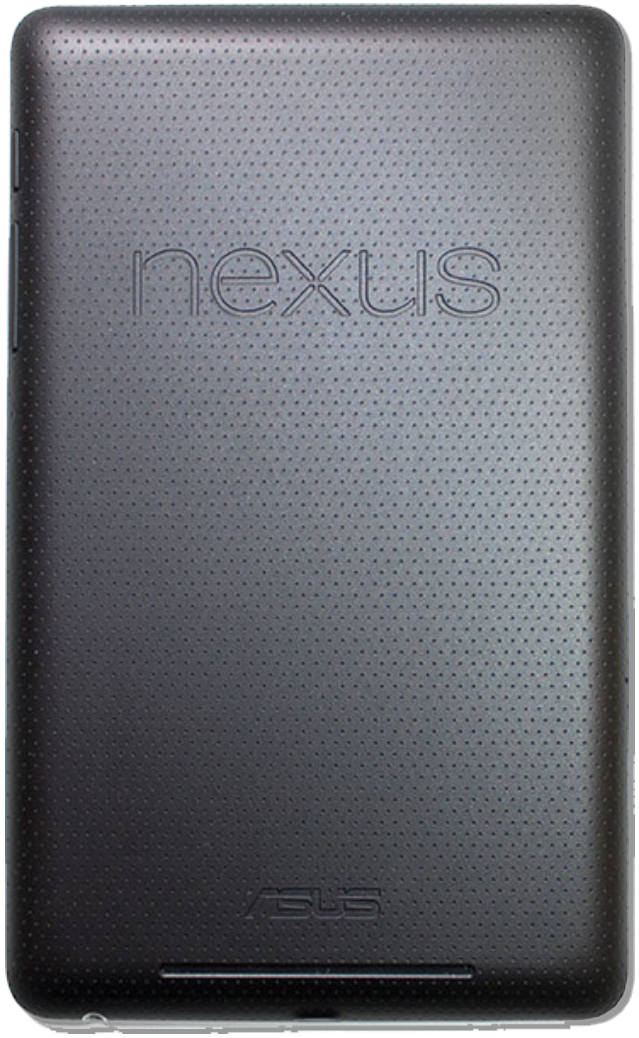
Near Field Communication (NFC)

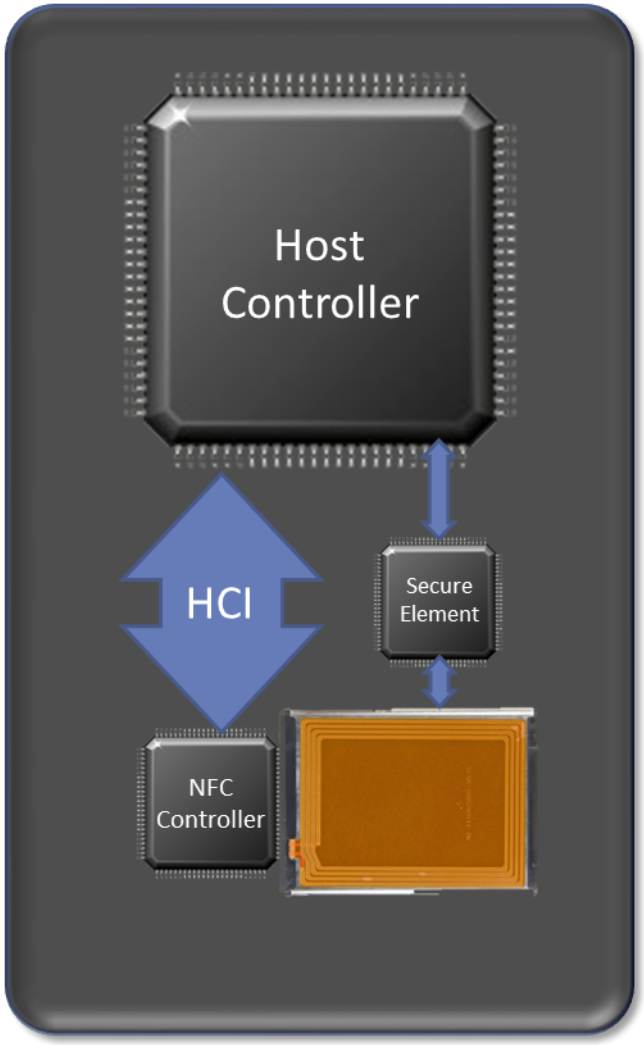
Some slide from:
https://www.cse.cuhk.edu.hk/lyu/_media/students/lyu1301_term1presentation.ppt

