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This Novel Realize New Electronic Capsule

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Abstract : This work will speak to the confront to smooth the progress of the development of a high capacity radio system for a small, miniaturized electronic pill device that can be saleable or implantable in human body in order to detect biological signals or keep in custody descriptions that could ultimately be used for diagnostic and curative purposes. In totaling to reviewing and discuss the topical attempt in electronic pill technology, a wideband (UWB) telemetry system aimed for the development of an electronic pill will be on hand in this paper. We have fruitfully realized more than half a meter UWB link under situation emulating a deposit.

Keywords: Ingestible pill, sensor array, microchip control, wireless communication

I. INTRODUCTION

The development of the transistor enabled the first radio telemetry capsules, which utilized simple circuits for in vivo telemetric studies of the gastro-intestinal tract. These units could only transmit from a single sensor channel, and were difficult to assemble due to the use of discrete components. The measurement parameters consisted of temperature, pH or pressure, and the first attempts of conducting real-time non invasive physiological measurements suffered from poor reliability, low sensitivity, and short life times of the devices. The first successful pH gut profiles were achieved in 1972, with subsequent improvements in sensitivity and lifetime [1]. Single-channel radio telemetry capsules have since been applied for the detection of disease and abnormalities in the GI tract where restricted access prevents the use of traditional endoscopy. Most radio telemetry capsules utilize laboratory type sensors such as glass pH electrodes, resistance thermometers, or moving inductive coils as pressure transducers. The relatively large size of these sensors limits the functional complexity of the pill for a given size of capsule. Adapting existing semiconductor fabrication technologies to sensor development has enabled the production of highly functional units for data collection, while the exploitation of integrated circuitry for sensor control, signal conditioning, and wireless transmission, and has extended the concept of single-channel radio telemetry to remote distributed sensing from microelectronic Capsule.

II. IMPLEMENTATION METHOD

Our up to date investigate on sensor incorporation and onboard data dispensation has, therefore, focused on the development of Microsystems capable of performing simultaneous multi parameter physiological analysis. The technology has a range of applications in the detection of disease and abnormalities in medical research. The overall aim has been to deliver enhanced functionality, reduced size and power consumption, through system-level integration on a common integrated circuit platform comprising sensors, analog and digital signal processing, and signal transmission.

In this information, we in attendance an original methodical micro system which incorporates a four-channel micro sensor array for real-time determination of temperature, pH, conductivity and oxygen. The sensors were fabricated using electron beam and photolithographic pattern integration, and were controlled by an claim explicit included circuit (CEIC), which sampled the data with 10-bit resolution prior to communication off chip as a single interleaved data stram. An integrated radio transmitter sends the signal to a local receiver (base station), prior to data acquisition on a computer. Real-time wireless data transmission is presented from a model in vitro experimental setup, for the first time. Details of the sensors are provided in more detail later, but included a silicon diode to measure the body core temperature, while also compensating for temperature induced signal changes in the other sensors; an ion-selective field effect transistor, ISFET, to measure pH; a pair of direct contact gold electrodes to measure the proximal to the distal GI tract. This will, in future enable a variety of syndromes to be investigated including the growth of aerobic bacteria or bacterial infection concomitant with low oxygen tension, as well as the role of oxygen in the formation of radicals causing cellular injury and path physiological conditions (inflammation and gastric ulceration). The implementation of a generic oxygen sensor will also enable the development of first generation enzyme linked amperometric biosensors, thus greatly extending the range of future

applications to include, e.g., glucose and lactate sensing, as well as immune sensing protocols.

