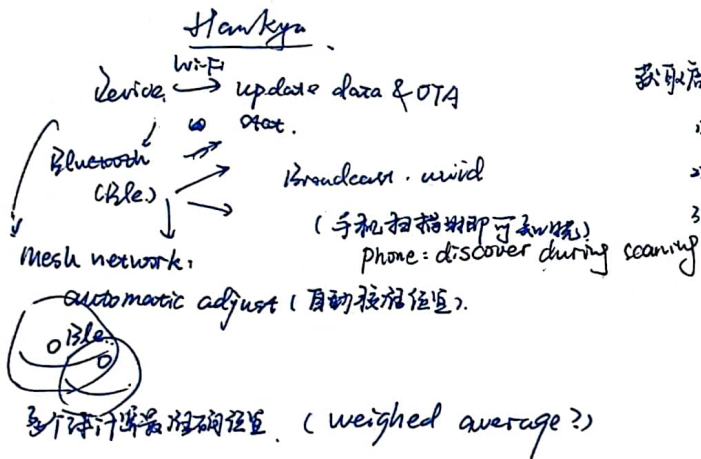


August 14

indoor navigation system



获取后端信息方式:

- 1) 手机下载离线商场地图数据.
- 2) BLE 广播 uuid 请求服务器.
- 3) 手机广播 uuid 实时联网请求.

Merchant data

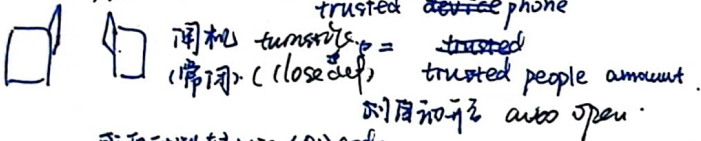
- 1) mobile download offline map data.
- 2) BLE request server broadcast.
- 3) Phone. UUID, (BLE) request server.

手机端 Mobile Client

- 1) 定位 (需 BLE 和 GPS+网络?) Localize via BLE
- 2) 导航 (路线规划?) Navigate (route planning) (algorithm?)
- 3) 门禁 (?:) Unlock door?

自动门禁: 摄像头

Auto unlocks: camera & connected trusted device phone



或自动跳转 NFC / QR code.
 or auto to NFC / QR code.

4. 互动岛.

Dynamic Island.

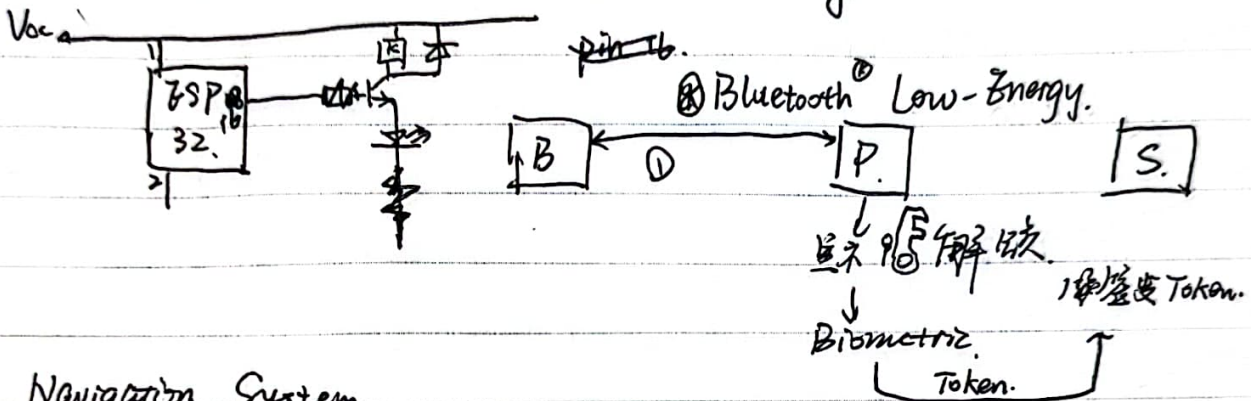


Beacon

Handwritten circuit diagram for a BLE advertisement module. The circuit includes a 15V VCC supply, a 6SP18 32-ohm component, and two LEDs labeled "工作指示灯" (Working Indicator Light) and "网络指示灯" (Network Indicator Light). The circuit is powered by a 15V source and includes a 32-ohm resistor. The output is connected to a BLE module, which is labeled "Ble advert".

Ble advertise & Connect with phone

Same as locating.



1. Schema

- 11. Area. In the area, You can go into every object. within a certain area without need of transportation or authentication.
- 12. A Connection. The device, including gates, stairs, ~~and~~ elevators, or escalators; also including public transportation (i.e., shuttle bus or train).
- 13. Polymer. A non-intersect point, ~~series~~ (indicates corner), that indicates that certain area available/unavailable. It's a property of area.
- 14. Store. The ~~critical~~ entity ~~outside~~ the polymer, which could have a internal polymer, incl. those large supermarkets, etc.
- 15. Kiosk. The entity ~~inside~~, including but not limited to surrounded the polymer.
- 16. Room. The entity with doors to access, yet most areas separated by walls.

fantasy of having a female teammate, I declined and concentrated on coding, especially when they ^{were} having conversations, ^{fear of being bullied as young, etc} they focus on material rather than program and designing.

August 26,

OUR STORY BEGINS

indoor mall & pos → land (2D) (landing plans)

1) Mobile App.

Pages

Multiple-Choice Questions (MCQs)

Home Page.

2B



(if signal)



(svg-based plot) /

0.770
18 bit



/

Discovery

(R) 17 18

(G) 18 19

(B) 19 20

/

Read calendar and find destination

/

Map app call

5

Discovery Page: discover valuable merchants.

Roadmap:

1) Implement the merchant / area / entity detailed figure.

2) ~~Ref~~ Upgrade "polygon" component so that it could better describe automated & flatten maps

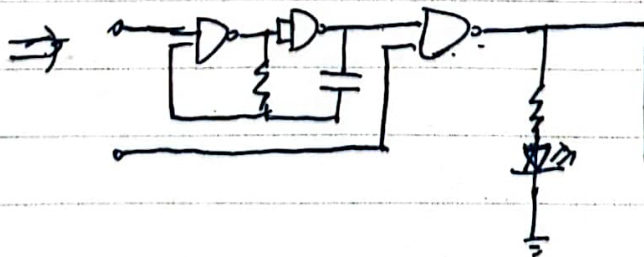
3) Authentication (Access Control) with prototype.

4) Account system

5) Customized protocol and accurate locate functionality

6) Apple Watch integration (vibrate with phone; instruction; standalone)

7) Vision Pro version: a ~~grid~~ model model guide along the path.

