GUI based Automatic Monitoring System for Improvement of Energy Consumption and Protocol Design

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Abstract— Wireless sensor networks have the diverse application in the field of science and technology. Micro sensors enable comfortable data exchange in communication. Energy consumption is the main constraint in wireless sensor network as it degrades the performance of network by affecting other parameters. By exhibiting the energy consumption of sensor network helps to design efficient protocol, system design and its throughput. If we protect our network from fast drain out, it will improve network lifetime. All these representatives are majorly altered by energy consumption. If we evaluate energy, we can improve major parameters that are concern in wireless sensor network. In this paper, we look at the energy consumption by wireless sensor networks using energy model to demonstrate the performance of automatic monitoring system so we can improve system throughput. Simultaneously using GUI continuous pattern generate of sensor input in regular interval, so protocol designer can analyze and design an effective protocol. A wireless sensor network technology is responsible for data sending and receiving devices that provide operator ease to observe and maintain energy by using real-time tool.

Keywords— *Energy consumption, Protocol design, GUI, Energy model*

I. INTRODUCTION

Wireless sensor network technology uses almost everywhere; industries, irrigation, medical, military, etc. Though wireless sensor networks have its own restrictions which researchers constantly addresses and putting efforts to eradicate it from network to produce more efficient system. No model can accurately measure the energy consumption due limited availability of WSN models to reveal accurate characteristic. In this model, we consider the power consumes by sensor node, controlling unit, transceivers and other peripheral devices. As presently available tools do not appraise exact energy consumption which disturbs performance analyses and protocol evolution. By using state changeover approach we calculate energy consumption of monitoring automation system.

II. BASICS OF AUTOMATIC MONITORING SYSTEM

We have two segments and segments consist sensors; which sense some sort of physical parameters later convert it into electrical signals, transceiver; it is a device which is responsible for exchanging data, supervising unit; it regulates the action of all components or unit present in module. Among these components, transceiver is the fundamental component which consumes highest energy. Controlling unit processes and controls all peripheral devices. It is responsible for gathering data and further process it establishes communication in network. It moves in three different states namely; sleep, idle and running. Transceiver is responsible for data exchange. It mostly acts as intermediate, it simply sends and receives information. Sensor nodes convert physical parameters into electrical signals which can be measurable using electronic equipment.

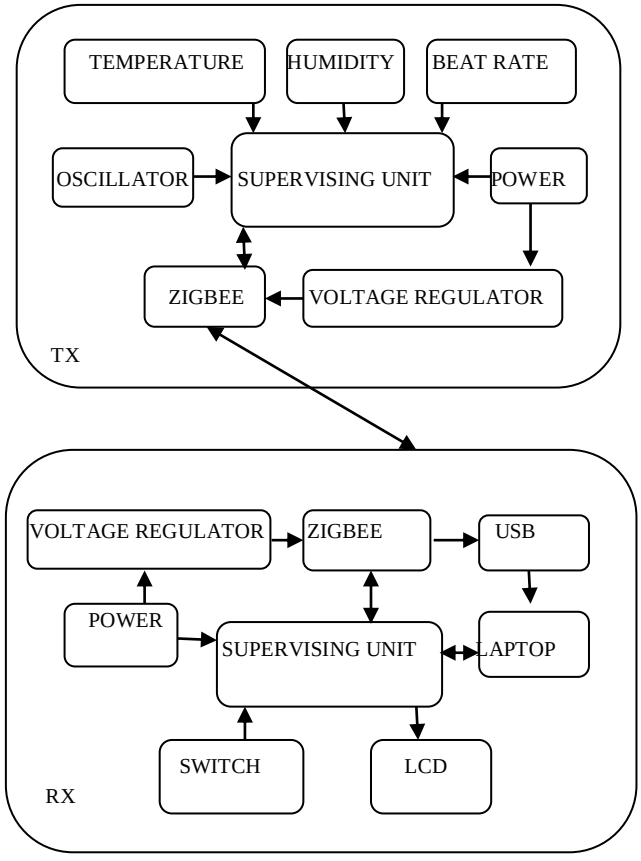


Fig.1: Automatic Monitoring System

III. PROPOSED METHODOLOGY

Wireless sensor networks have the self constructing nodes that establish peer to peer communication; it does not require human involvement as it is self sufficient to fix itself according to requirement. The GUI plays a vital role in monitoring and controlling the surrounding by data operator. Through a user interface, the operator can manipulate data onto information to understand environmental parameters in the form of graphs and discrete points. The microcontroller is interfaced to computer through USB. By using GUI sensor input generated on screen. Three sensors interfaced with supervising unit and generate pattern of temperature, humidity and neat rate. USB majorly used technique in communication as it broadens the range of sending and receiving information in the form of data packets. The USB requires source to create the virtual COMM PORT connection. Sensors will sense environmental parameters, gathered by supervising unit and records of sensor inputs on GUI, which helps operator to comprehend and evolve protocols in more effectively and evaluate energy consumption by looking to performance obtain.

IV. IMPLEMENTATION

In automatic monitoring system, there are three states on which these states are idle, sleep and running state. We adopt event-driving mechanism, after every particular time duration different events take place in the process of exchanging information. By using event driving mechanism able to evaluate significant changes occurred in states. Event driving in sensor shows periodically 'ON' with respect to external source trigger. Similarly in microcontroller when module comes in "run" state, three events performed; data gathering, sending and arriving packet data. In transceiver, event triggering in two states; transmitting and receiving.

