

Wireless and RFID Technology

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GOOD MORNING

- Welcome to all , professors, researchers , students.
- Agenda
 - Wireless technologies
 - RFID Technology
 - Uses of RFID for automation
 - example-college management system uses rfid technology

WIRELESS TECHNOLOGIES

- Communication between systems without wire is termed as wireless technologies
- WLAN: wi-fi, getting internet in computers
- Cellular : Mobile phone
- Bluetooth : home automation, wireless mouse, wireless keyboard
- RFID : contactless card, asset tracking, attendance system

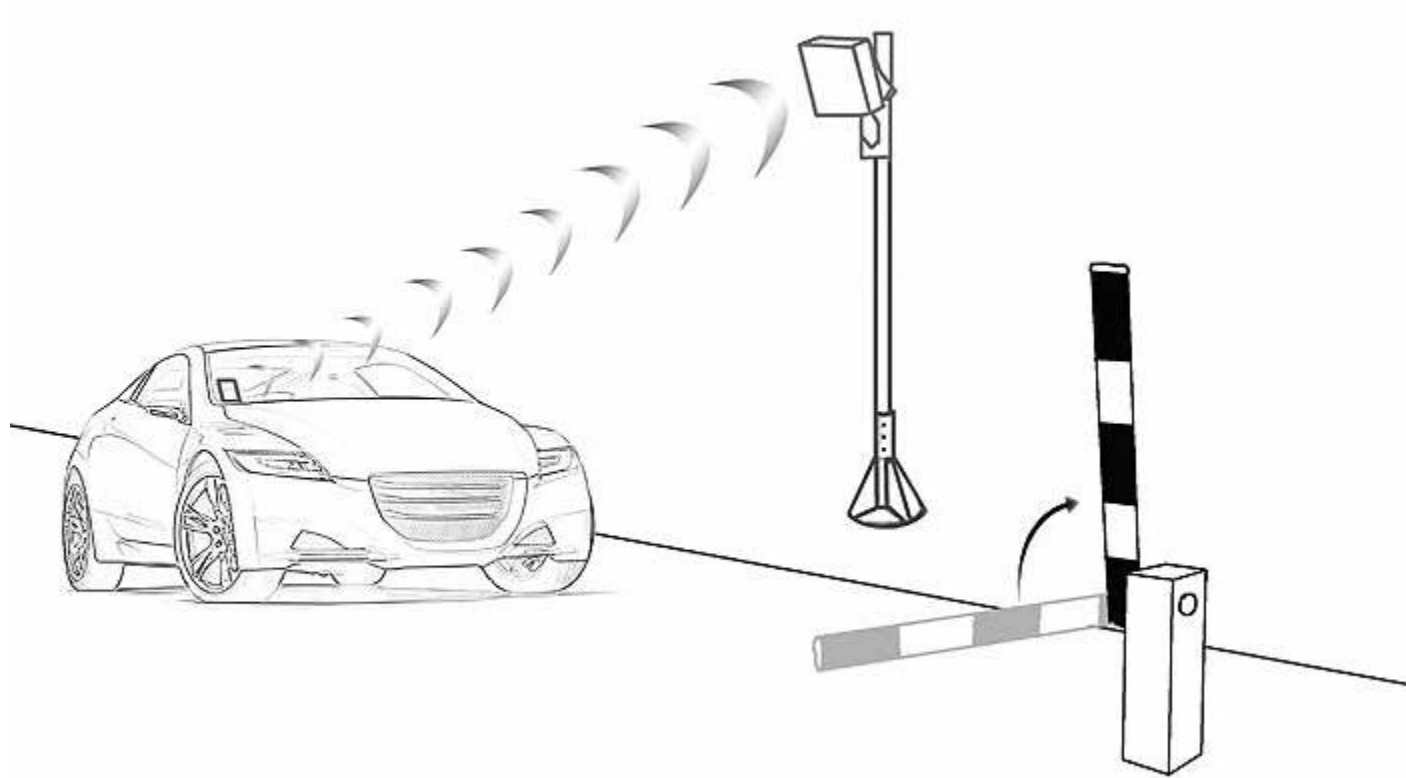
Radio Frequency Identification

Applications

Library management



Parking and toll collection

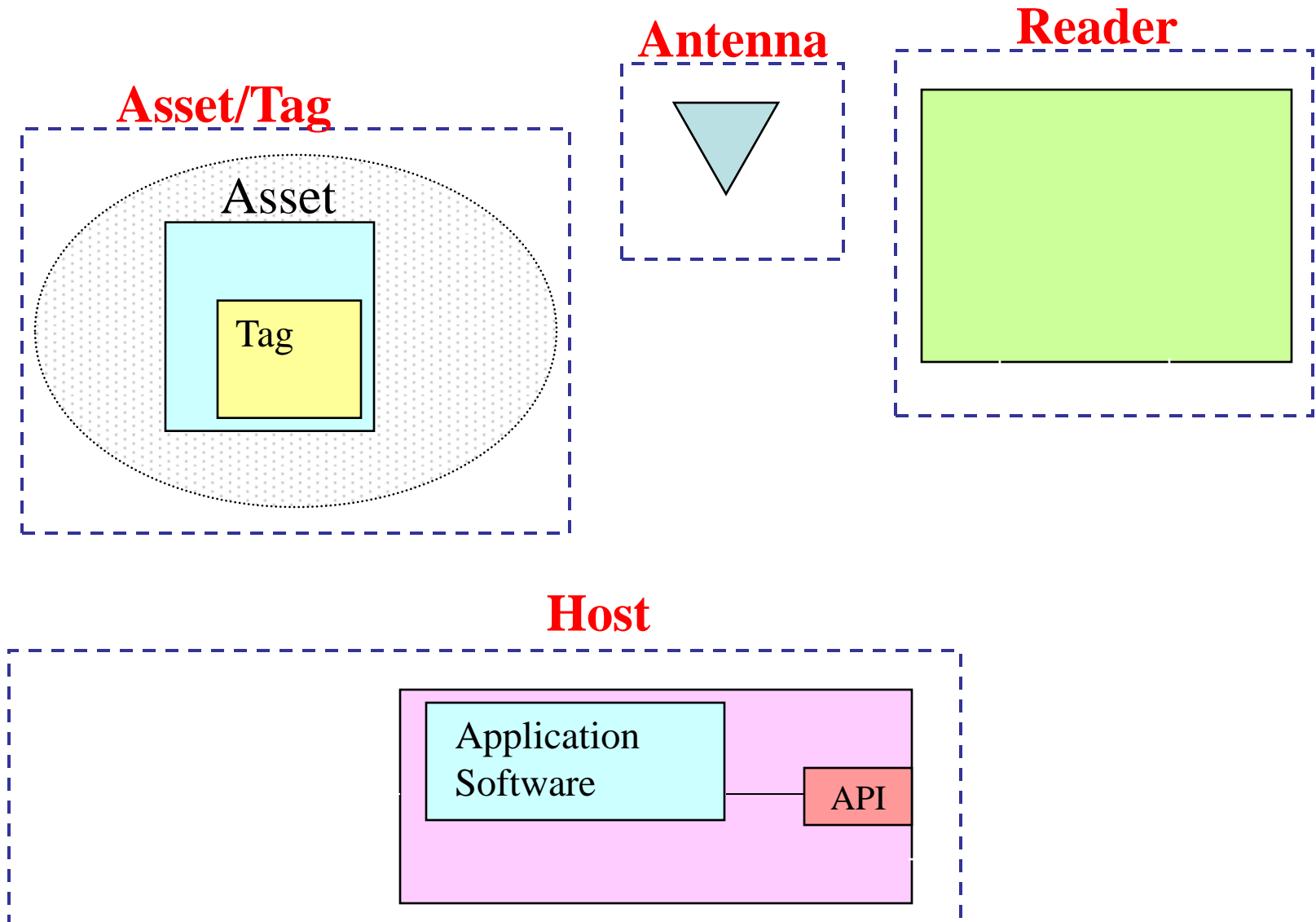


School management system

- Automatic attendance system
- Student security
- Automatic payment and account
- Uses SMS service to communicate to students/parents