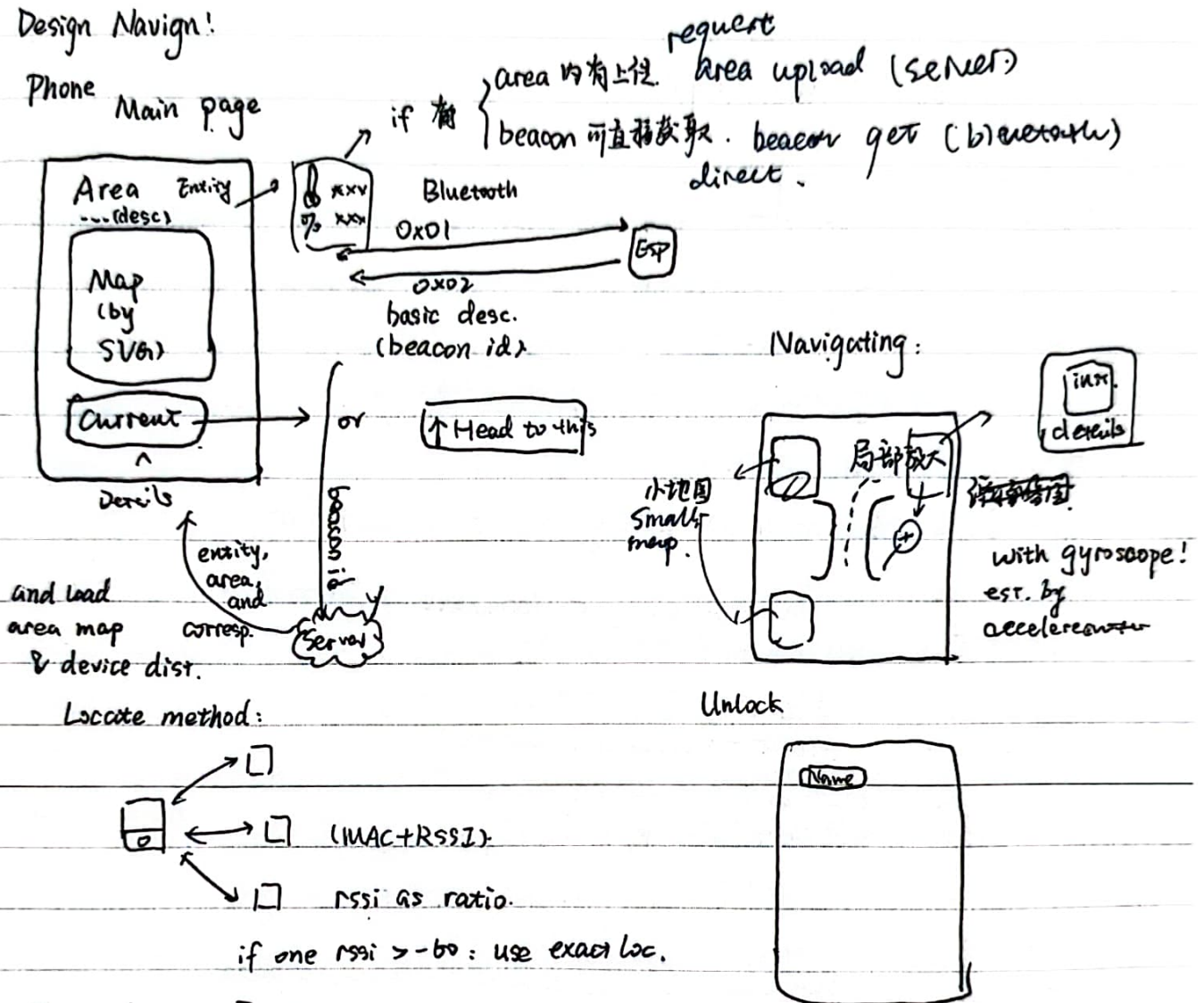


Sep 12

OUR STORY BEGINS

After finishing those drills, I think I need to have a review on recent.

Design Navign!



Entity Layout Page.



1. Allow unlock 10 允许经过时unlock, passing by areas.

Unlock → pause navigation 解锁后自动暂停导航

2. Best unlockable 20 解锁时此距离 rssi > -60.

RSSI > -60 自动开始流程.
Auto start unlock

for entity.

对每个 beacon 区域, 提供入口 area code 或 nfc 信息.

如简单教学生指导. No need beacon areas (like hotel),

同时支持 LLM 生成人话回答.

entrance grade / nfc (rfid).

indicate area.

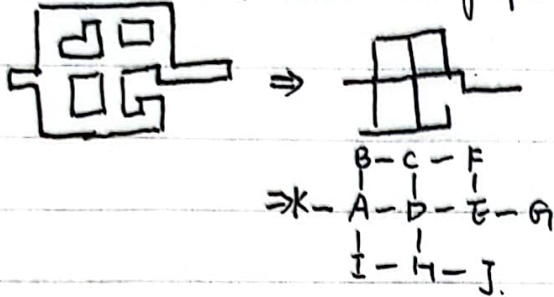
LLM human-readable instruction

Sep 27

Navigation Algorithm.

1. If same area.

1. 将抽象为图. Abstract to graph.



⇒ Dijkstra. (weighted via path width?)

2. 模式学习 Pattern Learning.

3. 贪心: 主要走大路. (corridor) greedy: select more corridors

2. If different area. Unaccessible target, terminate 若 area 不, 则先以临近 area.

1. 权限验证: i. 若目标区域不可访问, 则终止

Auth & Access

Ctrl

ii. 根据权限, 查看决定是否使用升降梯.

Elevators: depend on permission

2. 区域接驳 Area transpory.

Direct: least dist towards src/dest.

i. 直接接驳: 尽量使接驳与起始地/目的地短

△ 简单方法: 使用最近接驳 △ Simple: use nearest

ii. 间接接驳: 1. 尽量同地接驳 (如一个扶梯上几层楼)

Indirect.

Same place (same escalator go multiple floors)

2. 非特殊说明 单层 3层以内 扶梯 > 升降梯 > 楼梯

Without

< 3 floors, esc > ele > st.

Special Statement

3层及以上 升降梯 > 扶梯 > 楼梯

≥ 3 floors: 8 ele > 8 esc > 08.

Inner entry

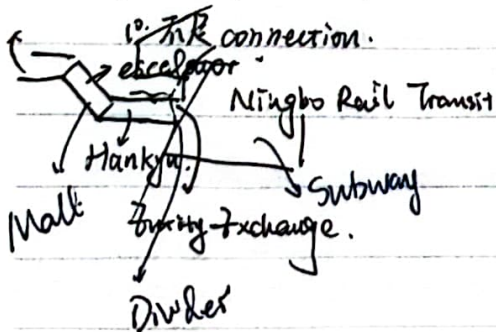
3. 跨 entry

1. 直接方法 Direct approach

e.g. Hankyu & Hojayan N. St.

