

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
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Presentation on
“SPARSHA”

‘Assistive Device for Blind-Deaf Person to shop at Supermarket’

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UNDER THE GUIDANCE OF:

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Problem Statement

“TO DESIGN AND DEVELOP A DEVICE FOR ASSISTING A **BLIND-DEAF PERSON** IN HIS/HER SHOPPING AT SUPERMARKET THAT INCLUDES SELECTING A PRODUCT AND VALIDATING TRANSACTION I.E., PAID AND RETURN AMOUNT(CASH)”

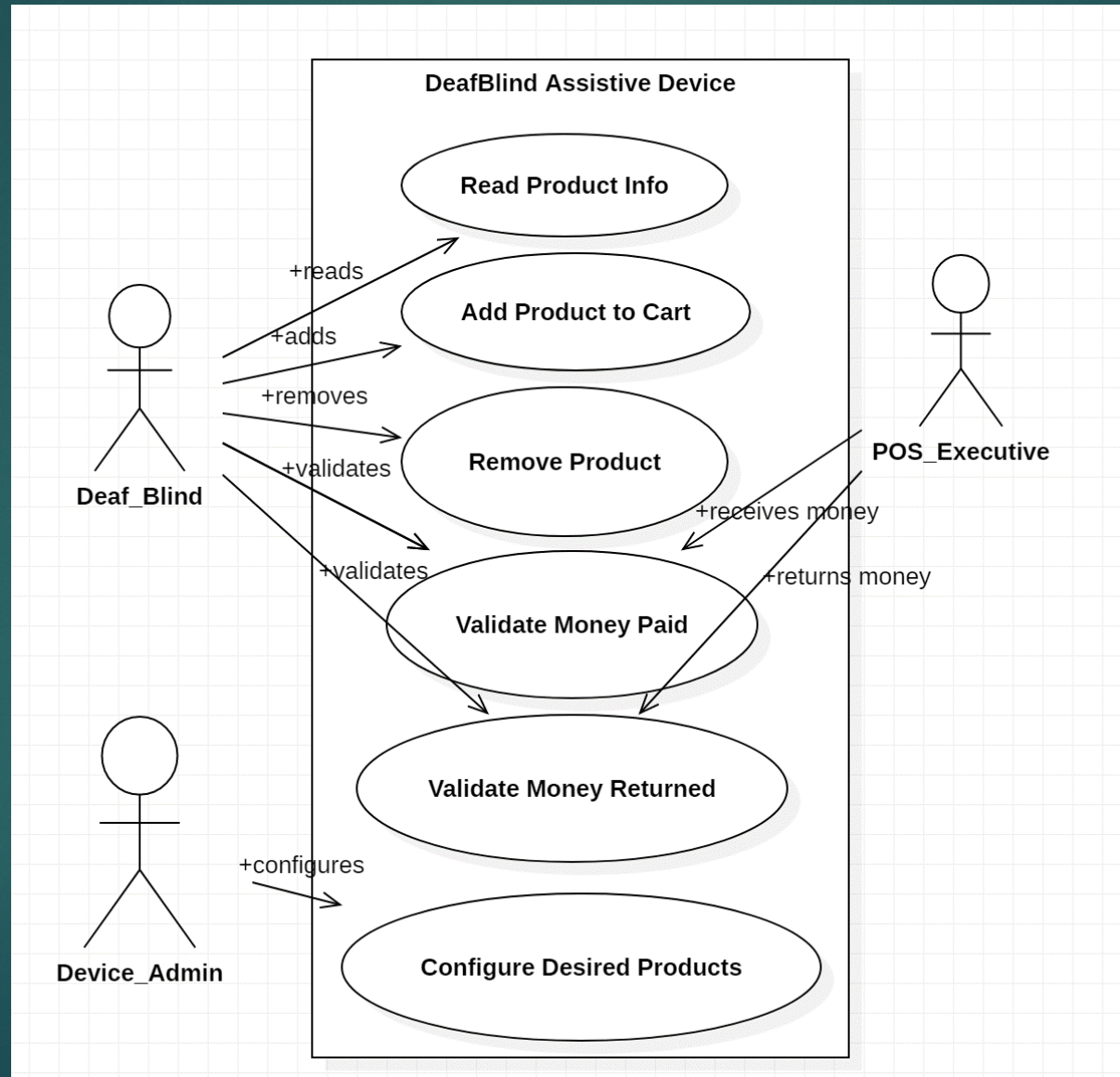
Agenda

- FUNCTIONAL REQUIREMENT
- FLOWCHART
- ARCHITECTURES
- ALGORITHMS
- DETAILED DESIGN

FUNCTIONAL REQUIREMENTS

