

Taking advantage of accurate distance measurement:

Stop car robbery by using this technology! BLE/UWB Module

InsightSiP based in France specializing in SiP (System in Package) aims to develop its new module [ISP1510] integrating both Bluetooth Low Energy (BLE) and UWB (Ultra-Wide Band) into automobile industry. The company is eager to contribute for stopping car robbery by equipping a car with a keyless entry system.

[Mayuko Murao: EE Times Japan]

A new technique of car robbery

Have you ever heard a word of "Smart Key Relay Attack? It is a new kind of vehicle robbery technique and it has been gradually on the rise quite recently. It is carried out by a manner that a culprit A in the vicinity to an owner of a car receives weak signals which are constantly emitted by a smart key and relays it to a culprit B in the vicinity of the car and steals it.

This crime is getting serious in the western countries and has been annoying car insurance companies.

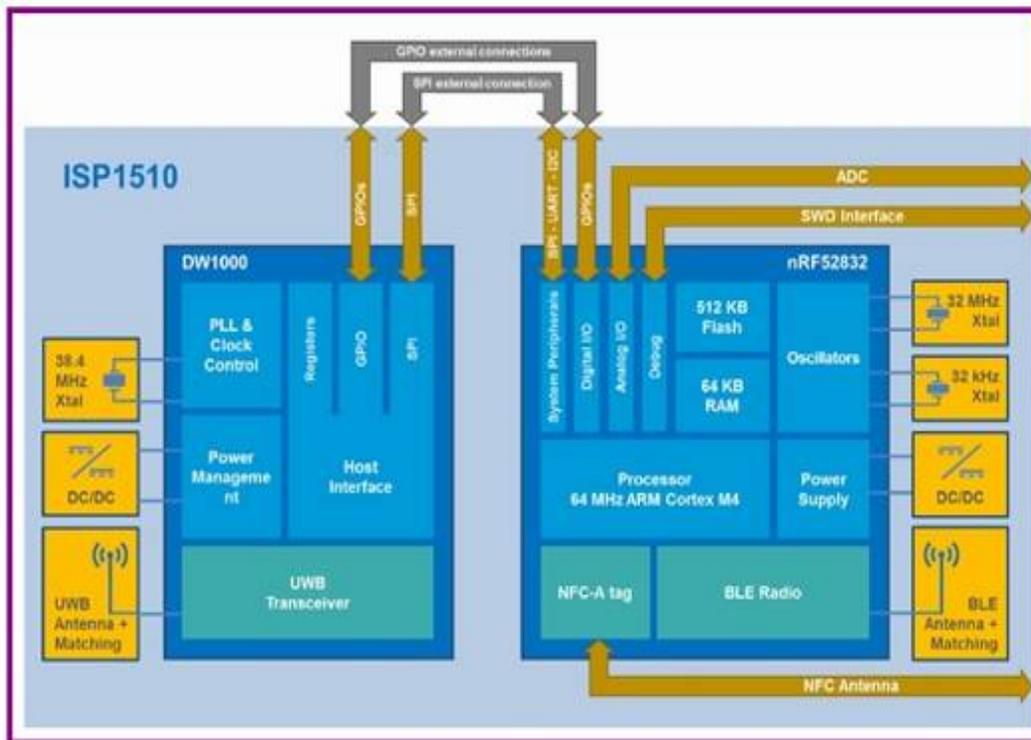
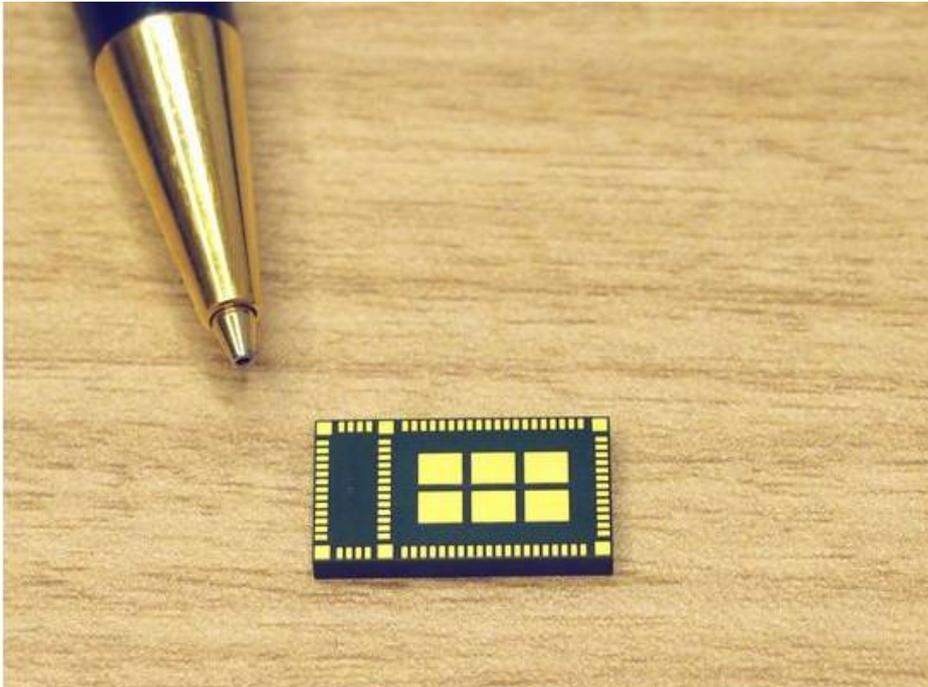
There are some counter measures like storing a smart key in radio protective case or copy guard system but a module developed by InsightSiP in France can be an effective preventive solution.