2. 需元: Direct door

起点 → 终点 洞用导航



Connection 还有一种: 接驳

Use Google map

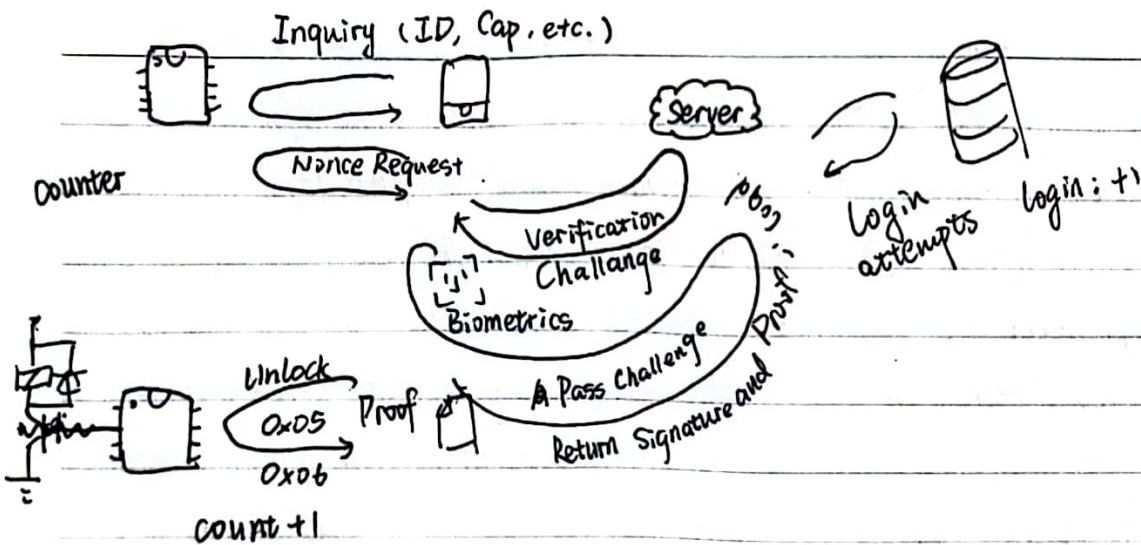
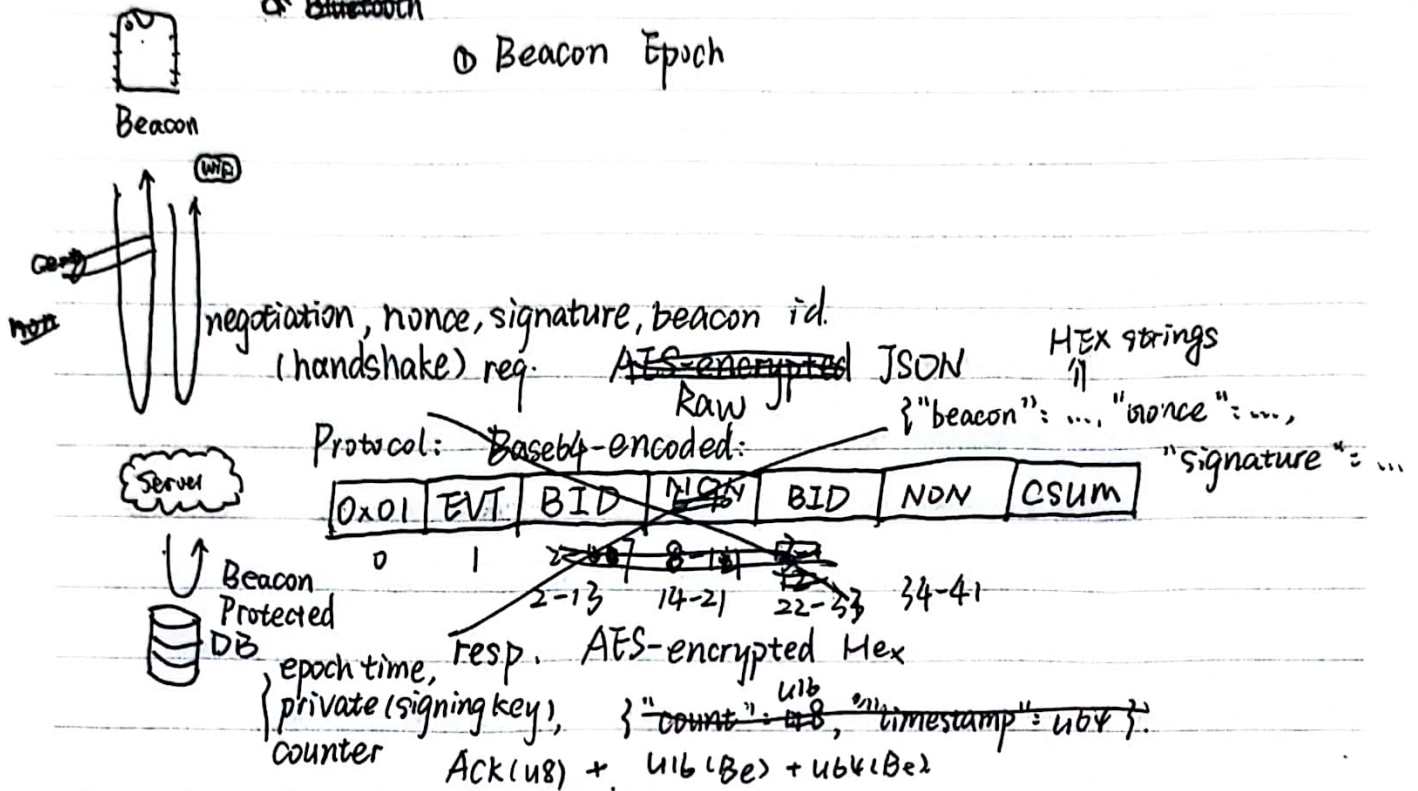
Conn. GND (1/3)