- Understand the usage of NFC
- Understand the limitation of NFC

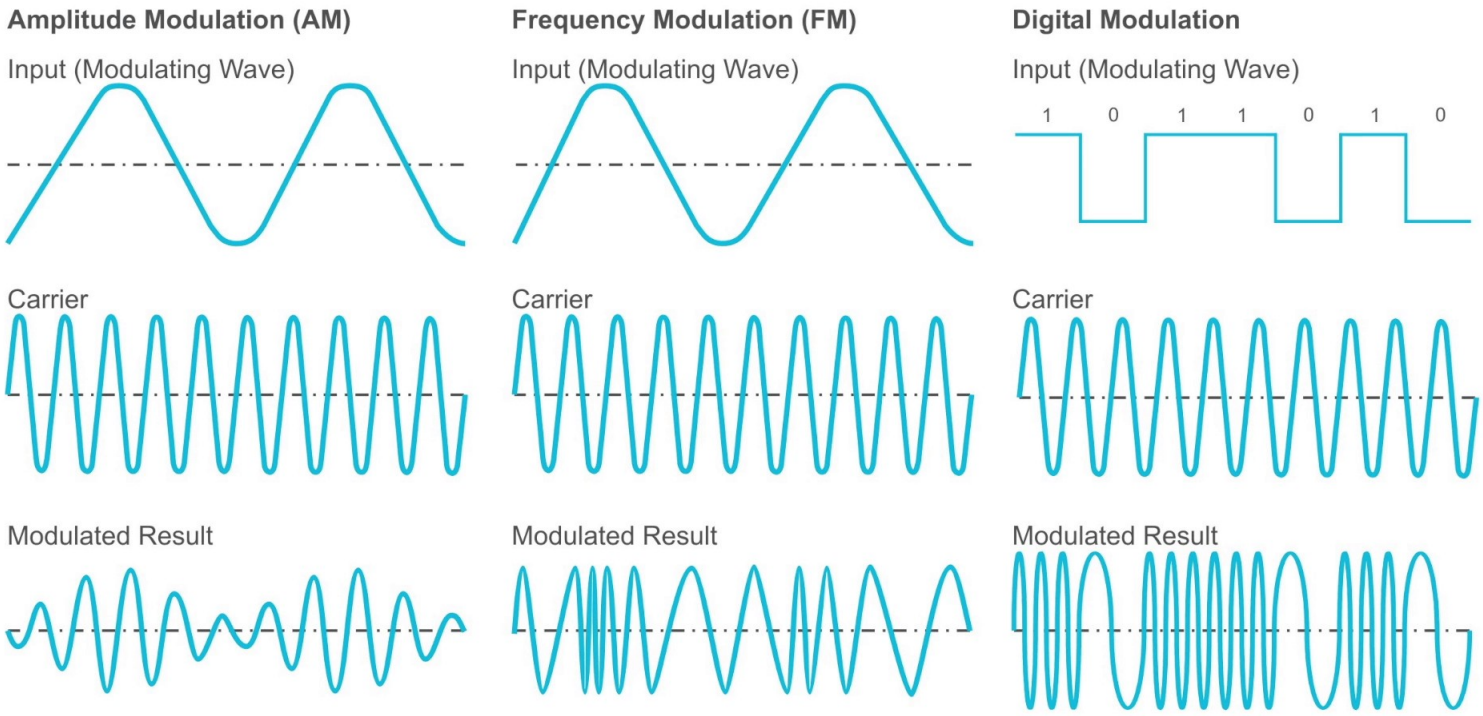

9:10
PANTECH


nexus

- Host Controller
- NFC Controller
- HCI
- Secure Element



Modulation


Amplitude Modulation (AM)
Input (Modulating Wave)
Carrier
Modulated Result
Frequency Modulation (FM)
Input (Modulating Wave)
Carrier
Modulated Result
Digital Modulation
Input (Modulating Wave)
1 0 1 1 0 1 0
Carrier
Modulated Result

Two mode of communication

Passive Communication Mode: The Initiator device provides a carrier field and the target device answers by modulating existing field. In this mode, the Target device may draw its operating power from the Initiator-provided electromagnetic field.

