Handbag Theft Detection System

An application of wireless sensor networks

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Why do we need theft detection?

- Handbag theft is an unpleasant experience

Handbag Theft Detection

- We wanted to build a system that:
  - Detects Theft
    - Items can be stolen from the handbag
    - When left unattended, the whole bag might get stolen
  - Alert the user when a theft has taken place
    - By sounding a buzzer

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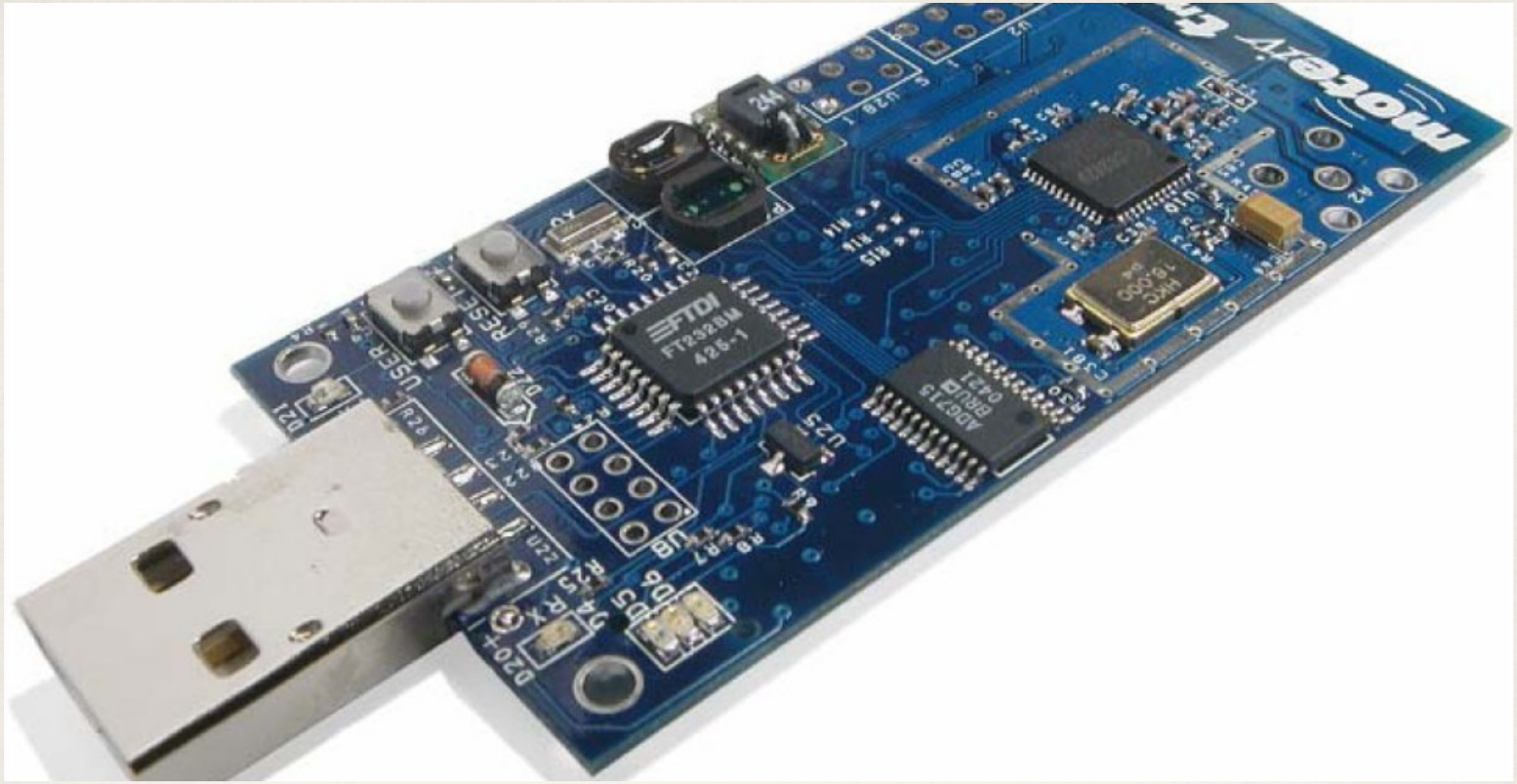

Sensor Board!

T-Mote Sky Sensors

- Features:
  - Sensing: Light, Humidity, IR, Acceleration, Sound
  - Battery Powered
  - Communications: IEEE 802.15.4 RF transceiver (ZigBee™)
  - Computations: 16-bit RISC architecture CPU

System Architecture

- Master (M) Mote
  - Located on the user's person
  - Ensures bag is nearby
  - Alert's the user
- Slave (S) Mote
  - Located in the bag
  - Detects activity in the bag
  - Reports unusual activity to (M)

System Demo

Problems encountered

- Sensors reliability: sensor data sometimes behave erratically
  - We developed a real-time data collection and graphing application, to be able to understand the sensor's behaviour to external environment
  - We used statistical methods to achieve a reliable response
- False alarms: differentiating between the user and a thief deemed a challenge
  - Sensor capabilities were very limited
  - A system activation/deactivation approach was used to mitigate this problem

Future Work

- Make use of more reliable sensors
  - IR and Acceleration
- Power optimisation
  - Reduction communication and radio power
- Use more complex threat detection algorithms
  - How would the villains break the system?
- Reduce false alarm
  - Correlation and adaptive filtering

Conclusion

- The system works!
- Two theft scenarios can be detected
  - Someone taking stuff from the bag
  - Someone taking the bag away when left unattended
- In the future, the system can be improved

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