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Evaluate the Effectiveness and Progress of the Bluetooth Wireless Sensor Network Contains Low Energy (BLE) To Monitor Wireless Network Ordnance Survey

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ABSTRACT:

WBAN nodes which have blocked RF links because of body shadowing forward their data with the BCC connect to a node that functions like a relay and it has an energetic RF connection. With this architecture we design a network layer protocol that manages the 2 communication technologies and accounts for relay selection and knowledge forwarding. To resolve this issue we present a brand new WBAN architecture that utilizes two communication technologies. One network is created between on-body nodes, and it is recognized with capacitive body-combined communication (BCC), while an IEEE 802.15.4 RF (RF) network can be used for forwarding data towards the gateway. Within this paper we're worried about the issue of information forwarding from the wireless body area network (WBAN) to some gateway when body shadowing affects ale WBAN nodes to talk with the gateway. Next, we develop analytical performance types of the medium access control (MAC) methods of these two independent communication links to become employed for driving the choices from the previous calculations. Finally, the analytical models can be used for further optimizing energy and delay efficiency. We test our bodies under different designs first by carrying out simulations and then by utilizing real RF traces.

Keywords: Wireless body area network (WBAN), body sensor network (BSN), body shadowing, capacitive body-coupled communication, optimization

I. INTRODUCTION

Energy consumption may also be key for your prolonged operation in the items attached to the body. For communication needs these WBANs usually employ RF (RF) technologies that are employed in the

commercial, scientific and medical (ISM) radio band? In many programs where wireless body area systems (WBAN) are deployed round the body, reliable and periodic delay communication is critical because of the critical nature in the collected data. However, it is also easy to utilize the broadly popular wireless LAN (WLAN) standard IEEE 802.11because in the readily available doorway (AP) infrastructure. Regardless of the specific wireless communication technology, when multiple sensors are deployed inside you, a WBAN in the star topology is usually created to make sure that all the on-body nodes speak with a gateway for forwarding the collected data. Although RF could be the only practical mechanism to forward data in this particular scenario, still several significant problems remain. RF signals suffer considerably from body shadowing in the highly variable way regarding body. This makes communication between on-body nodes, in addition to off-body, very difficult to depend on. This natural unreliability of RF communication round the body can be a critical problem for a lot of real-existence programs. We discuss two emerging application situations here to motivate our physiques design [1]. As one example of vital sign monitoring where multiple nodes need to be deployed in many different places from the body. Readers are usually flowing inside the uplink direction, i.e., within the WBAN nodes for the gateway. Consider say for example a human with a node round the torso then one round the wrist for monitoring the middle rate. When the human can be a patient lounging during intercourse, your RF link in the sensor round the torso might be completely blocked. Besides health monitoring, another essential application is real-time media entertainment [2]. While using rising recognition of wearable items, it's even feasible that high data rate video streams need to be posted in the body (uplink). In this particular paper we advise manuscript WBAN architecture, a network layer (NWK) protocol that exploits the recommended architecture, plus an optimization framework according to an analytical performance kind of the device. When the RF link from the node is difficult to depend around the node uses the BCC link for forwarding its data with the body with a node getting a much better RF link. The reason from the design choice is founded on the power-efficient BCC technology you should use instead of RF communication. Prototype BCC transceivers use simple baseband communication this will let you tiny form factor First, we advise

a completely new cooperative WBAN architecture that employs two communication technologies namely BCC and RF. This architecture is orchestrated having a novel NWK relay selection protocol that identifies the right relay for forwarding the data in the body. The recommended plan's unlike any existing relay selection techniques since two different communication technologies are used. Second, for each medium access control (MAC) protocol in the RF and BCC sub systems we develop accurate expressions in the delay and consumption just like a reason for specific protocol parameters [3]. Our novel contributions here include first the performance modeling from the NWK that concurrently uses two wireless MAC/PHY technologies. Second, our model can be a mix-technology model. We advise while using analytical performance models for additional optimization in the duty cycling in the BCC transceivers as well as the retransmission manner of the RF transceivers to make sure that energy consumption and delay are minimized. Benefits. The initial advantage is always that items getting a blocked RF link may use the relaxation from the nodes for forwarding their data with a gateway and improve thus the durability from the information delivery. Second, RF transmissions are reduced to minimum since WBAN nodes don't speak with each other using the RF link. The benefit is the RF link is moving a lesser load as well as the interference to surrounding RF items may also be minimized. The Next advantage is always that a node by getting an RF link that is not completely blocked, but works inefficiently, can speak with other nodes through BCC and select another node for data forwarding. Performance is evaluated both through simulations in addition to by utilizing real RF traces.

