A Miniaturized Long-Term Bladder Urine Pressure Measurement System

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***Abstract*:-A miniaturized system for long-term bladder urine pressure measurement system is presented.Not only the period of measurement can be adjusted but the reliability can be enhanced by using a IA.The instrumentation amplifier is used to amplify the signal which is detected by the pressure sensor.The signal sensed by the pressure sensor is then fed into the ADC (analog to digital converter).A long-term mode is required for a reliable observation,because the urine pressure the urine pressure inside the bladder does not vary drastically. The system measures the urine pressure in the bladder and transmit the readings to the external reader. The data analyser will analyse the reading received from the external reader to diagnose the situation of the bladder. Due to the intrinsic 1 atm pressure existing inside the bladder. The IA is able to cancel such pressure from the signals sensed by the pressure sensor inorder to keep the resolution for the pressure measurement of the bladder.**

Keyword : - miniaturized , urine pressure, bladder, instrumentation amplifier, pressure sensor, ADC

I. INTRODUCTION

Urinary infections and complications with in the urinary bladder are observed in many hemiplegic (or) disabled patients are suffering from urocystitis and other bladder diseases. By observing the abnormal syndromes of the bladder urine pressure variation , all most all of these bladder diseases can be prevented or predicted. The most important research topics in clinical medical investigations is the periodic evaluation of patient whose leak point pressure is greater than 40 cm H2O to discover their urodynamic situations and help these uroatastxic to urinate normally. Bladder's pressure sensing is an important topic among many uroresearches . The variations in the pressure of the urinary bladder reveals the syndromes of lot of urinary anomalisms urinary in continance is also known as involountary urination is any uncontrolled leakage of urine. It is a common and distressing problem which may have large impact on quality of life.

The loss of continence gives high pressure in the bladder during bladder – urethral sphincter dyssynergia can result in infections of the kidney, long term renal damages, frequent urinary tract infections.

There are many ways to measure the urine pressure in the bladder have been reported. In the existing system we can insert a pressure sensor in vivo by catheterization through urethra or other incision and readings of the pressure values are taken under different conditions . the better way to plot the pressure–volume curve of bladder pressure is by using cystometrogram (CMG). CMG is very time consuming and costly so it is not a proper long term recording plat form.Besides infection ,the system make target uncomfortable ,thus causing differences between in experiment and in reality.we propose a miniaturized long-term bladder urine pressure measurement system composed of a pressure sensor.We can implant the device in the bladder to measure the pressure because of its tiny size and low power.In the proposed system we can not only read the bladder pressure directly in real time,but also reduce the effects caused by the discomfort of the experimental target.

II..ARCHITECTURE OF THE BLADDER URINE PRESSURE MEASUREMENT SYSTEM

The proposed system adopts a wireless transmission such that the urine pressure measurements can be measured outside of the body using an external data reader,because of the demand of size miniaturization of implant able device and low power consumption for along-term measurements.

The infrastructure of the entire miniaturized long-term bladder urine pressure measurement system is composed of 3 major components.A pressure sensor,a control ASIC,and an RF module.The differential output voltage of the pressure sensor is amplified by the instrumentation amplifier in the ASIC and then quantized by the ADC and the data frames are delivered to theRF module for wireless communication with an external data reader.

A. Pressure sensor

The MPX5010/MPXV5010G series piezo resistive transducer are state of the art monolithic silicon pressure sensors designed for a wide range of application,but particularly those employing a microcontroller (or) microprocessor with A/D input .this transducer combined advanced micromatching techniques,thin film metalization ,and bipolar processing to provide an accurate,highlevel analog output signal that is proportional to the applied pressure

Features

- Ideally suited for microprocessor or microcontroller based systems
- Available in differential and gauge configurations

- Durable epoxy unibody and thermoplastic surface mount package
- Temperature compensated over -40 degree celsius to +125 degree Celsius.