Active Communication Mode: Both Initiator and Target device communicate by alternately generating their own field. A device deactivates its RF field while it is waiting for data. In this mode, both devices typically need to have a power supply.

- Reader/Writer Mode
- Peer-to-peer Mode
- Card Emulation Mode

- Reader/Writer Mode
- Peer-to-peer Mode
- Card Emulation Mode

- Reader/Writer Mode
- Peer-to-peer Mode
- Card Emulation Mode

- Reader/Writer Mode
- Peer-to-peer Mode
- Card Emulation Mode

- Shopping
- Card Emulation
- Phone Setting
- S-Beam

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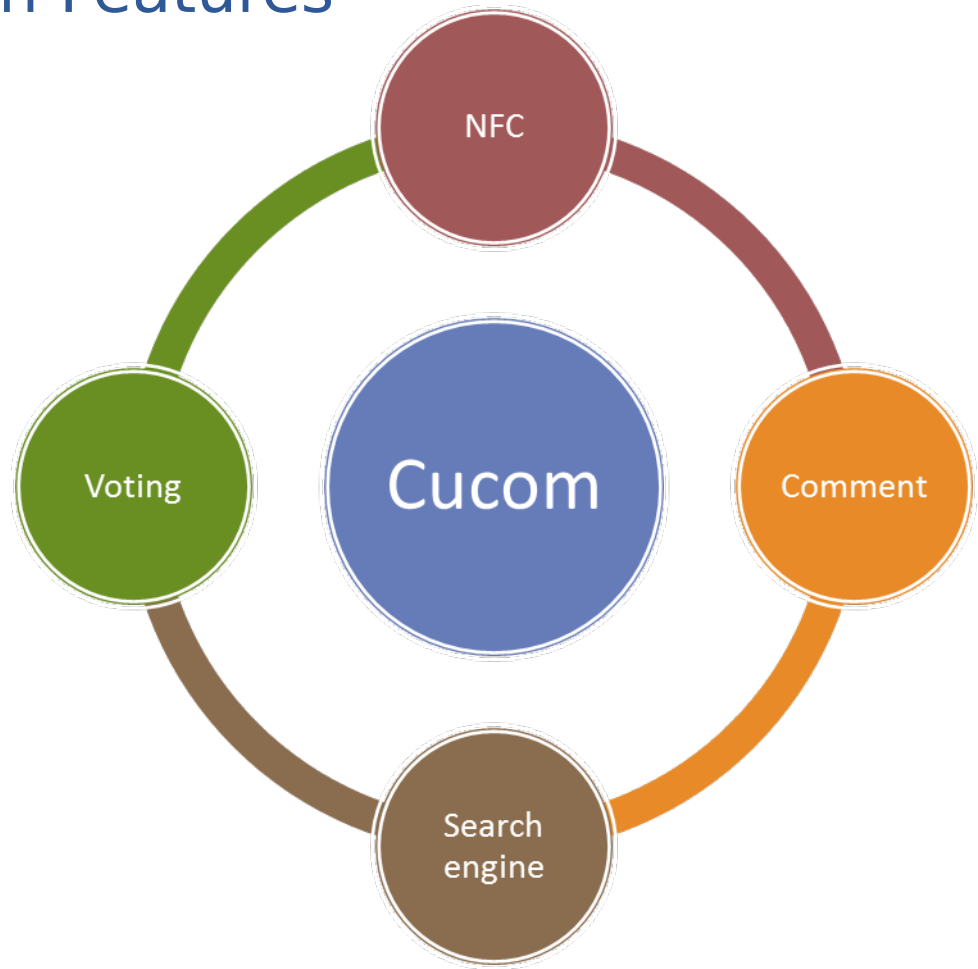
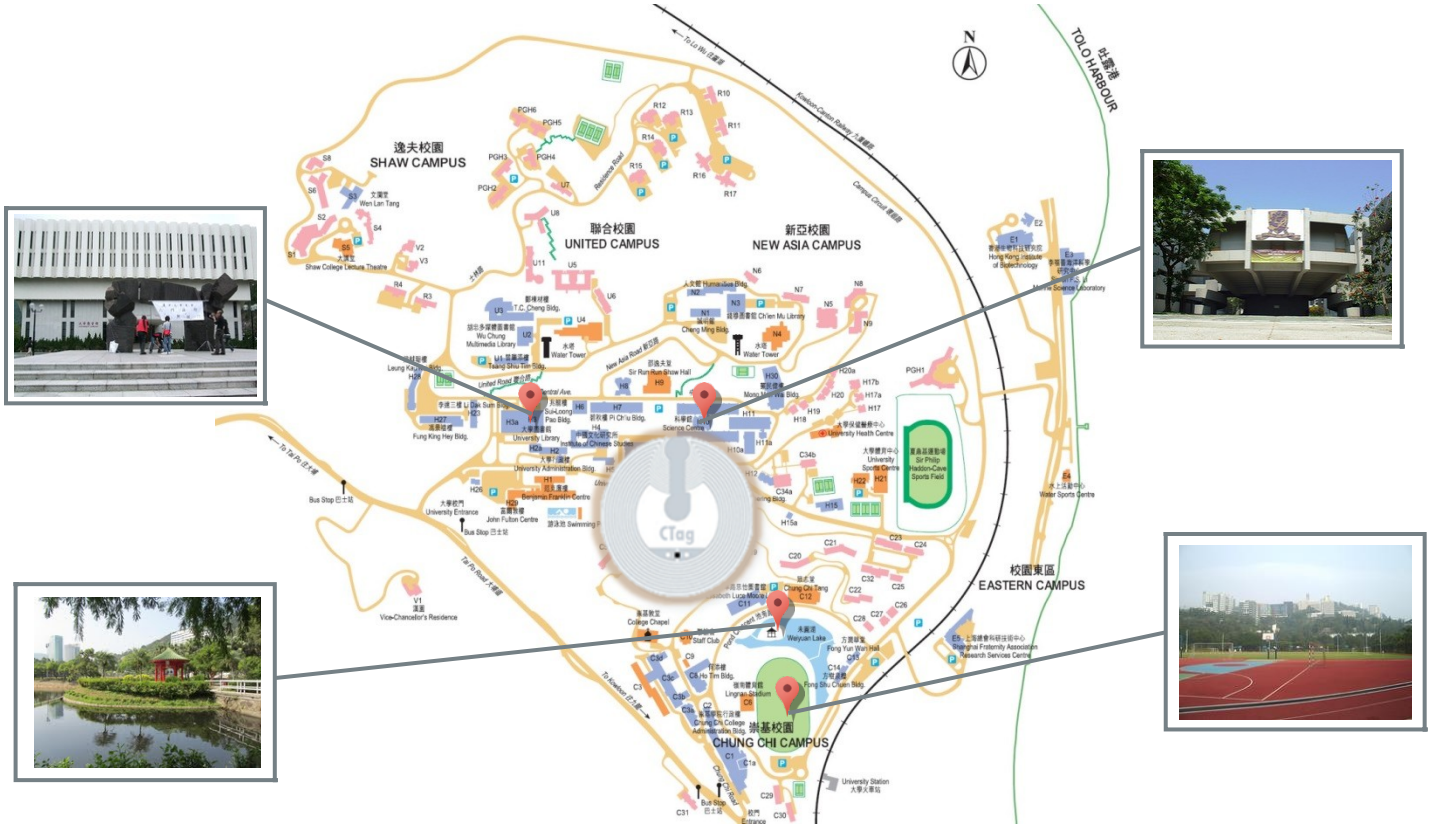
- The possibility usage of NFC
- The security level of NFC
- The communication limitation of NFC
  - E.g. P2P Half-duplex mode