Oct 3 Sep 22

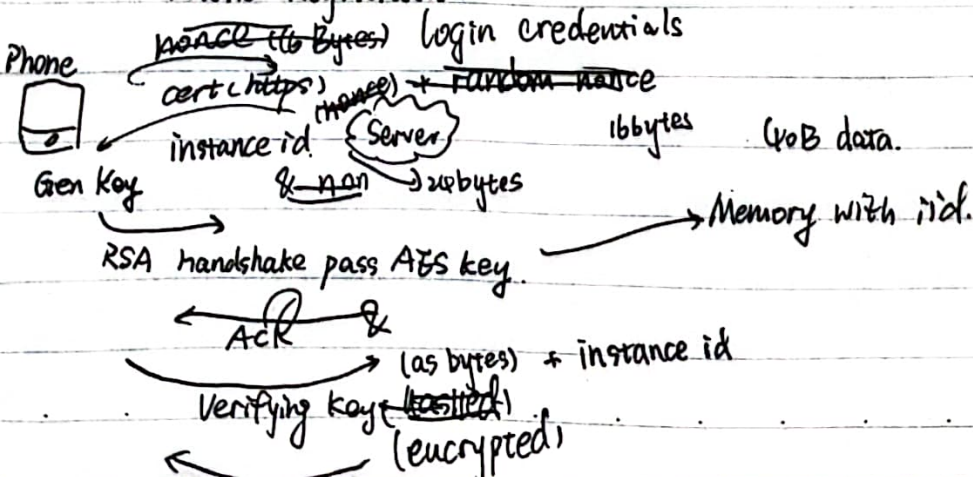
Navign Unlocker

& Bluetooth

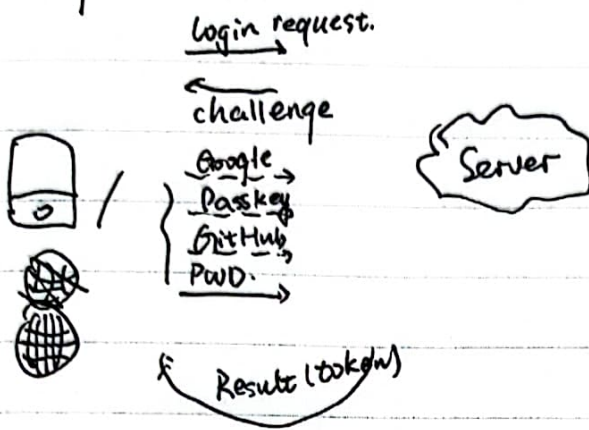
① Beacon Epoch



Phone Registration



Login Procedure



Device Bind.

Token request instance

Binding challenge.

RSA encrypted AES GCM key.

AES IV.

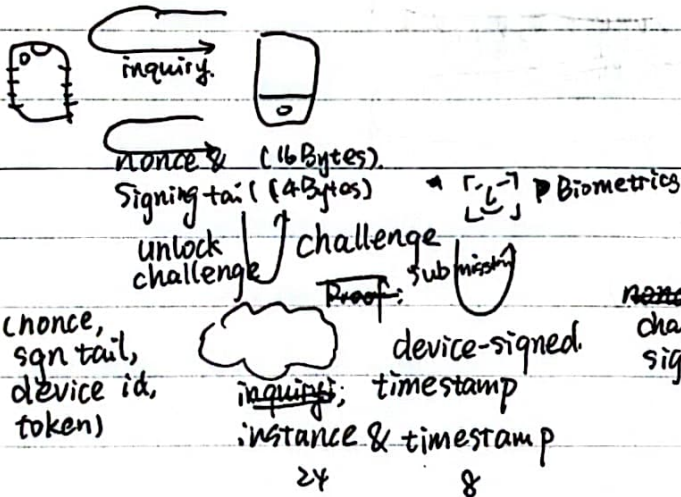
AES encrypted public key, 64.
~~signature~~ MAC, 16.
~~timestamp~~

Signature: AESkey + AESIV + Timestamp

Hash.

Result.

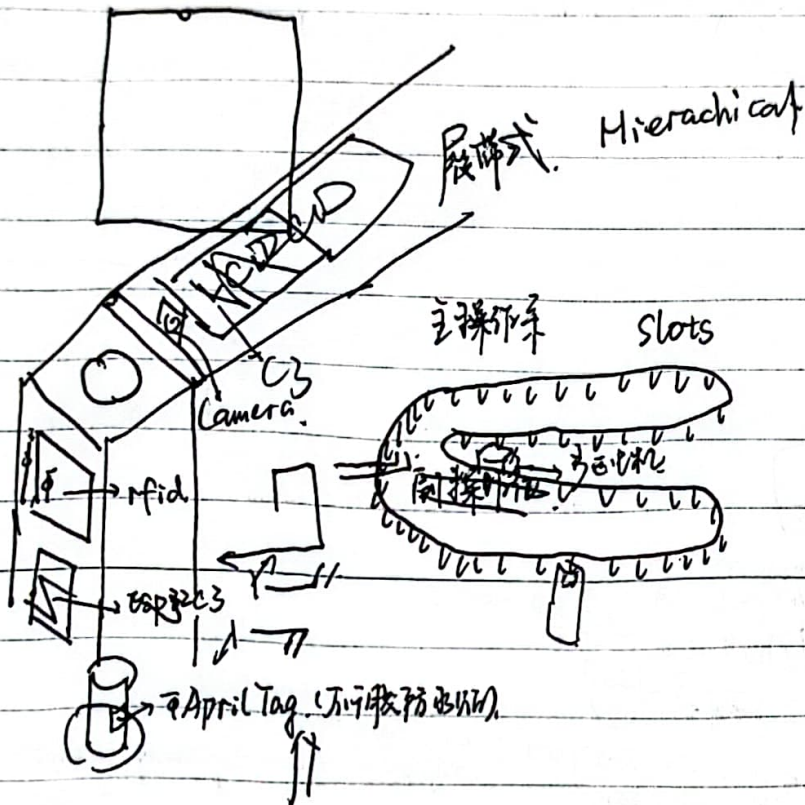
(ACK / Failed)



nonce, nonce, timestamp,
 challenge hash,
 signature [nonce, timestamp, counter, device
 16 8 signature tail