B. Node MCU

The Node MCU is an open source firmware and development kit that helps you to prototype your IOT product within a few Lua script lines.The development kit based on ES8266,integrates GP10,PWM,IIC,1-wire and ADC all in one board.The ESP 8266 is a low cost wifi microchip with full TCP/IP stack and microcontroller capability produced by shan ghai-based Chinese manufacturer espressif systems. A firmware implements WLAN protocol wifi direct specification.Low level protocol function are handled automatically ESP8266.ESP8266 offers a complete and self contained wifi networking solution.It can be used to host the application (or) to offlord wifi networking functions from another applications process.It has integrated cache to improve the performance of the system in such applications.Alternatively serving as a wifi adaptor,wireless,internet access can be added to any microcontrolled based design with simple connectivity.

C. Arduino

Arduino is a prototype platform (open sorce) based on a easy to use hardware and software.It consist of a circuit board which can be programmed (reffered to as microcontroller) and readymade software are called arduino IDE (integrated development environment) which is used to write and upload the computer code to the physical board.Arduino boards are able to read analog or digital input signals from difference sensors and turn it into an output such as connect to the cloud and many other actions.The board functions can be controlled by sending a set of instructions to the microcontroller on the board via arduino IDE.

Unlike most previous programmable circuit board arduino doesnot need a extra piece of hardware (called a programmer) inorder to load a new code on to the board.You can simply using a USB cable.Arduino provides a standard form factor that breaks the functions of the microcontroller into a more accessable package.

D.LCD display

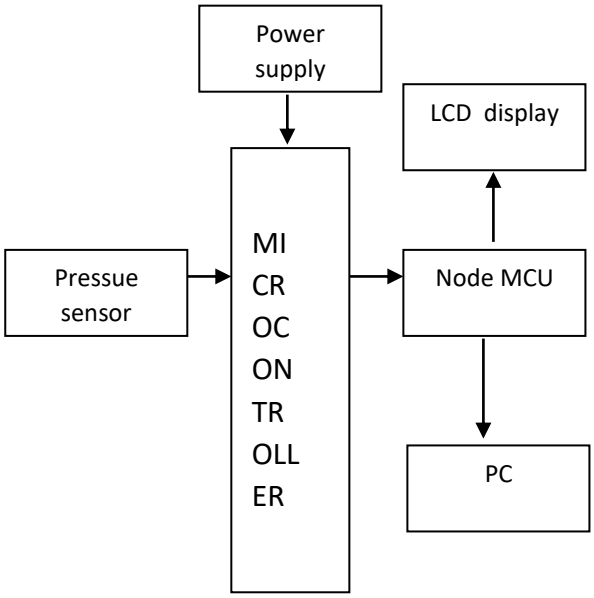
Liquid crystal display screen is an electronic display module and find a wide range of applications. A 16X2 LCD display is very basic module and is very commonly used in various device and circuits.The reading is then displayed in LCD.LCD is connected through six pins to node mcu D0,D3,D5,D6,D7,D8 pins of node mcu is connected to the pins of LCD display.

SOFTWARE TOOL

Thingspeak is an opensource internet of things (IoT) applications and API to store and retrieve data from things using the HTTP protocol over the internet or via local area network.Thingspeak enables a creation of sensor logging applications.

IoT is an advanced automation and analytic system which exploit networking,sensing big data and artificial intelligent technology to deliver complete system for a product (or) service.The most important hardware in IoT might be its sensors those device consist of a energy modules,power management modules,RF modules and sensing modules.IoT devices are responsible for data collection device integration,real-time analytics,applications and processes extension within the IoT network.Realtime analytics take data (or) input from various devices and convert it into viable actions and clear pattern for human analysis.It analog the potential of the existing technologies and leads us towards new and better medical device solution.

III.BLOCK DIAGRAM



IV. RESULT ANALYSIS

The measurement result of the control sequence in the working mode is totally correct.The measurement results of the ASIC is as good as the simulation specification.The mini-invasive system is sealed in the floating balloon with a diameter of 25 mm.The thickness of the proposed system about 10 mm,such that the diagonal length is about 22.2 mm.The volume of the balloon is 8.2 c.c.,which is much less than the volume capacity of the normal bladder.

V.CONCLUSION

We have proposed a miniaturized long-term bladder pressure measurement systems as well as controlled by Atmega328.Besides utilizing the pressure sensor and RF module to shorten the design time and cost ,ASIC in charge of commanding all of the components ensures the real ability on top of miniaturization.The sleeping and working mode are alternatively activated to extend the battery life to carry out longterm observation.

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