II. PREVIOUS WORK

Within this paper we cope with the issue of optimizing data delivery from the WBAN to some gateway. The issue is challenging because communication between on-body and off body nodes is extremely hard to rely on. Probably the most promising method to attack the issue is through cooperation between WBAN nodes. With cooperation the nodes that help with forwarding the information of other nodes would be the relays. There's an array of works that concentrate on choosing the perfect relay within the general situation of wireless sensor systems (WSN) by thinking about different optimization objectives, while less

works have focused in WBANs. Nearly all research works investigated cooperation in WSNs/WBANs with the aim to reduce power consumption. Our solution includes a new WBAN architecture along with a novel cooperative protocol design that's based on an analytical performance model. With this system even if a minimum of one node comes with an active RF link the information of the entire WBAN node will achieve the gateway [4]. A communication protocol that utilizes two technologies was presented our approach is considerably different.

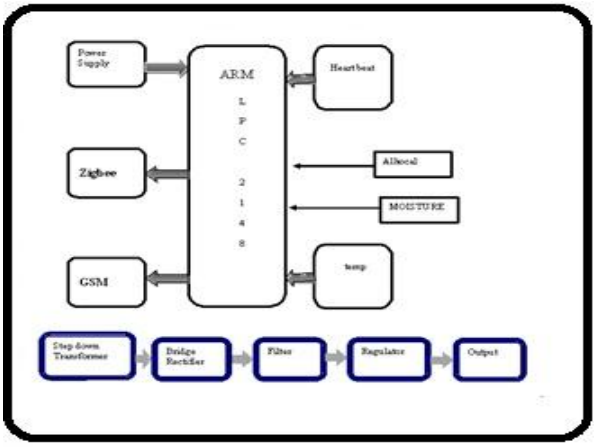


Fig.1 Block Diagram of the system

III. SYSTEM COMPONENTS

ARM:

The **ARM** (**Acorn RISC Machine**) architecture is developed at Acorn Computer Limited of Cambridge, England between 1983-1985. ARM Limited founded in 1990. **ARM** became as the **Advanced RISC Machine** is a 32-bit RISC processor architecture that is widely used in embedded designs. **ARM** cores licensed to semiconductor partners who fabricate and sell to their customers. ARM does not fabricate silicon itself Because of their power saving features, ARM CPUs are dominant in the mobile electronics market, where low power consumption is a critical design goal. As of 2007, about 98 percent of the more than a billion mobile phones sold each year use at least one ARM CPU. Today, the ARM family accounts for approximately 75% of all embedded 32-bit RISC CPUs, making it the most widely used 32-bit architecture. ARM CPUs are found in most corners of consumer electronics, from portable devices (PDAs, mobile phones, iPods and other digital media and music players, handheld gaming units, and calculators) to computer peripherals (hard drives, desktop routers). ARM does not manufacture the CPU itself, but licenses it to other manufacturers to integrate them into their own system

Sensors:

American National Standards Institute (ANSI) Definition

- A device which provides a usable output in response to a specified measure and
- A sensor acquires a physical parameter and converts it into a signal suitable for processing (e.g. optical, electrical, mechanical)

A transducer Microphone, Loud Speaker, Biological Senses (e.g. touch, sight,…ect)

Detectable Phenomenon

Stimulus	Quantity
Acoustic	Wave (amplitude, phase, polarization), Spectrum, Wave Velocity
Biological & Chemical	Fluid Concentrations (Gas or Liquid)
Electric	Charge, Voltage, Current, Electric Field (amplitude, phase, polarization), Conductivity, Permittivity
Magnetic	Magnetic Field (amplitude, phase, polarization), Flux, Permeability
Optical	Refractive Index, Reflectivity, Absorption
Thermal	Temperature, Flux, Specific Heat, Thermal Conductivity
Mechanical	Position, Velocity, Acceleration, Force, Strain, Stress, Pressure, Torque