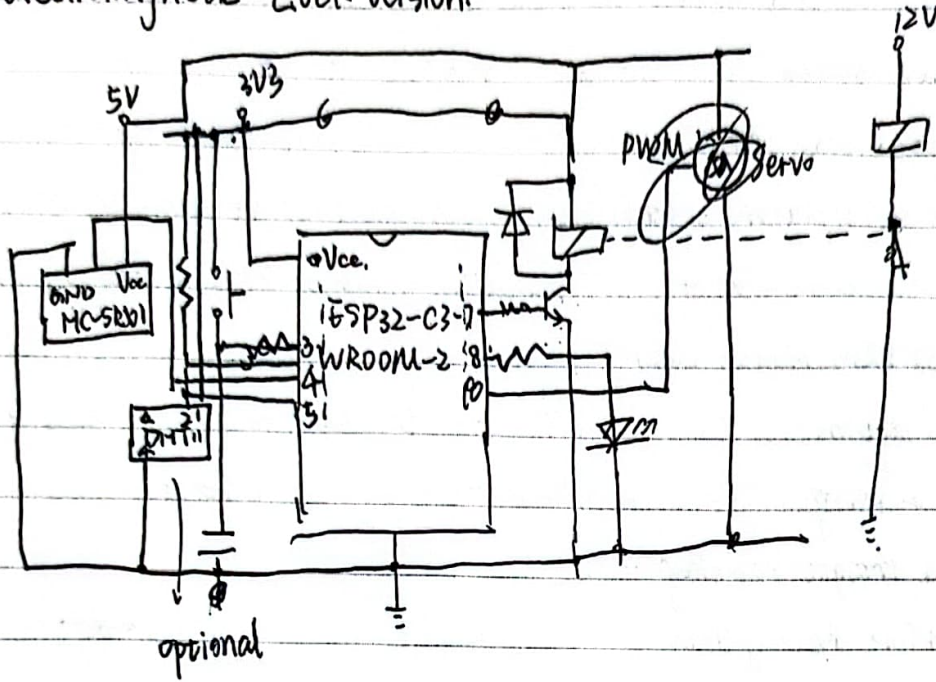
源流年管端空

核心板: esp32s3, stm32f407
 △ LCD, camera, motors(step, servo).
 Schematic.

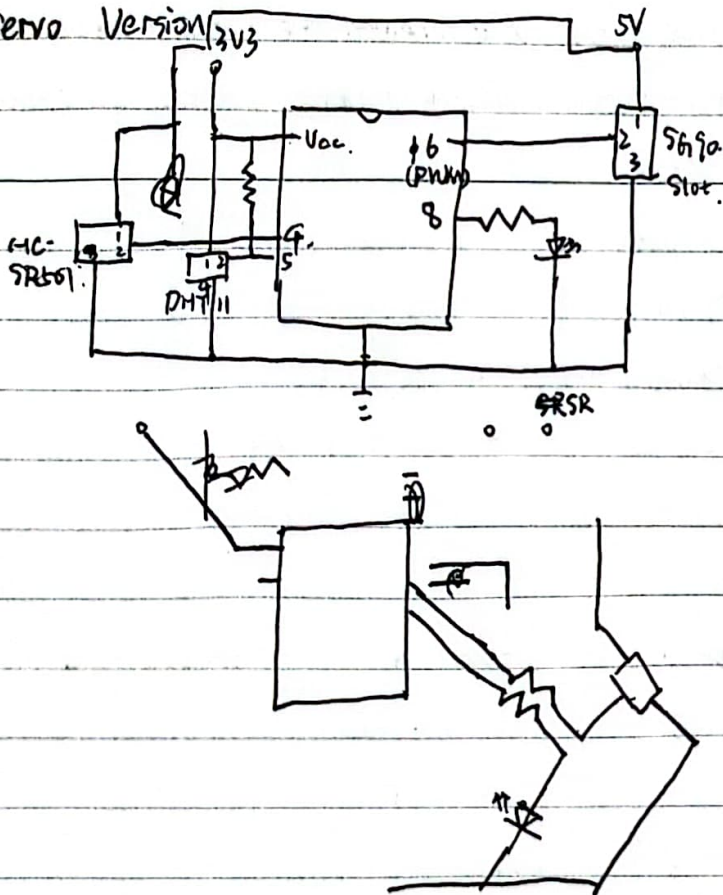


~~Sep 24~~ Sep 24. STORY BEGINS

Electromagnetic Lock Version.



Servo Version



Oct 2

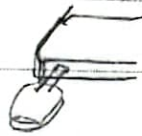
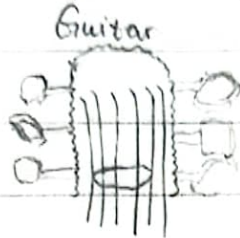
OUR STORY BEGINS

Guitar tuner.

Features: 28 BYJ48 stepper for accurate tuning.

INMP for sound recognition

ESP32S3 powerful chip with potential automation across devices



1. 步进电机可以不做减速, 且具有自锁能力 Stepper motor: \downarrow V, self-compass.

2. 电机模块仅应可前而驱动, 不可回拉机, 可发信号并持.

步进电机: 25 kg-cm motor no servo hand hold.



Oct 3

OUR STORY BEGINS

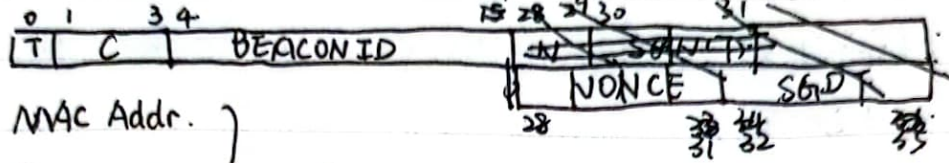
Navign 全制. before unit portfolio submission (Nov 1).

1. 定位逻辑. Locating logics

1) inquiry 逻辑升级: 更安全.

~~Over~~ Inquiry logic upgrades. Safer $16^4 = 2^{16}$.

Full data (raw).



MAC Addr.

Beacon ID

Nonce + Sign

→ Inquiry device for server.

NONCE @ 32. 4 bytes.

Only do when entering new area.
2) 定位逻辑: inquiry.

新区域 (New area)

cursor with 12 cache

(MAC, ID, ~~x, y, type~~ type, x, y)

SGT =

server

data packet.

(your ~~cursor~~ current area, updated at)

(~~and~~ beacon & merchant & configuration & map).

1. Data (Beacon, etc.): Sliding Window Cache.

(store two areas in backend)

2. Layout: & Dynamic store it in storage, (database)

ANY
1) RSSI ≥ -80 : assume user is has same place with beacon in largest RSSI.

ANY ALL
2) RSSI $\in [-100, -80]$: plot and find most possible place via distance approximation.

ANY
3) RSSI ≤ -100 : ignore if needed. ✓

IGNORE if not in this area range

If the amount in this threshold $> 1.2 \times$ original area, } → switch area.

or have a RSSI ≥ -80 and original all ≤ -80 .

Gyroscope: to be implemented delay.

Plot: delay.

2. 导航逻辑. Navigation Logic.

1. area 直通: 根据距离和 convention.

→ Explicit.

Direct area connections (distance & convention)

2. 跨 area: BFS. Dijkstra

Inter-area: Dijkstra

3. 代码 跨 area: 只与第一 area 相连: 同时可以减少 BFS.