RFID System Components

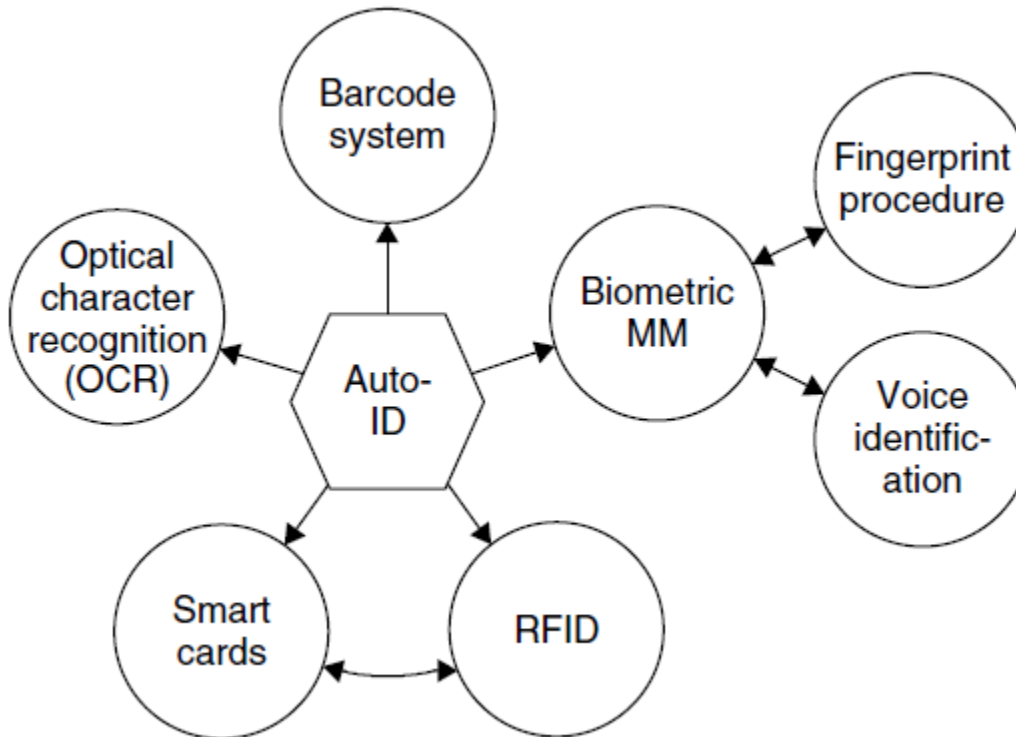
(block diagram)



RFID System

- **RFID Reader**
 - **RFID Card**
 - **Software**
 - **Computer**
-
- **Mainly used for automatic identification**