Temperature Sensor:

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1/4°C at room temperature and ±3/4°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C is rated for a -40° to +110°C range (-10° with improved accuracy). The LM35 series is available packaged plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

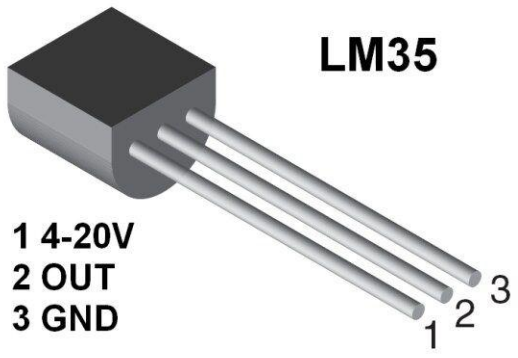


Fig : Temperature Sensor

Smoke Sensor:

Fig: Smoke Sensor

A mechanical device that is sensitive to smoke or particular material in the air that transmits a signal to the measuring instrument. Smoke detector consists of two parts:

- A sensor to sense the smoke .
- Electronic horn to horn the people

Humidity Sensor

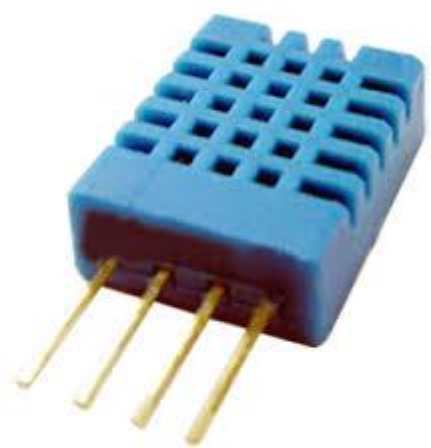


Fig : Humidity Sensor

Humidity is the presence of water in air. The amount of water vapor in air can impact human comfort as good as many manufacturing processes in industries. The presence of water vapor also influences more than a few bodily, chemical, and biological methods. Humidity dimension in industries is vital due to the fact that it's going to impact the trade fee of the product and the well being and safeguard of the personnel. Consequently, humidity sensing is very principal, specifically within the control programs for industrial techniques and human alleviation.

Heart beat Sensor:

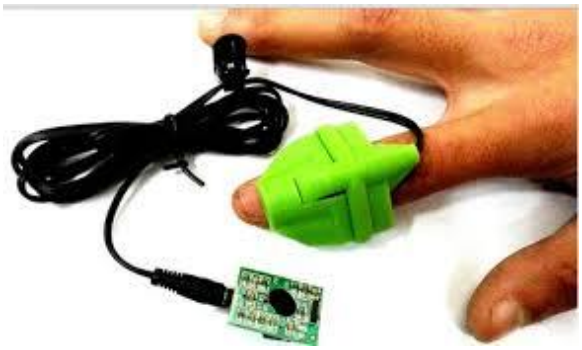


Fig : Heart Beat Sensor

This heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. When the heartbeat detector is working, the top-most LED flashes with each heart beat. This digital output can be connected to microcontroller directly to

measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse. Module dual output mode, digital output is simple, serial output with exact readings.