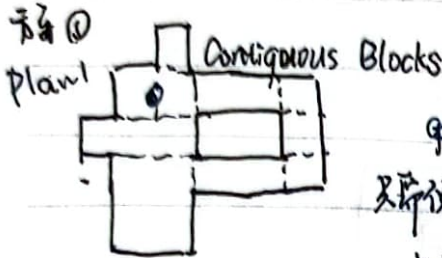
Agave Area: Only connect with one

Pruned: reduce dijkstra/BFS.

Oct 3

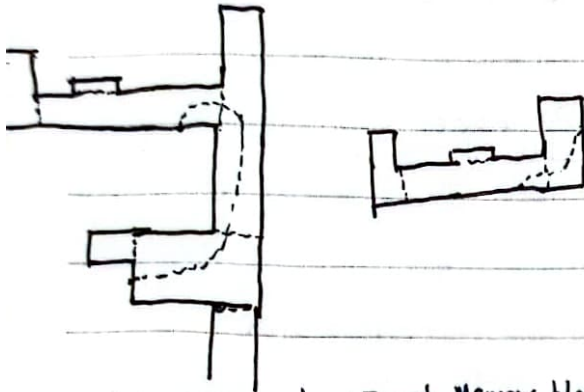
OUR STORY BEGINS

4. 区域内 Polygon → Node (trans) → Connect
 多边形 → 节点 → 图搜索 (检查点) ✓



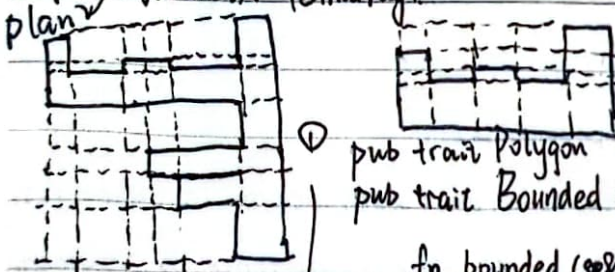
guarantee that only one are contiguous
 必须保证上下左右有且仅有一块区域
 与之毗连

标准



准

implemented (Fixed Memory block)
 图② 固定内存块 (Binary)



pub trait Polygon {
 pub trait Bounded {
 fn polygon(x: self) → Vec<(f64, f64)>;
 }
}

fn bounded(&self, x, y) → bool;

plan
 图③: Bitmap. bound check }

Grid Block

x1, x2, y1, y2

bounded: -

bounded: -

w: 4

h: 4

Block { W, H, T: Sized }

fn left

clone.
 + copy.

starting_ptr: u64 as *const

Oct. 4 正负数初等路径规划服务

Oct. 4. Completed initial route planning service.

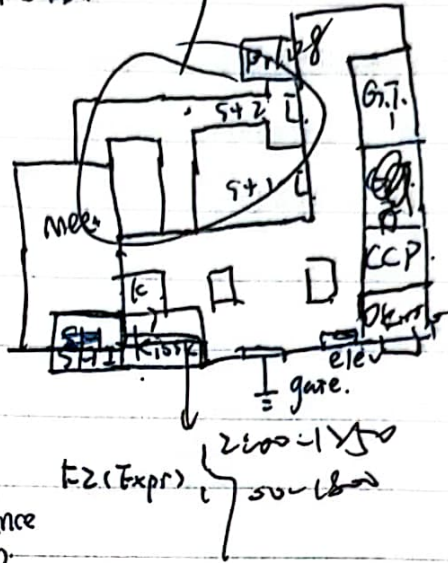
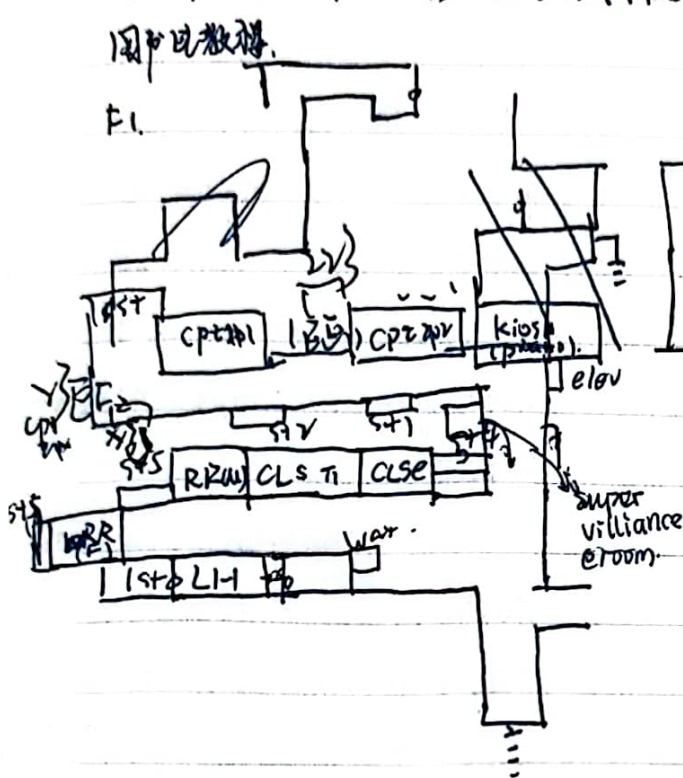
Oct 4

OUR STORY BEGINS

School Floor Image (Lib & Multi Building)

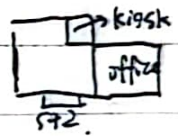
学校平面图. (图书馆、实验楼、教学楼)

图书馆

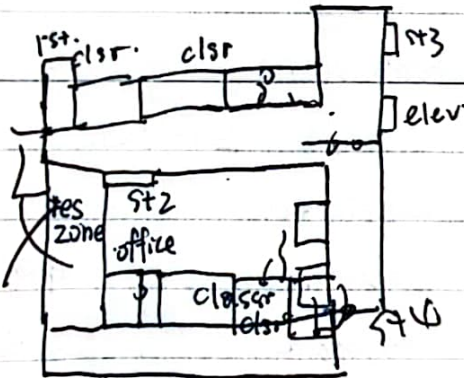
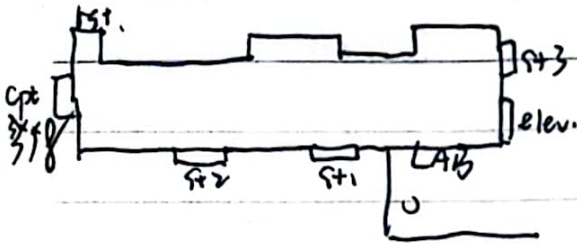


F5. (Int'l. Dept.)