- Cucom= Chinese University Communication

- Social App
  - To comment on physical environment in CUHK

Four Main Features

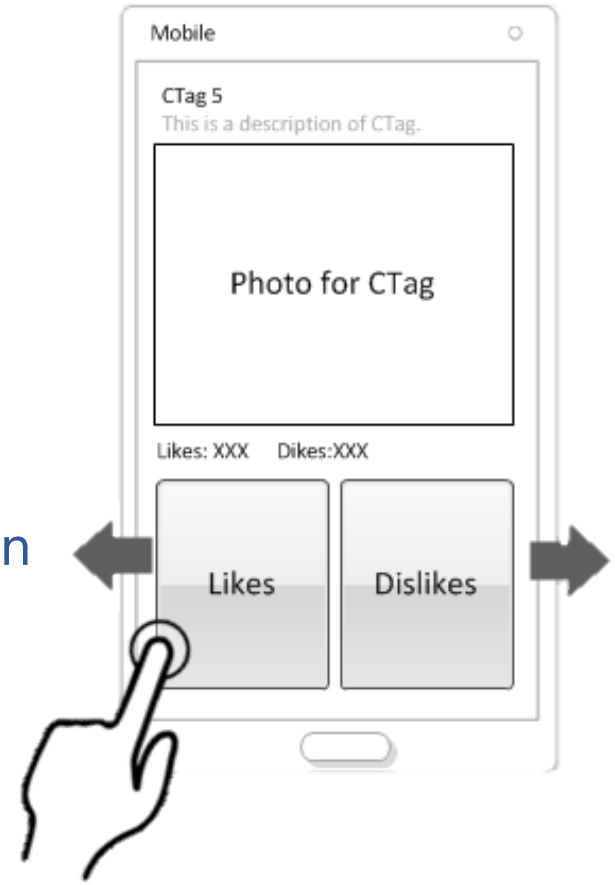




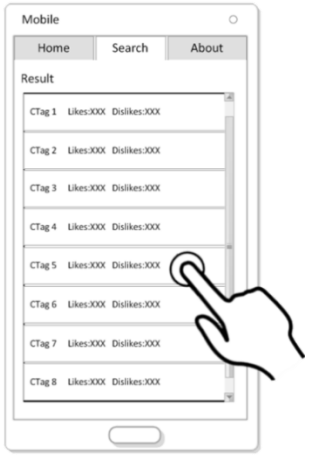
- CTag = Cucom’s NFC Tag
- Located in different places (canteens, lectures theatres etc.)

- Network not required
  - Benefit for people who have no network
- List the information
  - Name
  - Description
  - Likes
  - Dislikes
  - Comments

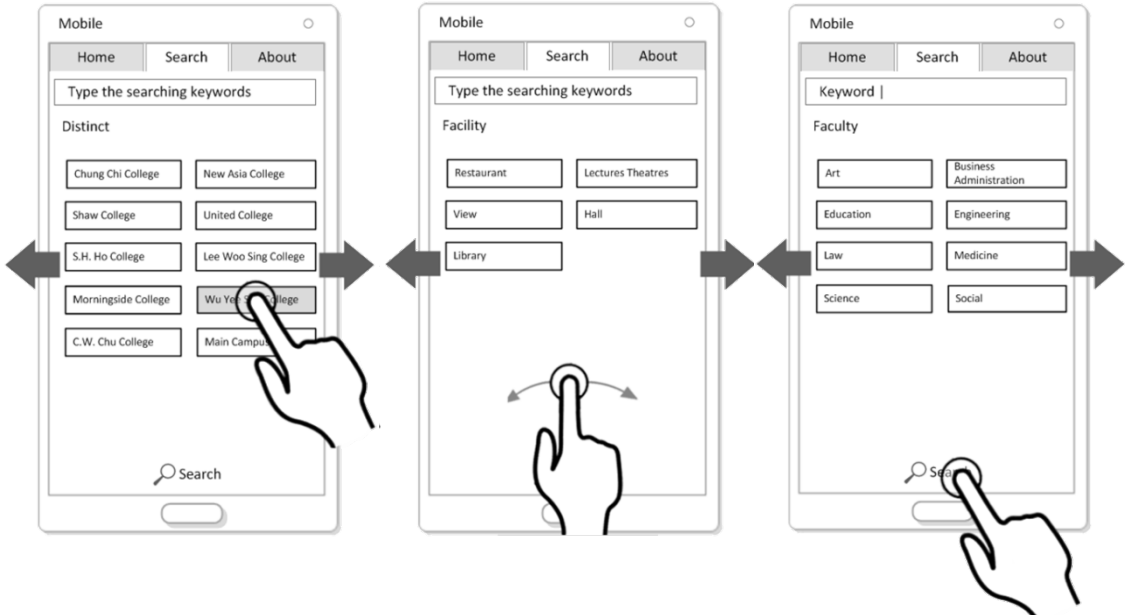
- Two choices
  - Likes
  - Dislikes
- Vote for once a month
- Update when having network
- Required users to go to the location
  - Interact with real world
  - Reflect popularity

