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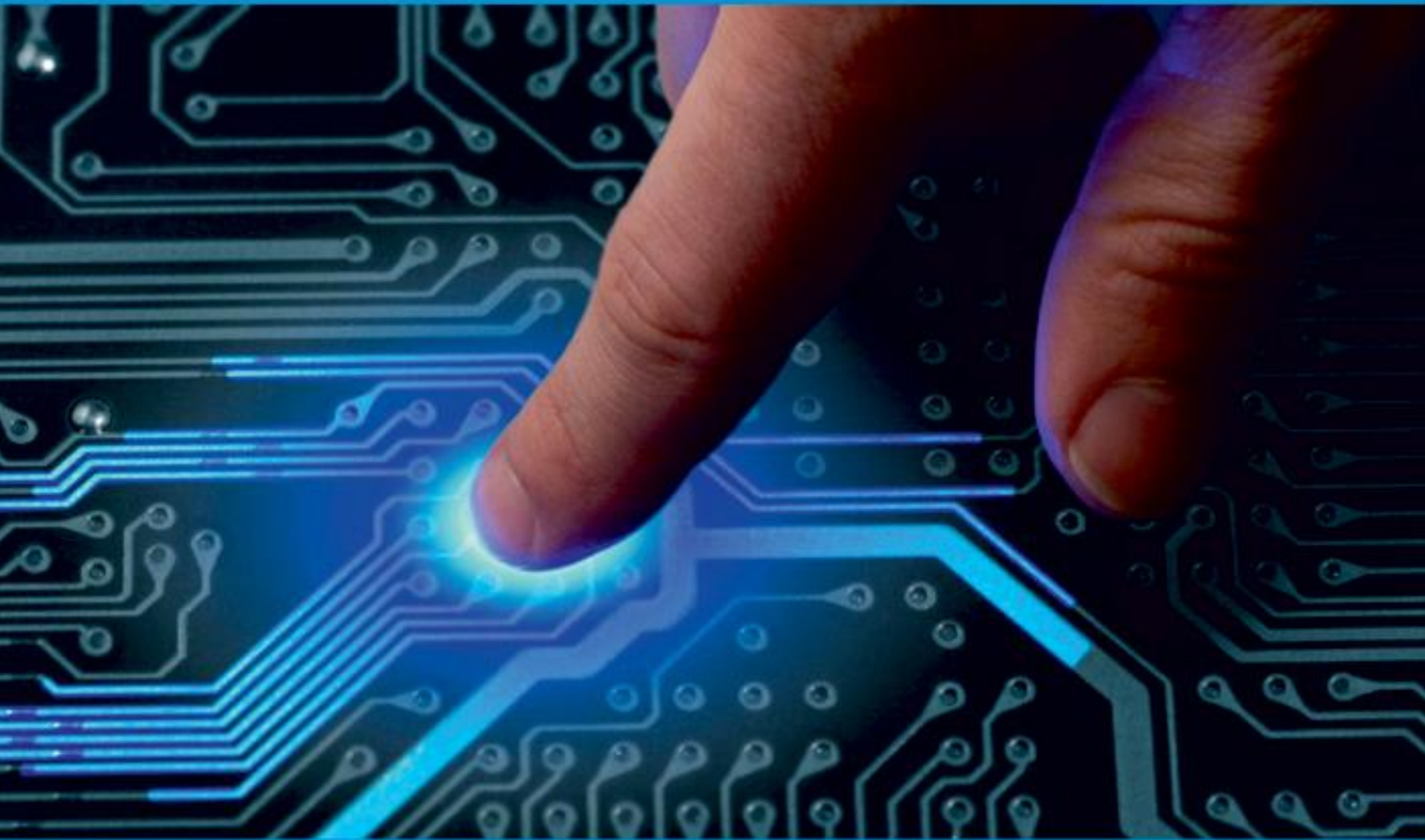

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IoT Based Medical Image Monitoring System

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ABSTRACT: Wireless communication is among technologies biggest contribution to mankind. It is enhanced to convey the information quickly to the consumers. In the modern health care environment, the usage of embedded system (ES) with global system for mobile communication (MC) bring convenience of physicians and patients. The body sensor networks is one of the core technologies of ES developments in health care system. ES and MC based monitoring system is proposed for continuous monitoring of patients health condition using sensors. This focus on the measurement and monitoring of various biological parameters using web server and android application. Doctor can monitor the patient condition on his/her smart phone.