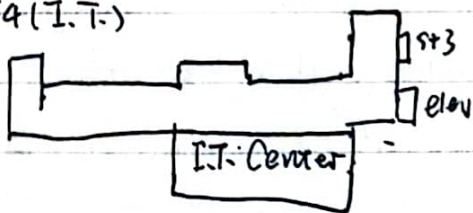
F6. Office.



F3. (I.T.)



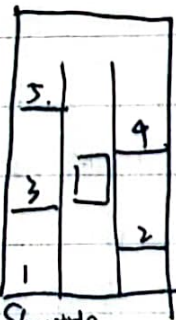
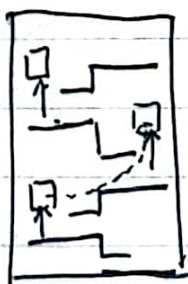
F4 (I.T.)



Stairs Page

Elevator Page

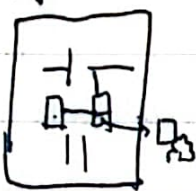
Escalator Page.



Gate



Turnstile



Shuttle.

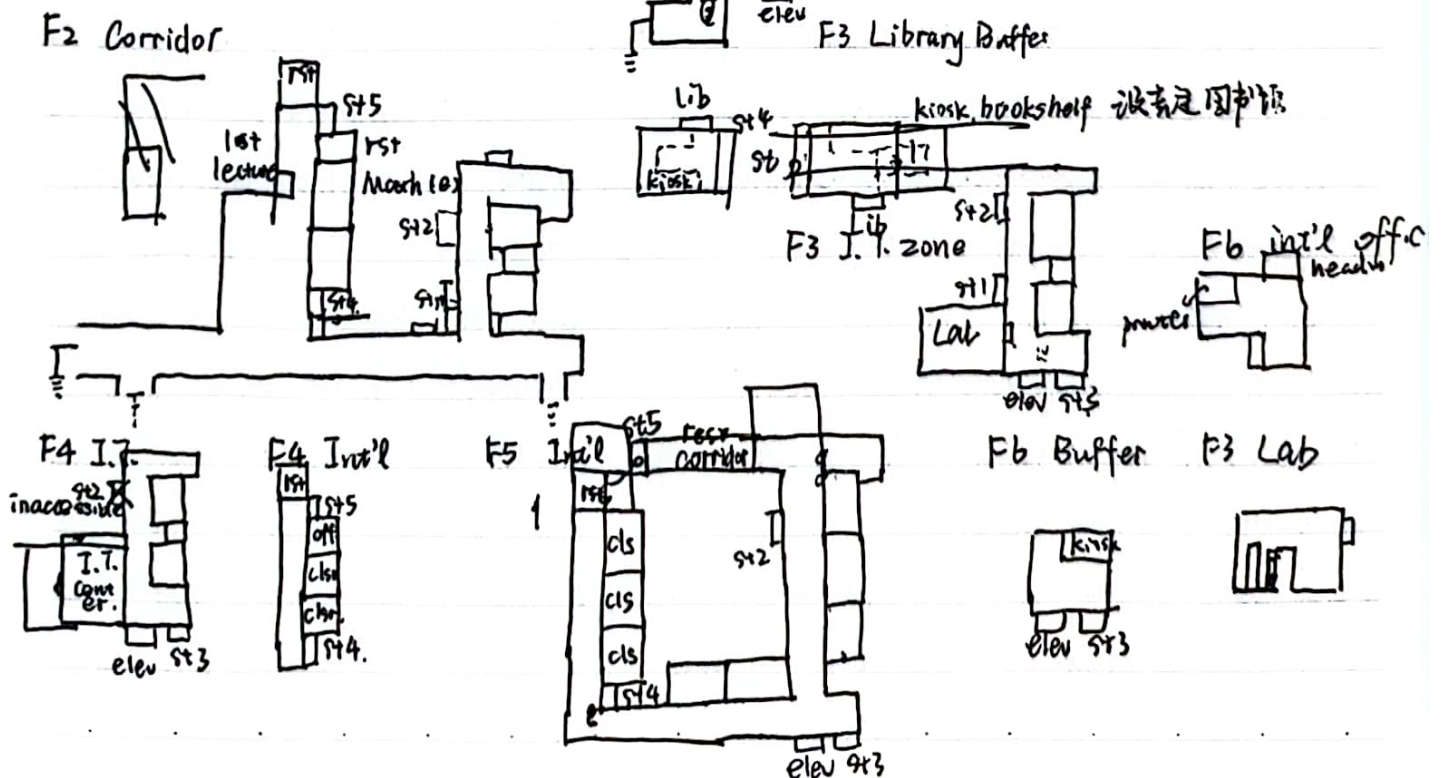
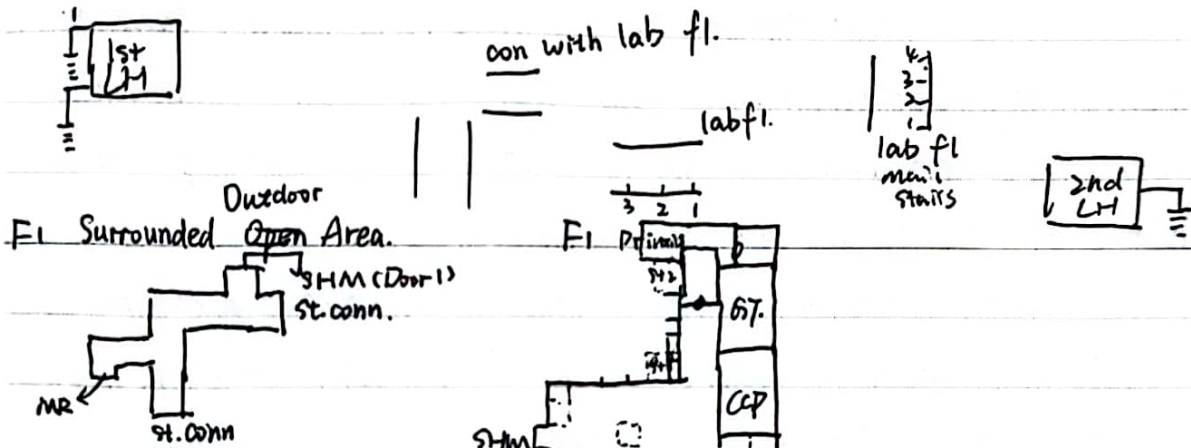
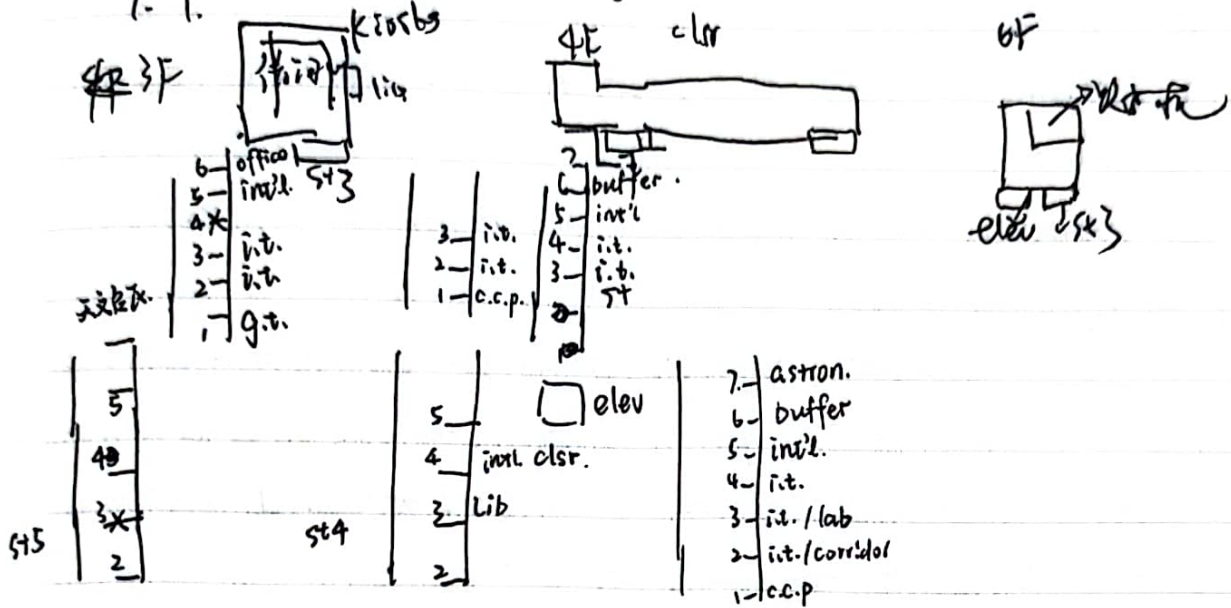