- ▶ **Read Product Info: <<Deaf_Blind_Person>>** Read the product information and convey by braille haptic device
- ▶ **Add Product to Cart: <<Deaf_Blind_Person>>** This should increment the amount automatically
- ▶ **Remove Product from Cart: <<Deaf_Blind_Person>>** This should decrement the amount automatically
- ▶ **Scan the denomination <<Deaf_Blind_Person, POS_Executive>>** and convey by braille haptic device
 - ▶ Conveys the total billed amount
 - ▶ Alarm if amount does not tally
 - ▶ Alarm if Paid amount is more than billed amount
- ▶ Scan the return denomination and convey by braille haptic device **<<Deaf_Blind_Person, POS_Executive>>**
- ▶ Upload required configuration data to the device **<<Device_Admin>>**

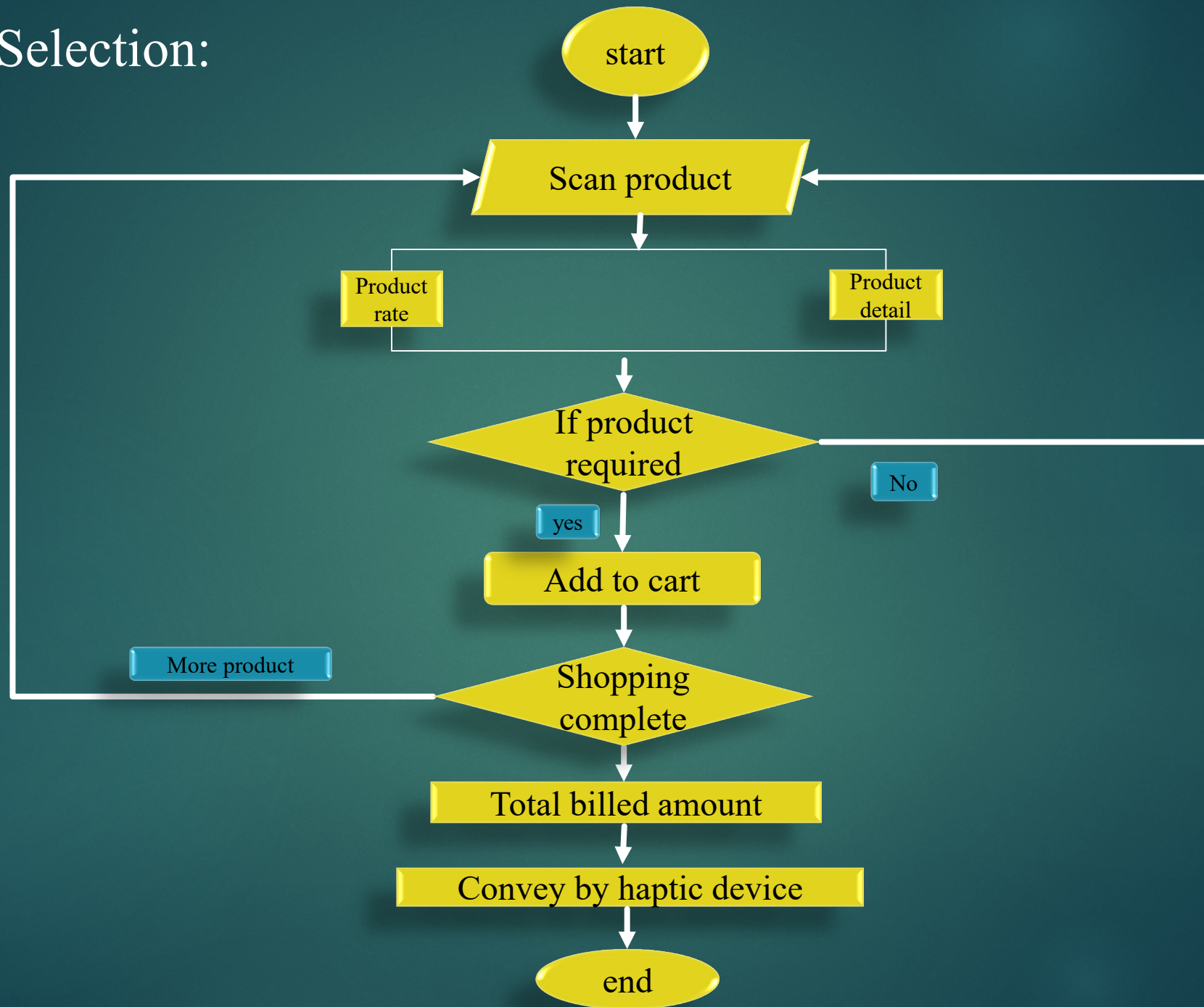
Functional Requirements - Use Case Diagram