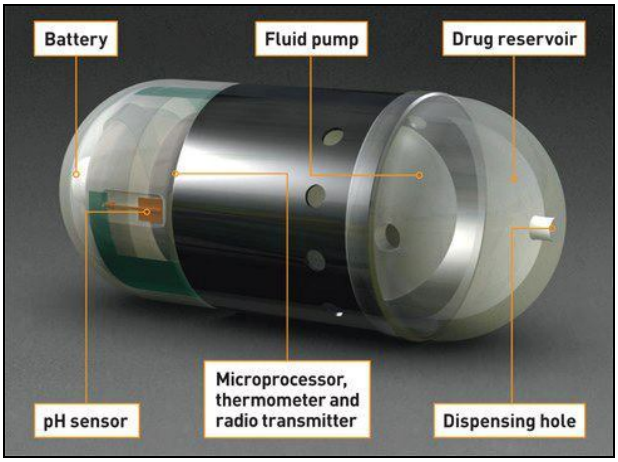

Fig.1. Claim Explicit Included Circuit

III. RULE OF CAPSULE

It is a capsule when swallowed can detect all the abnormalities inside a body and transmit the information about the abnormalities outside the body. And it can come out of the body by bowel movement after use.

Fig.2. Principle of Capsule

IV. ALLIED RESEARCH COMPUTERISED CAPSULE

The FDA has approved a new computerized pillbox called EMMA that dispenses patient's prescription drugs at home to help prevent medication errors [2].EMMA (Electronic Medication Management Assistant) is roughly the size of a bread box. It may be particularly helpful for older patients or people with complex dosing schedules, notes the FDA.EMMA stores prescription drugs, sounds an alert when patient are supposed to take their medications, and releases the drugs into a delivery tray when activated by the patient at the appropriate time.

The device, which plugs into a standard power outlet, is to be used under the supervision of a licensed health care provider. Doctors, pharmacists, or other health care professionals can access EMMA online to tweak patients dosing schedule or prescriptions, or to monitor patient's access to their medications.

EMMA is made by IN Range Systems of Altoona, Pa.

V. RECOMPENSE

A. It detects Digestive diseases and disorders can include symptoms such as acid reflux, bloating, heartburn, abdominal pain, constipation, difficulty swallowing or loss of appetite [3].

B. Electronic Capsule is being used to measure muscle contraction, ease of passage and other factors to reveal information

unavailable in the past.

VI. DESIGN MICROELECTRONIC PILL DESIGN AND FABRICATION

This new line of pH meters and probes, based on ISFET (Ion Sensitive Field Effect Transistor) sensor technology, includes four pH meters and 10 pH probes. The pH meters are designed for ease-of-use and feature an interactive graphics LCD display with on-board Help and Auto-Read functions. All meters constantly monitor and display probe status and an estimation of its remaining life. The advanced meters have real-time clocks for time/date stamping, calibration alerts and high/low pH alarms. Titan Bench top pH meters operate on AC or battery power and offer a host of sophisticated features, including programmable user alarms and data logging. Argus Portable meters are rugged, waterproof and operate on a long-life rechargeable battery. Each meter is available in simple or advanced versions of probes covering almost every application. The portable Argus uses an inductive (contact-less) battery charging system and IR data transfer eliminating the need for battery replacement or open contact points. This design ensures a completely watertight (IP67) rating [4].

A. pH value

pH is a measure of the acidity or basicity of an aqueous solution. Pure water is said to be neutral, with a pH close to 7.0 at 25°C (77°F). Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline. pH measurements are in important in medicine, biology, chemistry, food science, environmental science, oceanography, civil engineering and many other applications.

In a solution pH approximates but is not equal to p[H], the negative logarithm (base 10) of the molar concentrations of dissolved hydronium ions (H3O+); a low pH indicates a high concentration of dissolved hydronium ions, while a high pH indicates a low concentration. Crudely, this negative of the logarithm matches the number of places behind the decimal point, so for example 0.1 molar hydrochloric acid should be near pH 1 and 0.0001 molar HCl should be near pH 4 (the base 10 logarithms of 0.1 and 0.0001 being -1 and -4 respectively).

