to Unix, has tools that permits operation on one or more WSNs. Applications can be created for nodes and can be disseminated remotely to sensor nodes.

SOS

(SOS Embedded Operating System) is an occasion driven OS that takes after a more dynamic position microcontroller with a small program and data memory. Flash memories can be used for secondary storage purpose.

Contiki

Contiki is like TinyOS. Kernel of Contiki is event driven and per application basis and it support IPv4 and IPv6.

Raspberry pi

Raspberry pi is inexpensive, low power consumed computer board. It consists of processor, ram and various interfaces. It works as normal pc but requires a keyboard, storage, display unit, external power supply unit.

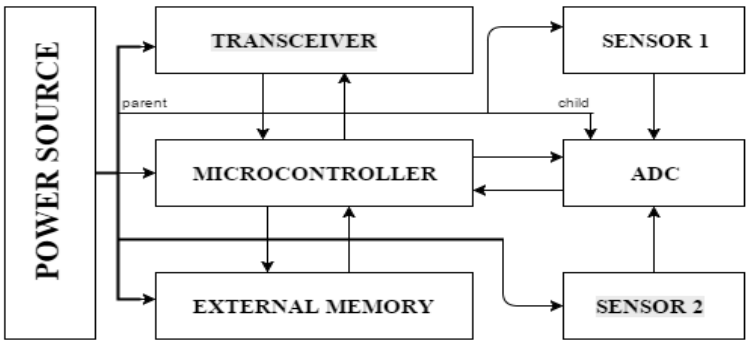

Fig. 2: System Design

IV. PROTOCOL STACK

Sensor network protocol with following layers

Application Layer: Application layer supports different software for application. Three application layer protocols are sensor management protocol (SMP), sensor query and data dissemination protocol (SQDDP) and task assignment and data advertisement protocol (TADAP) [4].

Transport Layer: Transport layer provides communication of network with world. It maintain data flow when application layer in need. Real challenge faced is that sensors influenced by number of parameters and limited power supply and memory

Network Layer: The network layer provides internetworking with external networks. This layer allows routing of data through channels [5].

Data Link Layer: Data Link Layer provides Multiplexing of data streams, medium access and error control and detection. Challenges are power conservation, mobility management and so on.

Physical Layer: Physical Layer is lower most layers which are responsible for frequency selection, modulation, signal detection and so on [7].

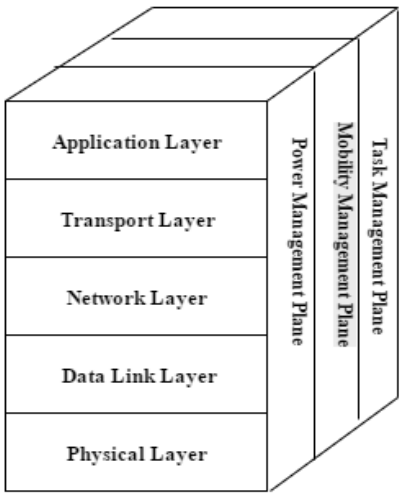

Fig. 3: Protocol Stack

V. NETWORK TOPOLOGIES

Design and deployment of WSN topology depends on environment and application. It also depends on factor such as rate and quantity of data needed to be sent, transmission distance, power, mobility and so on [6]. Three types of network topologies architecture

Star topologies: A star topology is a point to point single hop architecture. Each sensor node directly connects to a sink node. It consumes less power among other topology.

Mesh topologies: A Mesh topology is one to many multi hopping architecture. It allows peer to peer communication. Each router node connects to multiple nodes. All nodes choose best path among available path by self connecting to several nodes. Advantages are longer range, decreased loss of data and higher self healing communication ability. Disadvantages are cost and high power consumptions.

Cluster/tree topologies: A cluster is hybrid star mesh architecture. This topology partitions node into groups called clusters. Each group has a cluster head with one or more member nodes. Multi hop routing is used to transmit information from source to base station.

VI. CONCLUSION

In this research paper, a survey based on Environmental Monitoring System using Wireless Sensor nodes is explained. It is highly efficient and economical at toxic gases, solid wastes and any form of physical environment. This method helps to save lot of amount spend for labour, man-effort and also helpful in time consumption to make a new efficient eco-friendly environment considering its need and cost is negligible. The system is so much beneficial to us, but it is somehow difficult to implement such system at each and every surroundings. The major objective behind such design is mainly based on the further investigation on WSN platforms, for balancing unequal distribution of energy, to keep sensors life-span as much as possible.

REFERENCES

[1] Luis M.L Oliveira and Joel J.P.C Rodriques "A wireless sensor network based: A survey on environment monitoring ," Journal of Communication, vol. 6, no. 2, pp.143-151.

[2] Prachi Sharma, "wireless sensor network for environment monitoring, "International Journal of Scientific Research and technology, 2014

[3] Shabbir Hasan, Md Zair Hussain, R.k.Singh "A survey of wireless sensor network,"International Journal of emerging technology and advanced engineering vol. 3,issue.3, 2013, pp. 487-492.

[4] Luis M.L Oliveira and Joel J.P.C Rodriques "A wireless sensor network based: A survey on environment monitoring ," Journal of Communication, vol. 6, no. 2, pp.143-151.

[5] Ankita, "A Survey on wireless sensor network based approaches,"International Journal of Advanced Research in Computer Science and Software Engineering, vol. 3,issue 4 ,2014.

[6] Sanjeev Kumar Gupta ,Poonam Sinha "Overview of wireless sensor network: A survey," International Journal of Advanced Research in Computer Science and Software Engineering , vol. 3, issue 1, 2014

[7] Kazem Sohraby, Daniel Minoli and Taieb Znati (2007) "Wireless Sensor Networks Technology Protocols and Application", Wiley-Inter Science, ISBN 978-0-471-74300-2.

[8] Suraiya Tarannum (2010) "Energy conservation Challenges in Wireless Sensor Networks: A Comprehensive Study", Wireless Sensor Network 2010, Scientific Research, Vol.2 PP. 483-491.

[9] Hempstead, M.; Lyons, M.J.; Brooks D. & Wei, G.-Y. 2008 Survey of Hardware Systems for Wireless Sensor Networks, Journal of Low Power Electronics, Vol.4, pp. 1-10.