IV. METHODOLOGY

All of the nodes that are members of the RF network can connect with a gateway for forwarding the collected data. Each wireless link has different delay/energy qualities because of funnel versions. We think about a WBAN that includes N nodes where each node is outfitted by having an RF transceiver along with a BCC transceiver. Both of these hardware components use different MAC/PHY methods and therefore are both controlled from the specialized NWK protocol. While only Nr nodes are members of the RF network, all of the N nodes have fun playing the BCC network. Non-relay nodes transmit their packets with the BCC connect to among the relays, as the selected relay transmits wirelessly towards the gateway the in your area produced and submitted data packets. Nodes that don't have a relay responsibility are permitted to place into sleep mode the RF transceiver for lowering the energy consumption. However, as it is entirely possible that later on they assume the function of the RF relay, they awaken periodically, they transmit an RF packet, and after they get a response they update the received signal strength indication (RSSI) worth of their RF link. A no beacon-enabled and united nations-slotted carrier sense multiple accesses with collision avoidance (CSMA/CA) formula are assumed for funnel access. All of the nodes sense the funnel status throughout the obvious funnel assessment (CCA) slots. The fundamental concept of the united nations-slotted CSMA/CA formula is the fact that back off and packet transmissions aren't aligned to a particular slot limitations. BCC without needing skin contact could be recognized with two electrode transmitter/receiver products capacitive combined to the body Concerning the MAC layer it's a protocol that utilizes the well-known idea of low power listening. The foremost and primary task in our distributed WBAN product is to calculate the perfect subset of Nr RF relays all the accessible nodes, as the second task would be to forward the information with the optimal relay as needed. When an RF node isn't a relay, the RF transceiver is deactivated simply by entering an idle condition so it needs to enter an energetic condition to complete this function [5]. The funnel

estimation is a nearby task each and every RF node that's performed automatically in IEEE 802.15.4 for each received packet and thus no extra overhead is created by our plan while collecting the data and broadcasting it's an important task, it's also critical to make sure that the incoming information in a node is correctly processed.

RESULTS:

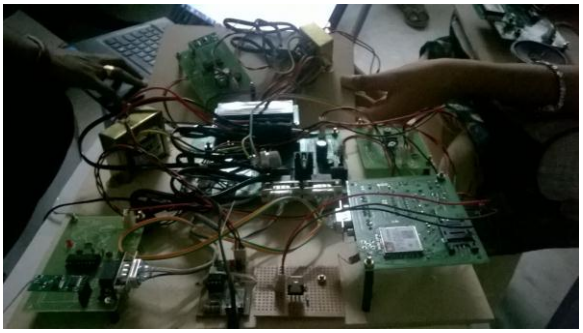
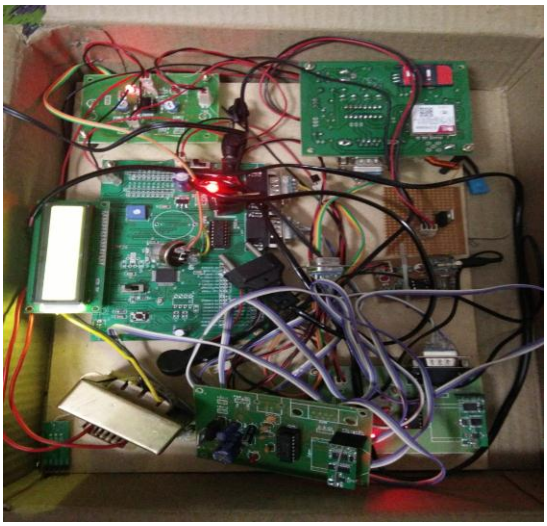


FIG:



IV. CONCLUSIONS

The performance gains are materialized not just using the novel WBAN architecture, but additionally having a NWK protocol that utilizes an formula for RF relay selection and packet forwarding driven with a performance model. In addition, the mix-technology performance models are used for local optimization from the MAC parameters from the methods that be employed in the BCC and RF sub systems. In traditional RF-based WBANs when confronted with body shadowing there's a simple compromise: Either consumes more energy for retransmissions or funnels coding to be able to increase reliability and suffer also greater delay, or reduces delay and at the expense of reduced reliability. However, we shown the above doesn't have is the situation if nodes cooperate via a

delay/energy-efficient secondary link (within this situation BCC) to be able to select the best RF link for forwarding WBAN data to some gateway. The performance results indicate the suggested product is more effective than the usual condition-of-the-art plan when it comes to energy and delay under different realistic funnel conditions, application loads, and gratification constraints. The possibility concern concerning the suggested product is the requirement for two different technologies. However, existing IC technology already enables the combination of multiple transceivers in one nick. Our future work is going to be focused first around the optimal configuration of other system parameters like the amount of used relays and also the content from the sent packets. Next, we plan to investigate potential together with your suggested system.

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