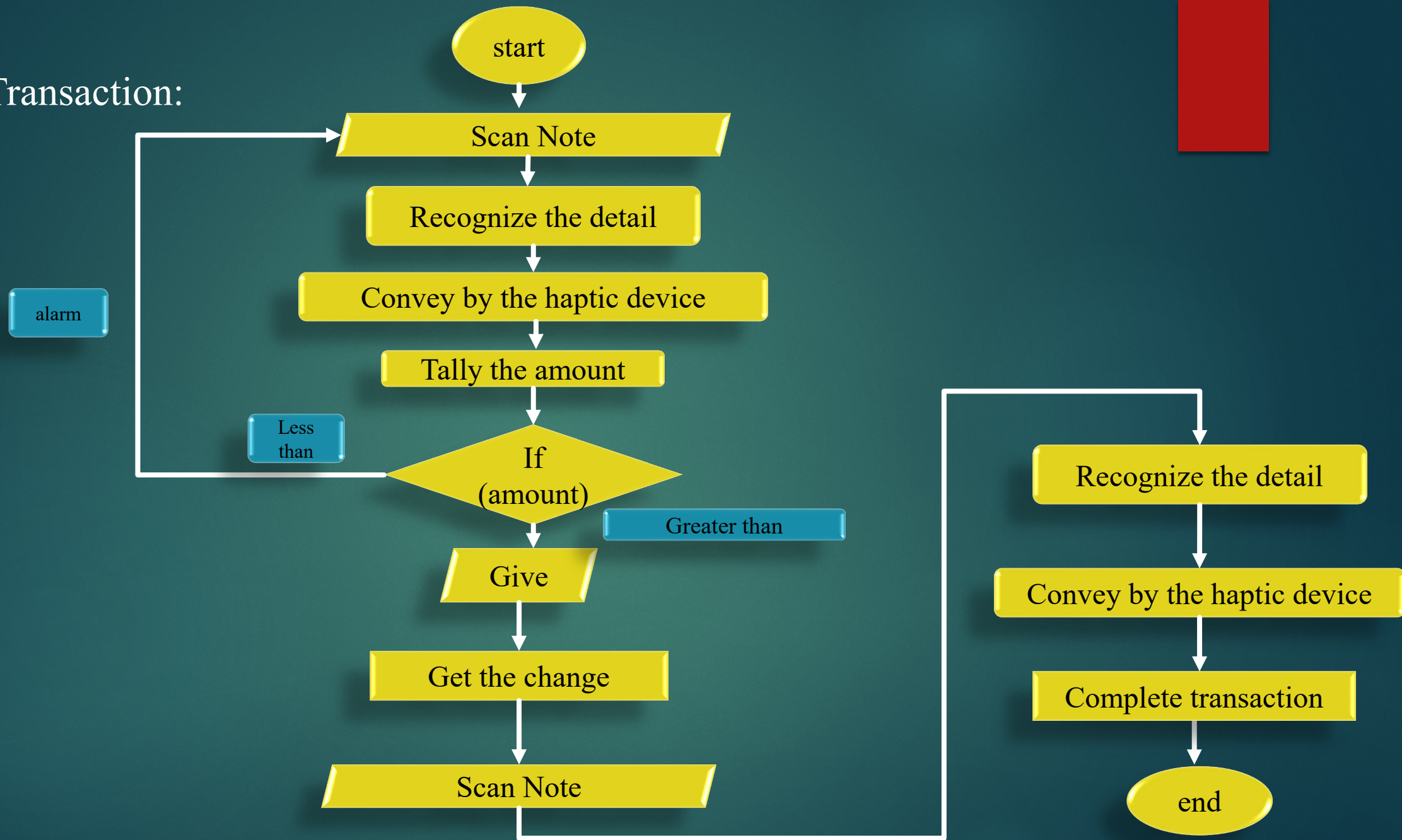
FLOWCHART

- ▶ Product Selection
- ▶ Cash Transaction
