

Development of Super High Resolution Micro size Magnetic Sensors and Their Highlights Applications

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The trend of big data in Fig.1 creates the big progress of sensors towards to like bio sensors. Like bio sensors must have high performance in super high resolution, micro size, low power consumption, real-time, low cost and mass production. The like bio sensors must be archived by combination of sensor innovation and the sensor fusion smart system. In the field of magnetic sensors the developments of high resolution micro size magnetic sensors and their new applications such as wearable computer in Fig.2, medical applications in Fig.3, automotive driving systems, smart grid has been dramatically progressed.

MI sensor which consists of amorphous wire and MEMS coil must be most promising super high resolution micro size magnetic sensors. Recently the remarkable progress on MI sensor improved by pulse stimulation from MHz to GHz and fine pithed MEMS coil from 30 μm to 5μm in Fig.4 which gives the 100 times increase in sensitivity compared to that of MHz type MI sensor is reported. I propose GHz type MI sensor as GHz-spin rotation sensor (GSR sensor1)). This GSR sensor must measure the earth magnetism easily and apply to gyro compass which is used as motion sensor for wearable computer. Moreover it can detect bio magnetism of Pico tesla level and apply to heart magnetic cardiogram and magnetoencephalography.

The keynote speech will introduce the recent developments in super high resolution micro size magnetic sensors and their high light applications challenged in Silicon Valley.

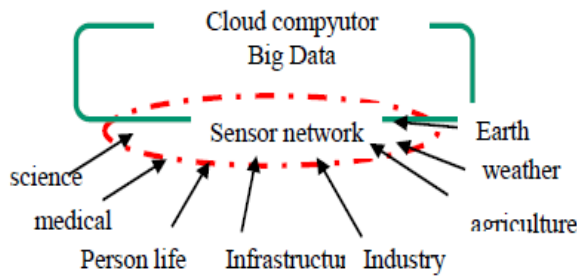


Fig.1 the ages of Big Data and the role of sensors
Market will increase from 10 B pieces /year to 100B pieces / year in 2020



Fig.2 Motion Fusion sensor size 4×4×1mm



Fig.3 magnetocardiography using SQUID

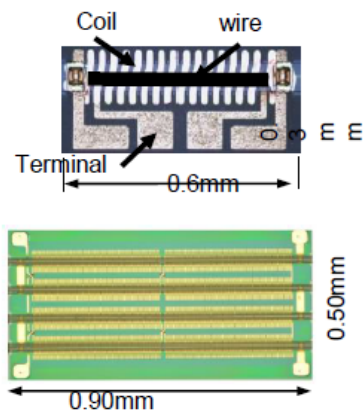


Fig.4 MI Element and coil pitch
Numbers of coil increased form 25 to 620 turns /mm

Reference

- 1) Y. Honkura; Nano plat form consortium symposium (2015).