I. INTRODUCTION

A **wireless sensor network** (WSN) is a computer network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. The development of wireless sensor networks was originally motivated by military applications such as battlefield surveillance. However, wireless sensor networks are now used in many civilian application areas, including environment and habitat monitoring, healthcare applications, home automation, and traffic control.

In addition to one or more sensors, each node in a sensor network is typically equipped with a radio transceiver or other wireless communications device, a small microcontroller, and an energy source, usually a battery. The size a single sensor node can vary from shoebox-sized nodes down to devices the size of grain of dust. The cost of sensor nodes is similarly variable, ranging from hundreds of dollars to a few cents, depending on the size of the sensor network and the complexity required of individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and bandwidth. In computer science, wireless sensor networks are an active research area with numerous workshops and conferences arranged each year.

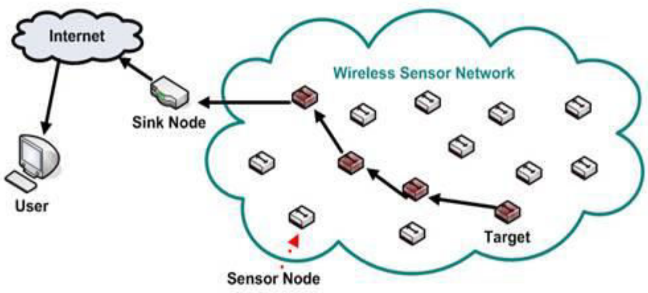

Figure 1: Architecture of WSN

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Typical applications of WSNs include monitoring, tracking, and controlling. Some of the specific applications are habitat monitoring, object tracking, nuclear reactor controlling, fire detection, traffic monitoring, etc. In a typical application, a WSN is scattered in a region where it is meant to collect data through its sensor nodes.

- Environmental monitoring
- Habitat monitoring
- Acoustic detection
- Seismic Detection
- Military surveillance
- Inventory tracking
- Medical monitoring
- Smart spaces
- Process Monitoring
-

II. LITERATURE SURVEY

Connor, Stephen B., Timothy J. Quill, and James R. Jacobs. "Accuracy of drug infusion pumps under computer control." Biomedical Engineering, IEEE Transactions on 39.9 (1992): 980-982.

Infusion rates demanded of the infusion pump in many computer-controlled drug delivery applications are made to change at intervals much shorter than those encountered under routine clinical use. The purpose of this study was to validate the volumetric accuracy of three commercially available infusion pumps operating in a demanding computer-controlled application. In independent 2-h evaluations, the infusion rate demanded of each pump changed as often as every 5, 10, or 15 s using an algorithm for computer-controlled pharmacokinetic model-driven intravenous infusion. Accuracy of the infusion devices was determined gravimetrically.

Goepel, Ernst. "The ink drop sensor-a means of making ink-jet printers more reliable."

An ink-drop sensor has been developed for use in ink-jet printers so that the function of the multi nozzle print head can be checked before printing starts or cyclically during printing. If the sensor detects that one or more nozzles have failed, the print head can be restored to correct operation in a service station. This process, which is completely automatic and requires no intervention on the part of the user, increases the reliability of the ink-jet printer.

Sankaranarayanan, Sriram, et al. "A model-based approach to synthesizing insulin infusion pump usage parameters for diabetic patients." Communication, Control, and Computing (Allerton), 2012 50th Annual Allerton Conference on. IEEE, 2012.

We present a model-based approach to synthesizing insulin infusion pump usage parameters against varying meal scenarios and physiological conditions. Insulin infusion pumps are commonly used by type-1 diabetic patients to control their blood glucose levels. The amounts of insulin to be infused are calculated based on parameters such as insulin-to-carbohydrate ratios and correction factors that need to be calibrated carefully for each patient. Frequent and careful calibration of these parameters is essential for avoiding complications such as hypoglycaemia and hyperglycaemia.

Testing of Droplet-Based Microelectrofluidic Systems Fei Su, Sule Ozev, and Krishnendu Chakrabarty

Composite Microsystems that integrate mechanical and fluidic components are fast emerging as the next generation of system-on-chip designs. As these systems become widespread in safety-critical biomedical applications, dependability emerges as a critical performance parameter. In this paper, we present a cost effective concurrent test methodology for droplet-based Microelectrofluidic systems.