B. Sensors

The sensors were fabricated on two silicon chips located at the front end of the capsule. Chip 1 comprises the silicon diode temperature sensor, the pH ISFET sensor and a two electrode conductivity sensor. Chip 2 comprises the oxygen sensor and an optical nickel-chromium (NiCr) resistance thermometer. The silicon platform of Chip 1 was based on a research product from EcoleSuperieureD'In-genieurs en Electro technique ET Electronique with predefined n-channels in the p-type bulk silicon forming the basis for the diode and the ISFET. A total of 542 of such devices were batch fabricated onto a single 4-in wafer. In contrast, Chip 2 was batch fabricated as a 9X9 array on a 380mm thick single crystalline 3n Silicon wafer with <100> lattice orientation, percolated with 300nm Si3N4, silicon nitride. One wafer yielded 80, 5X5 mm2 sensors.

C. Sensor Chip

An array of 4X2 combined temperature and pH sensor platforms were cut from the wafer and attached onto a 100mm thick glass cover slip using S1818 photo resist cured on a hotplate. The cover slip acted as temporary carrier to assist handling of the device during the first level of lithography (Level 1) when the electric connection tracks, the electrodes and the bonding pads were defined. The pattern was defined in S1818 resist by photolithography prior to thermal evaporation of 200nm gold (including an adhesion layer of 15 nm palladium). An additional layer of gold (40 nm) was sputtered to improve the adhesion of the electroplated silver used in the reference electrode. Liftoff in acetone detached the chip array from the cover slip. Individual sensors were then diced prior to their re-attachment in pairs on a 100mm thick cover slip by epoxy resin.

VII. PHOTOLITHOGRAPHY MANNER

Photolithography (or "optical lithography") is a process used in micro fabrication to selectively remove parts of a thin film or the bulk of a substrate. It uses light to transfer a geometric pattern from a photo mask to a light-sensitive chemical "photo resist", or simply "resist", on the substrate. A series of chemical treatments then either engraves the exposure pattern into, or enables deposition of a new material in the desired pattern upon, the material underneath the photo resist. In complex integrated circuits, for example a modern CMOS, a wafer will go through the photolithographic cycle up to 50 times.

Photolithography shares some fundamental principles with photography in that pattern in the etching resist is created by exposing it to light, either directly (without using a mask) or with a projected image using an optical mask. This procedure is comparable to a high precision version of the method used to make printed circuited boards. Subsequent stages in than to lithographic printing. It is used because it can create extremely small patterns (down to a few tens of nanometers in size), it affords exact control over an entire surface cost-effectively.

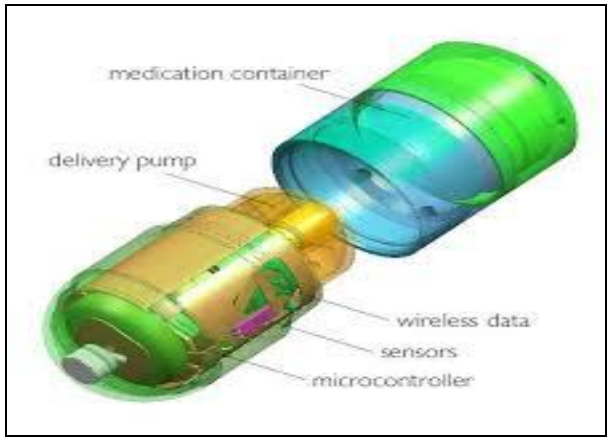

Fig.3.Photolithography

VIII. OPERATIONAL PROCESSING

This computer-controlled smart pill which can be electronically tracked and instructed to deliver a drug to a predetermined location in the gastro-intestinal. The communication system can assist the electronic pill to trigger an actuator for drug delivery, to record temperature, or to measure pH of the body. It consists additionally to a 32-bit processor, memory, external peripheries, and detection facility. The complete system is designed to fit small-size mass medical application with low power consumption, size of 7X25 mm. The system is designed, simulated and emulated on FGPA [5].Drug delivery system is an issue of optimization for many interests, immediate release drug will be absorbed in the upper part of the small intestine after the stomach, extended release drug is desired to be absorbed in the lower level of the intestine. Fluid pump is used to measure temperature, acidity, blood pressure, pH of the body.