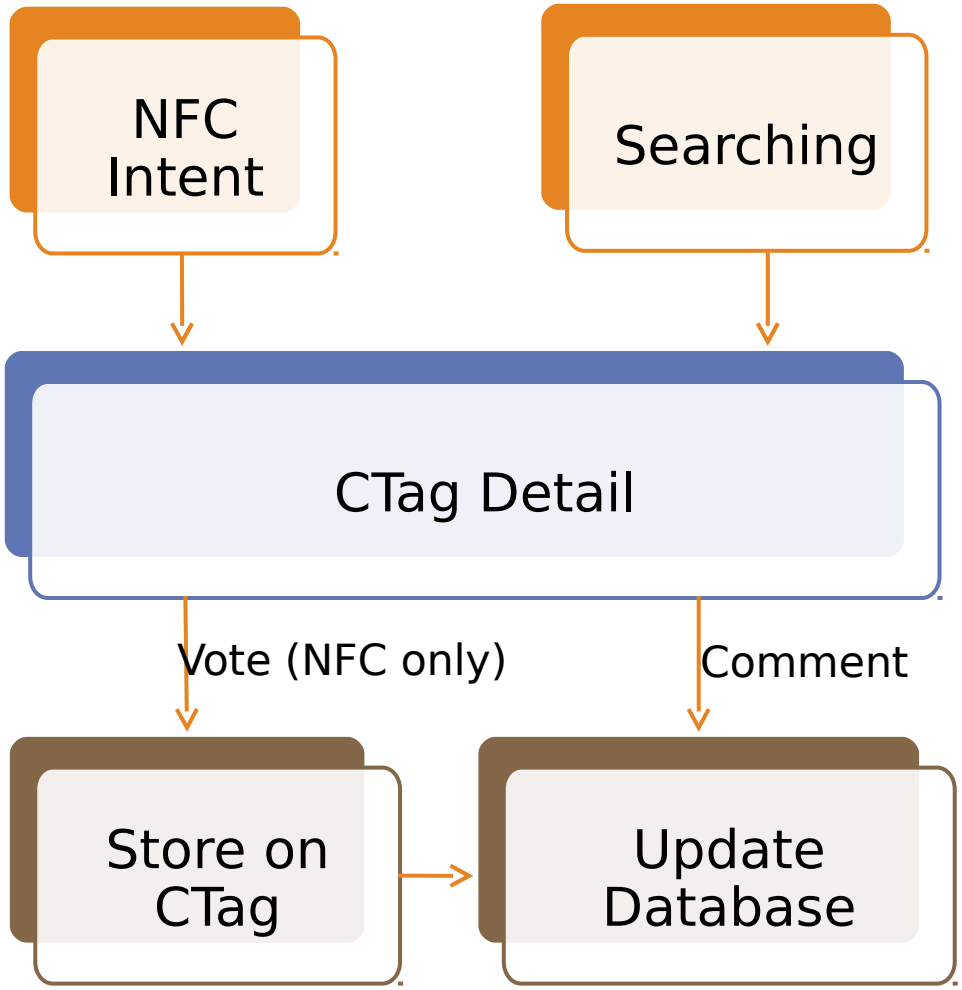


- Category
  - For filtering
    - Distinct
    - Facility
    - Faculty
- Keyword
  - For searching



Distinct	Facility	Faculty
•Chung Chi College •New Asia College •Shaw College •United College •S.H. Ho College •Lee Woo Sing College •Morningside College •Wu Yee Sun College •C.W. Chu College •Main Campus	•Library •Lectures Theatres •Restaurant •View •Hall	•Art •Business Administration •Education •Engineering •Law •Medicine •Science •Social




NFC Intent
Searching
CTag Detail
Vote (NFC only)
Comment
Store on CTag
Update Database

- Upload to server if possible
- Atomicity of writing action
- User Experience
  - Simple
  - Swiping
  - Searching

NFC Tag Security

- Requires user to read and write data
- Limitation: complete datasheet on suitable tag type is not easily available

NFC Tag Lifetime

- The more popular the CTag, the lesser the lifetime

Popularity (Write/day)	Mifare Ultralight Lifetime (days)	Mifare Classic (days)
5	2,000	20,000
10	1,000	10,000
25	400	4,000
50	200	2,000
100	100	1,000
150	67	667
200	50	500
500	20	200

- **Comment in Offline**
  - Create buffer on remaining space in CTag
- **Customizable Features**
  - E.g. booking classroom
- **Enhance User Interface & Personalize**
  - User account
  - Add set of themes and characters
  - Motion gesture