Das, Alok K., Anup K. Mandal, and Sadhan Banerjee. "Measurement of liquid droplet parameters using optical fiber." Light wave Technology

The measurement of liquid droplet parameters such as size, number, concentration, viscosity, and refractive index is reported. The droplets are sprayed either from a pressure nozzle or a gas atomizing nozzle. The parameters are

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measured by detecting the clad mode power in the leaky ray zone of a three-region fiber by a new clad-probing technique, using normal core-clad fiber.

III. EXISTING SYSTEM

In existing system all the sensors data will be stored send send to the doctor using Zigbee.A Wireless Sensor Network (WSN) for monitoring patient's physiological conditions continuously using Zigbee. Here the physiological conditions of the patient's are monitored by sensors and the output of these sensors is transmitted via Zigbee and the same has to be sent to the remote wireless monitor for acquiring the observed patient's physiological signal Infusion pump is a medical device. It is healthcare facilities used worldwide in hospitals, and at home. It can deliver fluids both in medicines and nutrients such as pain relievers chemotherapy drugs, hormones or insulin, and antibESics into a patient's body in any amounts.

IV.PROPOSED SYSTEM

In the proposed system, the MC technology is replace with ES. The ES technology monitors the patients health and log the data in a cloud storage. Whenever the patient need emergency care, the proposed system alerts the predefined users and also it finds the nearby emergency contacts like ambulance. The ES technology uses internet to transfer the medical data about the patient continuously. Body Sensor Network (BSN) allows the integration of intelligent, miniaturized low-power sensor nodes in, on or around human body to monitor body functions and the surrounding environment. It has great potential to revolu-tionize the future of healthcare technology and attained a number of researchers both from the academia and industry in the past few years. Generally, BSN consists of in-body and on-body sensor networks. An in-body sensor network allows communication between invasive/implanted devices and base station. On the other hand, an on-body sensor net work allows communication between non-invasive/wearable devices and a coordinator. Now, our BSN-Care BSN architecture composed of wearable and implantable sensors. Each sensor node is integrated with bio-sensors such as Electrocardiogram (ECG), Blood Pressure (BP), etc. These sensors collect the physiological parameters and forward them to a coordinator called Local Processing Unit (LPU), which can be a portable device such as PDA, smart-phone etc. The LPU works as a router between the BSN nodes and the central server called BSN-Care server, using the wireless communication mediums such as mobile networks 3G/CDMA/GPRS. Besides, when the LPU detects any abnormalities then it provides immediate alert to the person that wearing the bio-sensors.

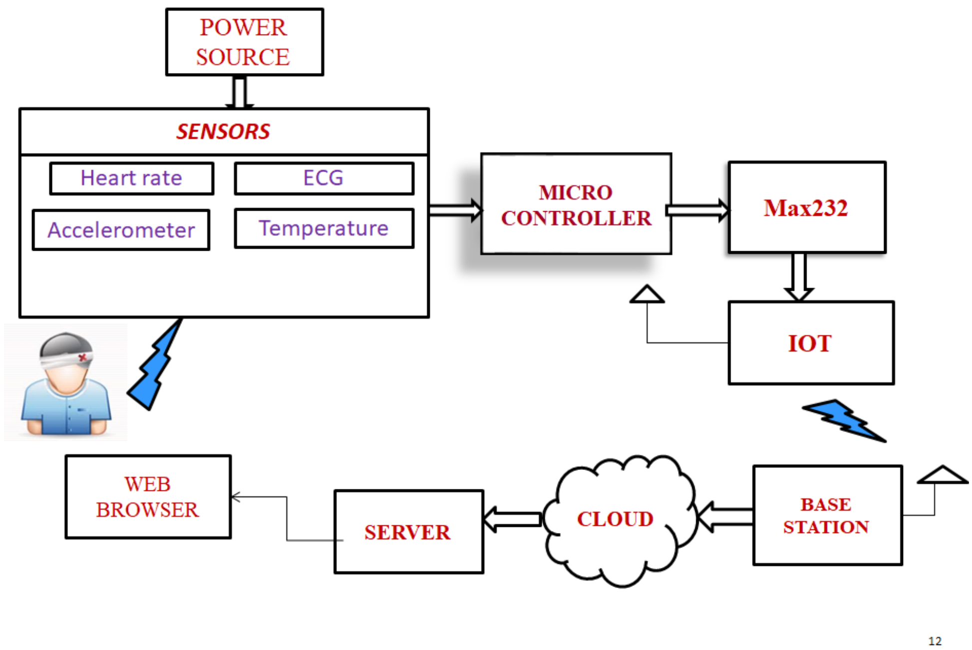

Figure 2: Architecture of IoT Based Medical Image Monitoring System

Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery.