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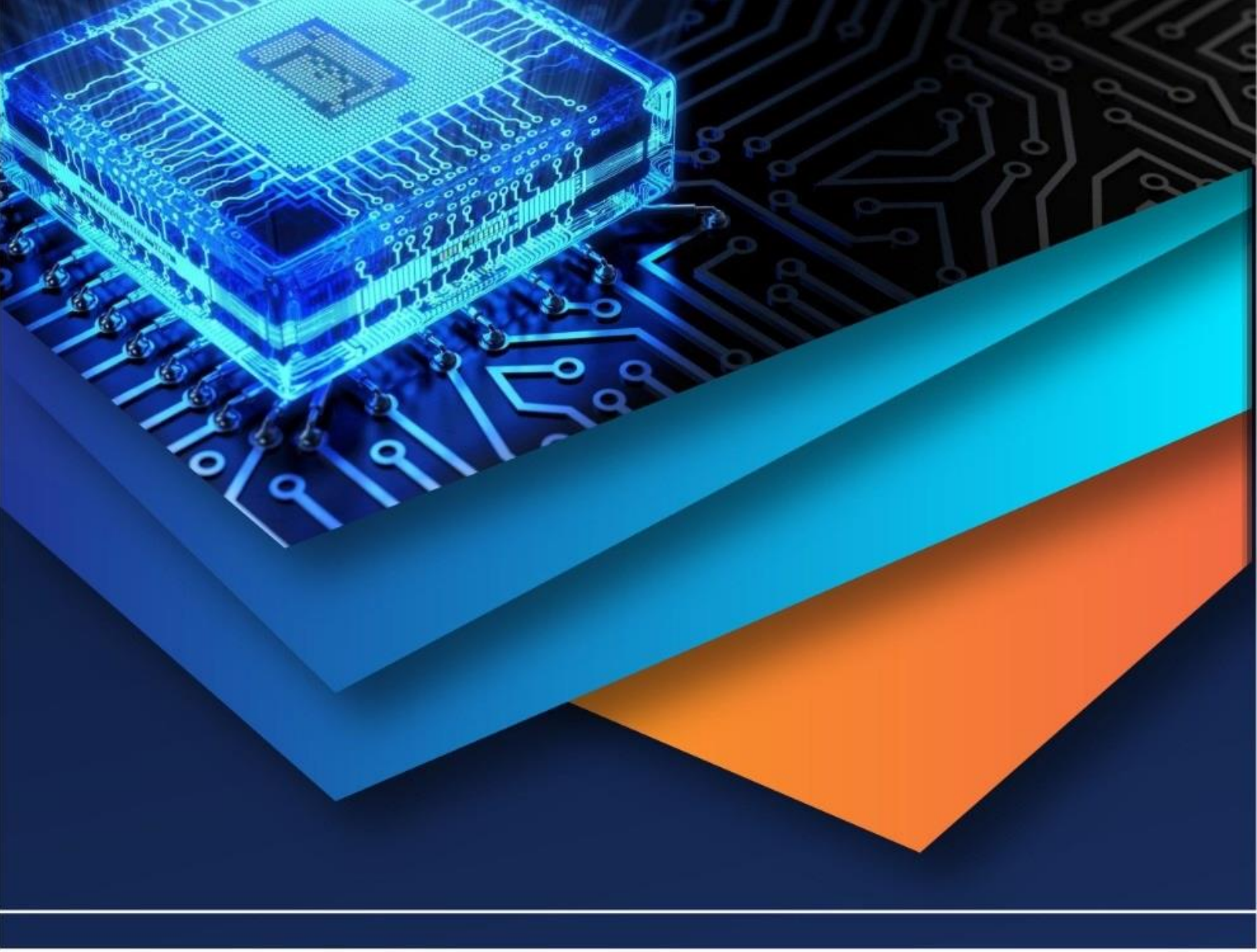

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