- ▶ Product Upload

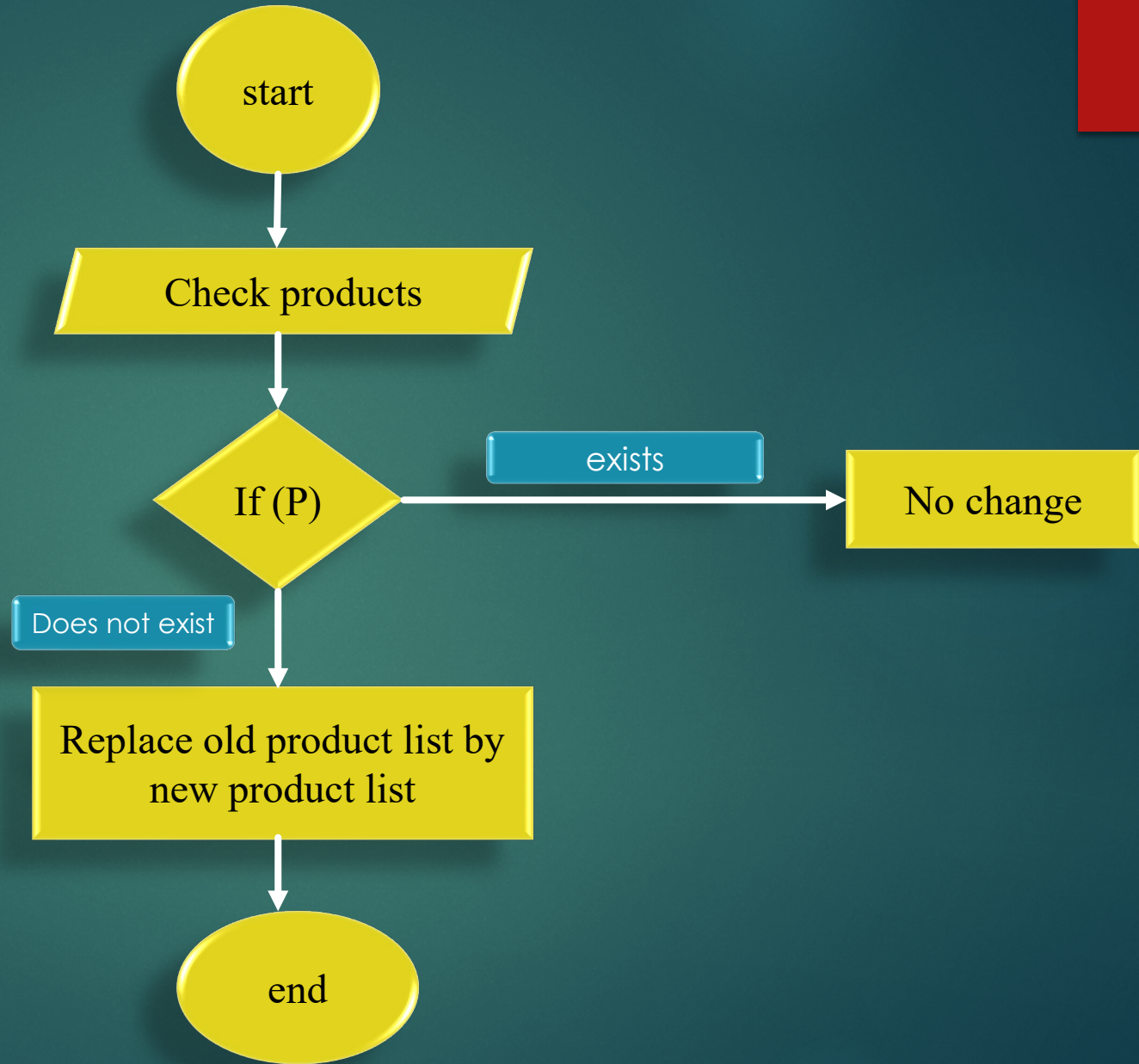
Product Selection:



