**RFID 4: RFID Backscattering in Long-Range Scenarios** by Francesco Amato, Hakki M. Torun and Gregory D. Durgin

The main drawback of using an RFID sensor is that the range for detection is very small, usually around 5-10 feet and sometimes up to 15 feet. However, there is a bypass to this limit or constraint. The effect of quantum tunneling can be exploited to increase the range of an RFID tag to close to 300 times the usual range. This RFID tag works on a 5.8GHz band. The most impressive characteristics of this backscattering would be that it has a return gain as high as 35dB and sensitivity of -81dBm. It also is very power efficient consuming very little energy.

This is impressive for many reasons; one is the major application that it can see in Internet of Things. Secondly, this is also one of the main tools to pick up card details from unsuspecting by passers. RFID chips are very frequent today on credit and debit cards which would make this improvement a massive advantage for anyone who would intend to skim a card from farther away.

Even though there are no RFID frauds reported, it could open up a world of possibilities in the future for threats and major fraudulent activity with this.

**RFID 5: Lightweight RFID Protocol for Medical Privacy Protection in IoT** byKai Fan, Wei Jiang, Hui Li, and Yintang Yang

RFID technology works on 2 main components, namely RFID Scanner and the RFID tag. The information is stored on the tag while the scanner is responsible for reading the information of the tag. When the scanner reads the tag, there is information exchanged between the scanner and the tag and this is when the details are at risk of being intercepted. This is a major breach in privacy since it contains half of the details required to access any credit or debit cards, the other half being the PIN, 2FA or biometric authentication. Through this information there are many ways to figure out more personal information about the card holder as well as get the PIN through social engineering.

Since RFID works on low energy consumption, it is advantageous to have a protocol that is as lightweight as possible, hence the protocols which experimentally satisfy privacy and lower power consumption are preferred in many fields including, but not limited to, IoT and cybersecurity.

**RFID 6: Ranging RFID tags with ultrasound** by Riccardo Carotenuto, Massimo Merenda, Demetrio Iero and Francesco G. Della Corte

We can calculate and estimate a 3D position of a RFID tag by obtaining the three co-ordinate measures. This allows to track the movement and could possibly lead to detecting suspicious behavior inside or around ATM stalls or vestibules. This allows another potential security feature. The main challenge for this proposed solution would be the estimation of location precisely without consuming a lot of computation power. To bypass this restriction, we can outsource the computation to a computer outside the stall or vestibule for calculation of the distance. The only sensors inside the ATMs would be utilized for obtaining the co-ordinates of the tag.

This can also be utilized to inform users via a text message if and when they leave their card behind in the ATM. The solutions 3D positioning of RFID based on ultrasound provides are numerous and it is also applicable in many fields such as IoT applications and banking sectors etc.