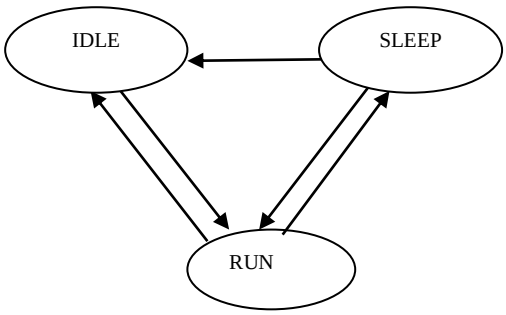


Fig. 2: Supervising unit state transition

Energy and power consumption

$E=V*I$ *Joule*

$P=V*I*T$ *mw*

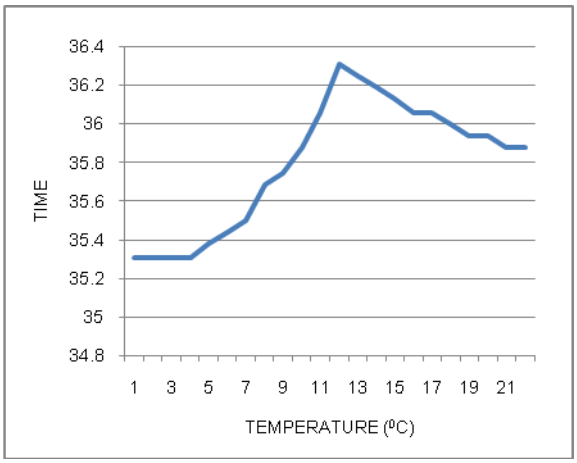
Where;

E-energy, P-power, V-potential difference, I-current, t-time interval

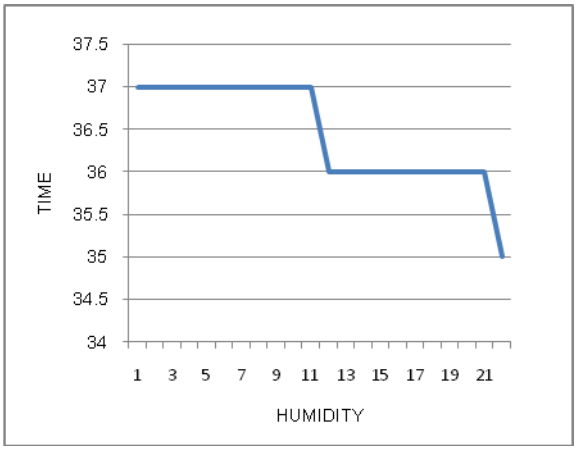
$\sum E = E(TX) + E(RX)$

Where;

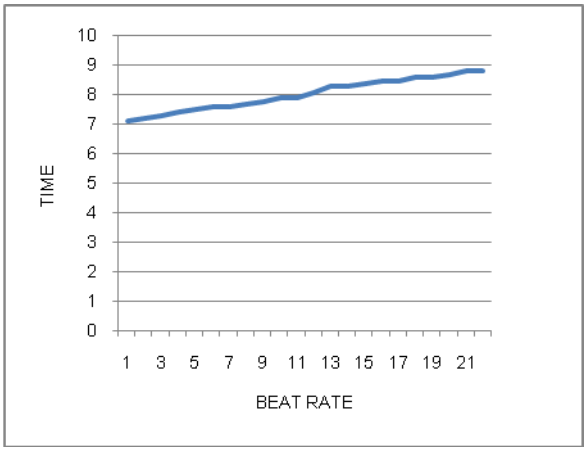
$\sum$E-total energy, E (TX) - transmitter energy, E (RX)-receiver energy



Graph-1



Graph-2



Graph-3

V. RESULTS

STATES	VOLTAGE (V)	CURRENT (mA)	TIME INTERVAL	POWER (mW)
SLEEP (STEADY)	12 V	0.18	1	2.16
IDLE (TRANSIENT)	12 V	0.20	1	2.40
RUNNING (STEADY)	12 V	0.23	3	8.28

Table 1: TRANSMITTING SEGMENT

STATES	VOLTAGE (V)	CURRENT (mA)	TIME INTERVAL	POWER (mW)
SLEEP (STEADY)	12 V	0.04	1	0.48
IDLE (TRANSIENT)	12 V	0.06	1	0.72
RUNNING (STEADY)	12 V	0.08	3	2.88

Table 2: RECEIVING SEGMENT

VI. CONCLUSION

In this paper, we used energy model to evaluate the energy consumption of demonstrating model and exhibiting the energy consumption of respective segments. We have observed when all segments are steady running state it keeps consuming energy which is comparatively larger than other states which is misuse of energy or simply wastage of energy. If we keep transmitting segment on running and rest other (receiving) segment on standby, it saves energy. Consider 'N' number of modules by implementing hierarchical approach we can layer number of segments into transmitter and receiver and by put transmitter on processing or running state and rest layers keep on standby. The compulsory module acts, will only consume energy which is mandatory at running state and remaining at sleep state which utilize less energy. If we put other segments on standby mode which has currently no participation in the process will lead to energy saving. So this is how one can save network from fast drain out. Another concern is efficient protocol design by using GUI, it generate pattern of physical parameters. So designer can analyze and evaluate an efficient approach for superior wireless sensor networks.

VII. APPLICATIONS

- In medical field.
- To measure environmental parameters

VIII. MERITS

- Network can be saved from fast drain out.
- Increase battery lifetime by consuming less energy
- We can design efficient protocol
- Reduce probability of dead node.

IX. DEMERITS

- We are not able to eliminate all losses.

X. REFERENCES

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