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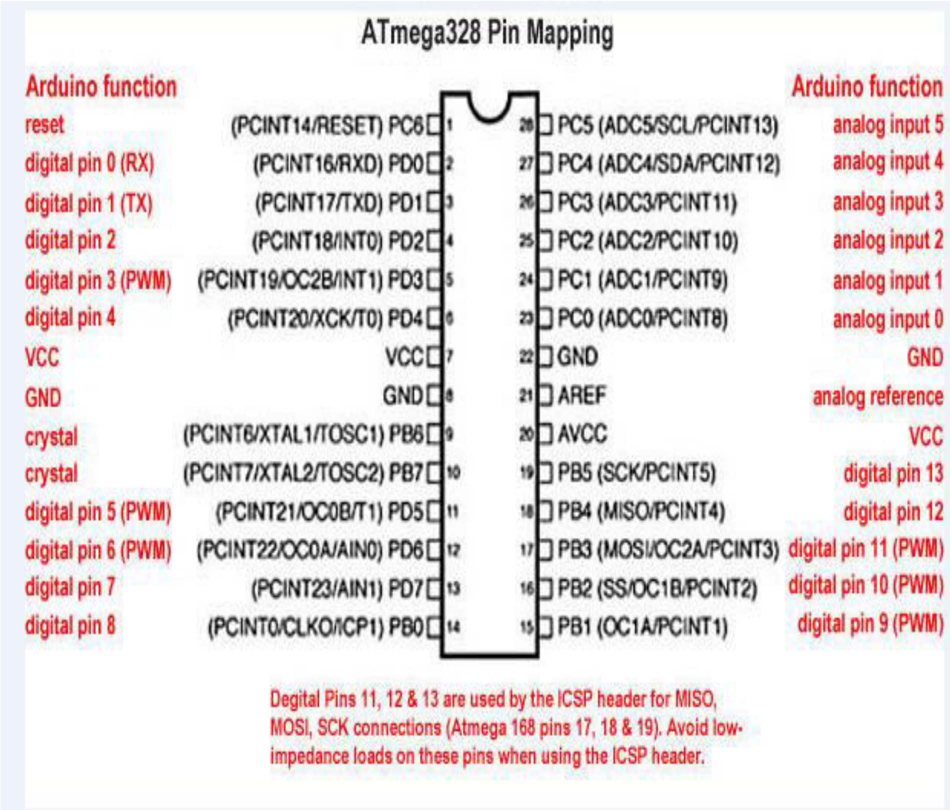
The adapter can be connected by plugging a 2.1mm centre-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:
VIN.- The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V.- The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

3V3 - A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
GND. Ground pins.



Input and Output
Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode(), digital Write(), and digital Read() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 m A and has an internal pull-up resistor (disconnected by default) of 20-50 k Ohms. In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX).
Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

External Interrupts: 2 and 3.
These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attach Interrupt() function for details.

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PWM: 3, 5, 6, 9, 10, and 11.
Provide 8-bit PWM output with the analog Write() function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).
These pins support SPI communication using the SPI library.

LED: 13.
There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. 3 | P a g e 3 Arduino Uno The Uno has 6 analog inputs, labelled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference() function. Additionally, some pins have specialized functionality:

I2C: 4 (SDA) and 5 (SCL).
Support I2C (TWI) communication using the Wire library.
There are a couple of other pins on the board: AREF. Reference voltage for the analog inputs. Used with analog Reference(). Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

V.RESULT

This project aims at developing a system which is capable of monitoring the patient's medical parameters like heart beat pulse sensor, Temperature sensor wirelessly through WI-FI module using thing speak, designing a system which is capable of tracking the location of cardiac patients and also monitoring of heart rate alerts in case of emergency through SMS to predefined numbers. It has night vision capability. Now a day's technology is running with time, it completely occupied the life style of human beings. It is being used everywhere in our daily life to fulfil our requirements. We can not only increase the comfort of life but also increase the health monitoring techniques by making use of advanced technology.

Figure 2: IoT Based Medical Image Monitoring System

VI. CONCLUSION

We found that even though most of the popular BSN based research projects acknowledge the issue of the security, but they fail to embed strong security services that could be preserve patient privacy. Finally, we proposed a secure ES based healthcare system using BSN, called BSN-Care, which can efficiently accomplish various security

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requirements of the BSN based healthcare system. All the sensor which is connected in the body is used to collect the ubnormal symptoms of the human body and then it is collected back to the doctors through the ES technology.

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