A small SiP module dealing with BLE and UWB

The latest wireless module "ISP1510" announced by InsightSiP in 2016 will be the key product. It was displayed at "The 3rd Wearable EXPO" held from January 18 to 20th 2017.

ISP1510 contains Bluetooth Low Energy (BLE) and UWB (Ultra-Wide Band) chips together with two antennas for two radios as well as ARM(Cortex-M4) CPU, DC-DC converter, 512kB Flash and 64kB SRAM memories in a package. This module can be characterize by a very small size of 9 x 16 x 1.9 mm.



ISP1510 Block Diagram: BLE Chip uses nRF52832 from Nordic Semiconductor and UWB chip uses DW1000 from Decawave. (Source: InsightSiP)

InsightSiP, CEO, Mr Michel Beghin tells that ISP1510 will go for a precise positioning system as the major markets because it has got a UWB IC integrated which can achieve very precise distance measurement using UWB signals. The way to measure a distance is similar to a radar system in which a transmitter sends UWB signals and calculate the distance by the time of signal flight between the transmitter and the receiver (in a range of micro seconds). The wave length of UWB is very short so the time accuracy can be so reliable to make the measurement highly accurate.

The question would be “How to use this to prevent Smart Key Relay Attack” .

Use distance measurement for vehicle rubbery prevention

The hint is to add a feature to a smart key system that can measure the distance between a vehicle and its owner. Conventional system has used the only radio signal strength to determine if he is the owner or not therefor once the radio signals are maliciously copied, the system no longer can judge the credibility of the owner. ISP1510 needs to be equipped on a vehicle and smart key so the distance between the vehicle and owner possessing the key can be precisely measured. The physical distance accuracy can help to realize the keyless entry system when the system can get to judge the credibility on a basis that “The vehicle doors cannot be opened unless the key owner must be within 50cm from them or the engine cannot be operated out of 50cm away from the car.

* Needless to say, there is no way if the key itself is stolen.

Mr. Beghin tells that “in Europe smart key relay attack have quite a big number in car rubbery and it’ s getting a more serious problem since software that help to pull off the crime is available cheaply.

I have seen the car industry in Europe and the US taking a keen interest in the use of ISP1510 we have proposed.”

InsightSiP claims ISP1510 can reach 30m as the maximum transmission distance but

Mr. Beghin says it can be extended to about 70m with the accuracy of less than 10cm.

He has also suggested he targets a secure building

entry system and a drone flight surveillance system other than vehicle applications.



InsightSiP CEO: Mr Michel Beghin

Mr. Beghin mentioned that the most challenging factor in developing ISP1510 was to implement two antennas for BLE and UWB. Usually, there is less interference between two antennas if they are placed apart from one another but a big package cannot be allowed for this module design. "A thing was how to install 2.4GHz BLE and 5-10GHz UWB antennas within a limited space. Spurious emission generated at 2.4GHz band is so close to 5-10GHz that the antenna must be placed apart enough not to interfere each other. We had to optimize the placement and do the tweak on filter and tuning" , he added.

A working sample of ISP1510 has already been offered to four to five European customers and the volume production is planned toward Q3 or Q4 in 2017. However, because the current ISP1510 supports 5 – 10GHz UWB frequencies, it would support US and European markets but not usable in Japan. It needs to accommodate 7.25 to 10.25GHz to operate in Japan but Mr. Beghin says "It cannot be difficult to be adjusted for the frequencies."

*It can operate in 3.4 to 4.8GHz but it requires a feature called "DAA: Detect and Avoidance" to reduce the interference so enabling it to operate in 7.25 to 10.25GHz is more pragmatic.

Mr. Beghin says that the target unit price for ISP1510 is less than 10 USD. Because He can foresee the potential market size could be several million units per year, the volume like that could bring a further lower unit price in the future.

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