Automatic Identification

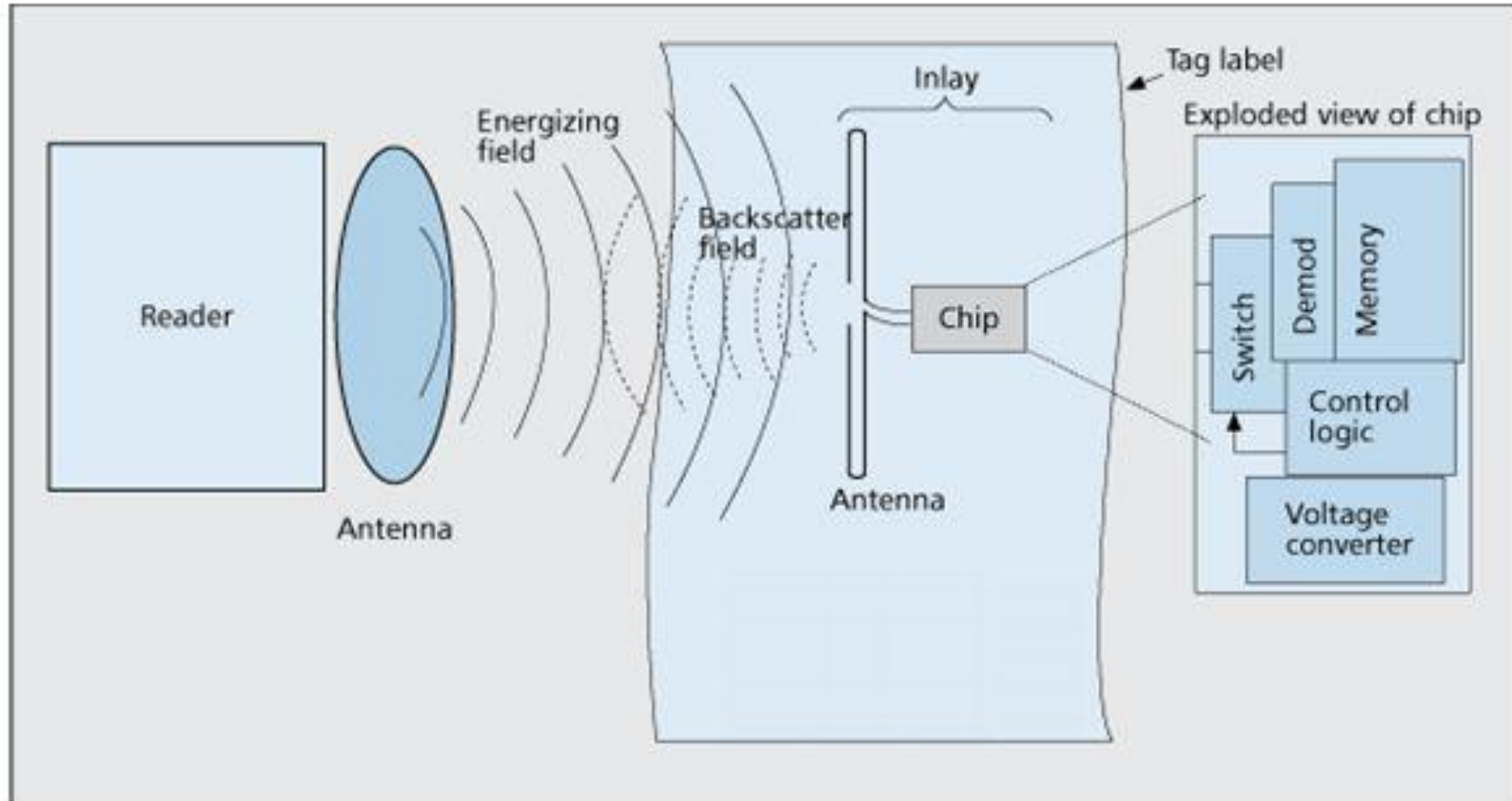


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comparison

System parameters	Barcode	OCR	Voice recog.	Biometry	Smart card	RFID systems
Typical data quantity (bytes)	1–100	1–100	—	—	16–64 k	16–64 k
Data density	Low	Low	High	High	Very high	Very high
Machine readability	Good	Good	Expensive	Expensive	Good	Good
Readability by people	Limited	Simple	Simple	Difficult	Impossible	Impossible
Influence of dirt/damp	Very high	Very high	—	—	Possible (contacts)	No influence
Influence of (opt.) covering	Total failure	Total failure	—	Possible	—	No influence
Influence of direction and position	Low	Low	—	—	Unidirectional	No influence
Degradation/wear	Limited	Limited	—	—	Contacts	No influence
Purchase cost/reading electronics	Very low	Medium	Very high	Very high	Low	Medium
Operating costs (e.g. printer)	Low	Low	None	None	Medium (contacts)	None
Unauthorised copying/modification	Slight	Slight	Possible* (audio tape)	Impossible	Impossible	Impossible
Reading speed (including handling of data carrier)	Low ~4 s	Low ~3 s	Very low >5 s	Very low >5–10 s	Low ~4 s	Very fast ~0.5 s
Maximum distance between data carrier and reader	0–50 cm	<1 cm Scanner	0–50 cm	Direct contact**	Direct contact	0–5-m, microwave

