A TUNEABLE CMOS TEMPERATURE SENSOR

This invention is a new, low power, highly compact design of an on-chip CMOS temperature sensor for computing applications.

INVENTION

This invention is a new type of highly compact temperature sensor based on the complementary metal-oxide semiconductor devices. The invention utilizes the least operating power and offers highly controllable temperature sensitivity. The said design is suitable for on-chip temperature sensors commonly used in electronic systems to prevent excessive chip temperatures from destroying the devices. The invention ustilizes operation amplifiers, making easy design and even easier integration on-chip.

MARKET SIZE AND GROWTH

As the computational power of everyday consumer electronics increases, the demand for on-chip temperature sensors also increases. The global temperature sensor market was valued at USD 5.5 Billion in 2017 increasing at a CAGR of 7.3% to around USD 8.5 Billion by 2023[1].

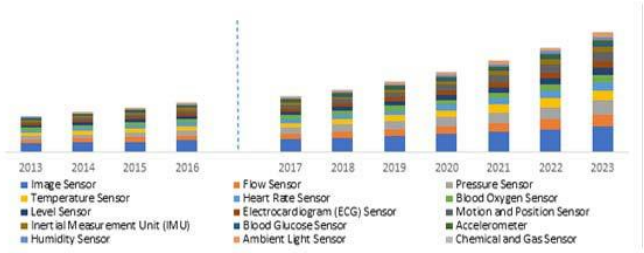

Fig. 1 Global sensor market – 2013-2023

The main demand of on-chip sensors comes from the highly increasing consumer electronics segment, including wearable gadgets, ultra-thin computers and smart-home electronics[2].

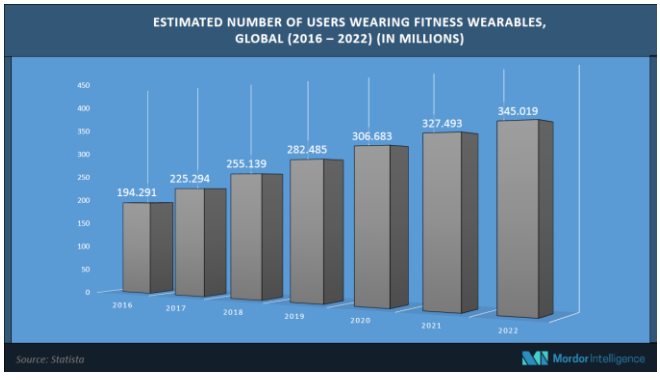

Fig. 2 Number of users wearable electronics – 2016-2022.

APPLICATIONS

The invention applies to on-chip temperature measurement setup present on microprocessors in any electronic device. This invention would play an integral part in maintaining the temperature of the chip to within operating levels and assuring proper device cooling is done without device damage.

ADVANTAGES

This design has the following main advantages over the existing ones:

- The overall size of the complete sensor is comparable to the existing ones at 0.18 micro meters.
- It has been proven to successfully detect chip temperature in the range of -50-150 Degrees centigrade.
- This design occupies the least area (0.006 sq. mm) as compared to the exiting designs in literature.
- The power consumption is comparable to the existing designs at 150nW.

PROJECT STATUS

The presented design, in its current form, has been simulated to show different advantages mention in the previous sections.

LOOKING FOR A DEVELOPMENT PARTNER

Following successful simulation, it is required to monitor the performance of the temperature sensor when integrated on a microcontroller. Simulating the invention by integrating on microcontroller chip designs would give a clear idea of the operation factors of the designed sensor.

PATENT PROTECTION

A U.S. patent pending application: US15/902503.

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For further information please contact:
Name: Farooq Sultan
Email: skfarooq@kfupm.edu.sa
Telephone: +966 – 13 – 8608695

1. P&S Market Research.
2. Mordor Intelligence