Oct 5

OUR STORY BEGINS

MWF 12:00-12:40, 16:10-18:00

T.T.

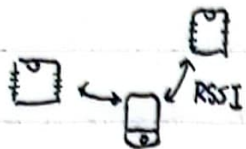


Connection: Transportation and arent

Principles 2) Schema Entity: the largest container

Merchant: Store, room, or

10) Locate Area: people can move ANYWHERE within Area Beacon: —



RSSI > -80, find nearest beacon as the location

All between -60 and -80, use weighted central point

Filter RSSI < -160

2) Navigate

1°. Find best area transportation.

2°. Find within area (quantize)

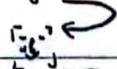
3°. Concatenate to instructions.

2) Unlock

Protocol inquiry.



nonce & sign create instance



unlock proof sign challenge



I was always wondering why I would be extremely stressful when doing things that is "risky." The initial answer could be, "afraid to fail." But even if we figure out the outcome, which results in recoverable outcomes, but we still worry about it.

Then ^{we} ~~I~~ would say: ~~hypothalamus hijack~~ hypothalamic hijack. When, especially after trauma, we had similar counter replay and our brain inherently in provence of secondary damage.

Oct 16.

"~~Hey, my Bluetooth HCI is sending a packet to you via Secure Management Protocol (SMP)~~

" Hey, my Bluetooth HCI is sending a packet to

b ₀ b ₁ b ₂ b ₃ b ₄ b ₅ b ₆ b ₇	LSB	0x01, 0x04, 0x01, 0x3D, 0x10, 0x0F, 0x0F, 0x00, 0x00	MSB
0 1 1 1 1 0 0 0		[0] [1] [2] [3] [4] [5] [6] [7]	

Hey, my Bluetooth HCI in my heart is sending the following packet to you:

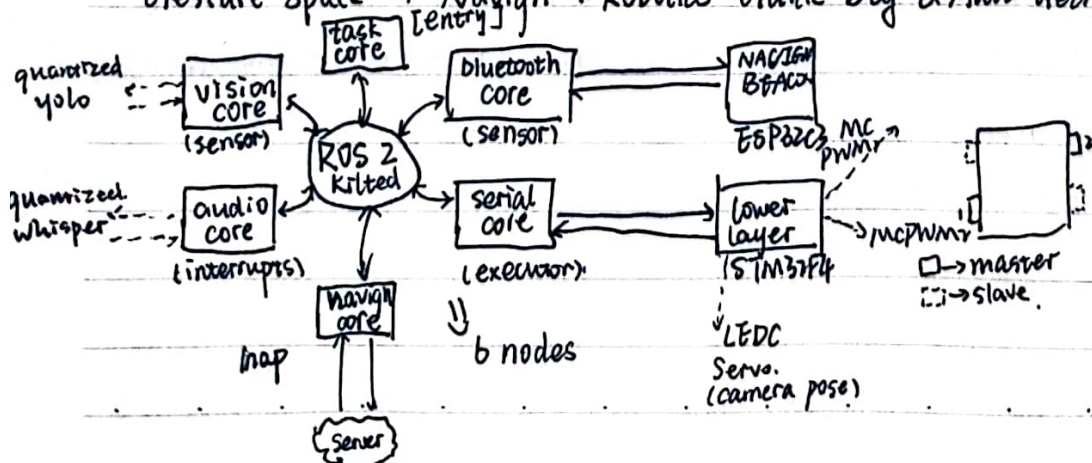
trying to ← (LSB) [0x01, 0x04, 0x01, 0x3D, (MSB) 0x10, 0x0F, 0x0F]

confess via ble packet.

~~7039677~~
269422336

Actually this packet is extremely common ~~when~~ daily, especially when you get a new ~~earpods~~ wireless earpods, and start to listen music. But ~~heartly~~ hereby I have another layer of interpretation beyond technical jargon, holding the literal meaning of this method. If you don't know what the packet is, ask an AI for help."

Gesture Space + Navign : Robotics Guide Dog & Auto delivery.



ROS-based upper layer design.



Act 1. Task scheduling.



msg

server dispatch
task queue.

[type, occupation, ...]

into message

Gesture Space X Navign.

(3mins)

(~~1min~~ integration 1.5mins)

Intro. guide dog & delivery bot.

Oct 5.

Another self-study day. I just completed some of work and, subsequently, went to the Library & Multimedia ~~Room~~ Building, and explored the confusing layout and floor layout - 11 areas exclude the observatory, with 5 stairs. There wasn't any concurrent floors sharing same ~~paths~~ more than 3 ^{areas} floors, and only stair 1 and 2 has shared 2 areas. How ~~the~~ confusing!