The System



RFID Operation

- **Host Manages Reader and Issues Commands**
- **Reader and tag communicate via RF signal**
- **Carrier signal generated by the reader (upon request from the host application)**
- **Carrier signal sent out through the antennas**
- **Carrier signal hits tag**
- **Tag receives and modifies carrier signal**
 - “sends back” modulated signal
- **Antennas receive the modulated signal and send them to the Reader**
- **Reader decodes the data**
 - Results returned to the host application

RFID Readers

- Readers can be at a fixed point such as
 - Entrance/exit
 - Point of sale
 - Warehouse
- Readers can also be mobile hand-held or wireless

RFID CARDS

- pallets or cases of product
- vehicles
- company assets or personnel
- items such as apparel, luggage, laundry
- people, livestock, or pets
- high value electronics such as computers, TVs, camcorders

Types of card

✓ Active

- Tag transmits radio signal
- Battery powered memory, radio & circuitry
- High Read Range (100m)

✓ Passive

- Tag reflects radio signal from reader
- Reader powered
- Shorter Read Range (5m)

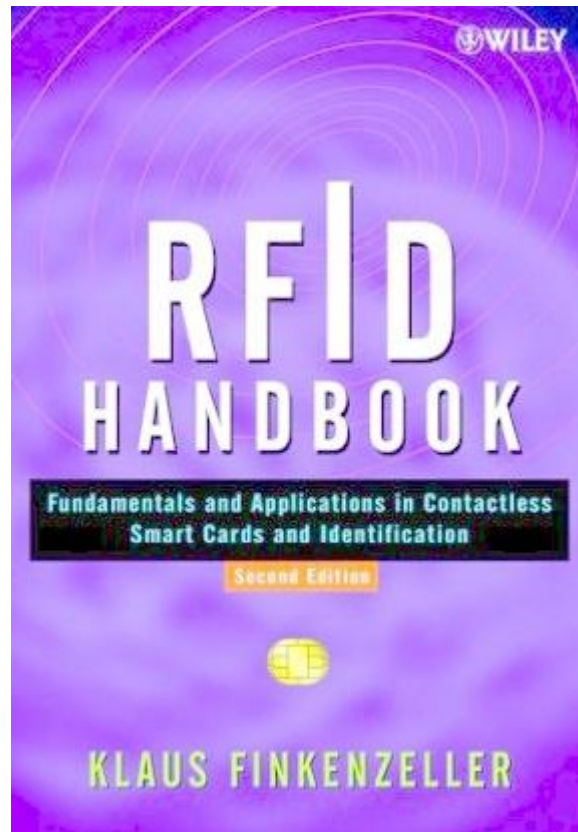
Passive and active Card

	<i>Passive RFID</i>	<i>Active RFID</i>
<i>Power Source</i>	<i>External (Reader provided)</i>	<i>Internal (Battery)</i>
<i>Tag Readability</i>	<i>Only within the area covered by the reader, typically up to 3 meters.</i>	<i>Can provide signals over an extended range, typically up to 100 meters..</i>
<i>Energization</i>	<i>A passive tag is energized only when there is a reader present.</i>	<i>An active tag is always energized.</i>
<i>Life</i>	<i>Very high, ideally does not expire over a life time.</i>	<i>Limited to about 5 years, the life of a battery.</i>
<i>Data storage</i>	<i>Limited data storage, typically 1mbyte.</i>	<i>Can store larger amounts of data. 100mB</i>
<i>Cost</i>	<i>Cheap</i>	<i>Expensive</i>
<i>Size</i>	<i>Smaller</i>	<i>Slightly bulky (due to battery)</i>

Classification

Frequency	Range	Data Speed	Comments
125-150 kHz	≈ 10 cm	Low	Animal identification and factory data collection systems
13.56 MHz	< 1m	Low to moderate	Smart cards, attendance
433 MHz	1 – 100 m	Moderate	Asset tracking
860-930 MHz	2 – 5 m	Moderate to high	Car parking, high way toll collection
2450 MHz	100 m	High	Highest range

reference



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Thanks

- RFIC technologies is working on cutting edge technologies for producing low cost high performance wireless system, VLSI, electronics, embedded system.