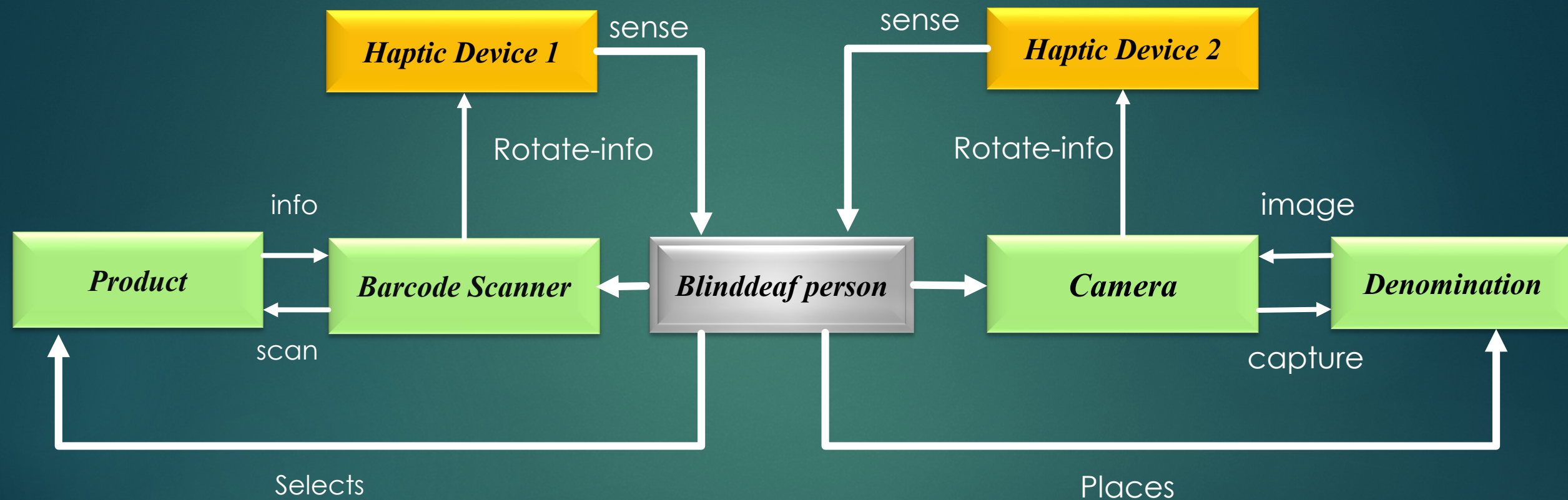
Cash Transaction:



Product upload



Architecture



Algorithms:

- ▶ Algorithm for developing Barcode Recognition system.
- ▶ Scale-invariant feature transform(SIFT) algorithm for feature detection
- ▶ Image Hashing
- ▶ Arduino and RF Transmitter Receiver Module
- ▶ Customized algorithm for motor rotation

1. Algorithm for developing Barcode Recognition system.

- ▶ It involves two steps for automatic scanning of all the barcodes:

1. To find the position of a barcode
2. To decode the barcode.

- ▶ Steps involved

1. Cropping
2. Contrast Enhancement
3. Converting to ideal barcode image
4. Edge detection

2. Scale-invariant feature transform(SIFT) algorithm for feature detection

- ▶ The scale-invariant feature transform (**SIFT**) is a feature detection **algorithm** in computer vision to detect and describe local features in images.
- ▶ Steps involved
 1. **Scale-space Extrema Detection**
 2. **Keypoint Localization**
 3. **Orientation Assignment**
 4. **Keypoint Descriptor**
 5. **Keypoint Matching**

3. Image Hashing

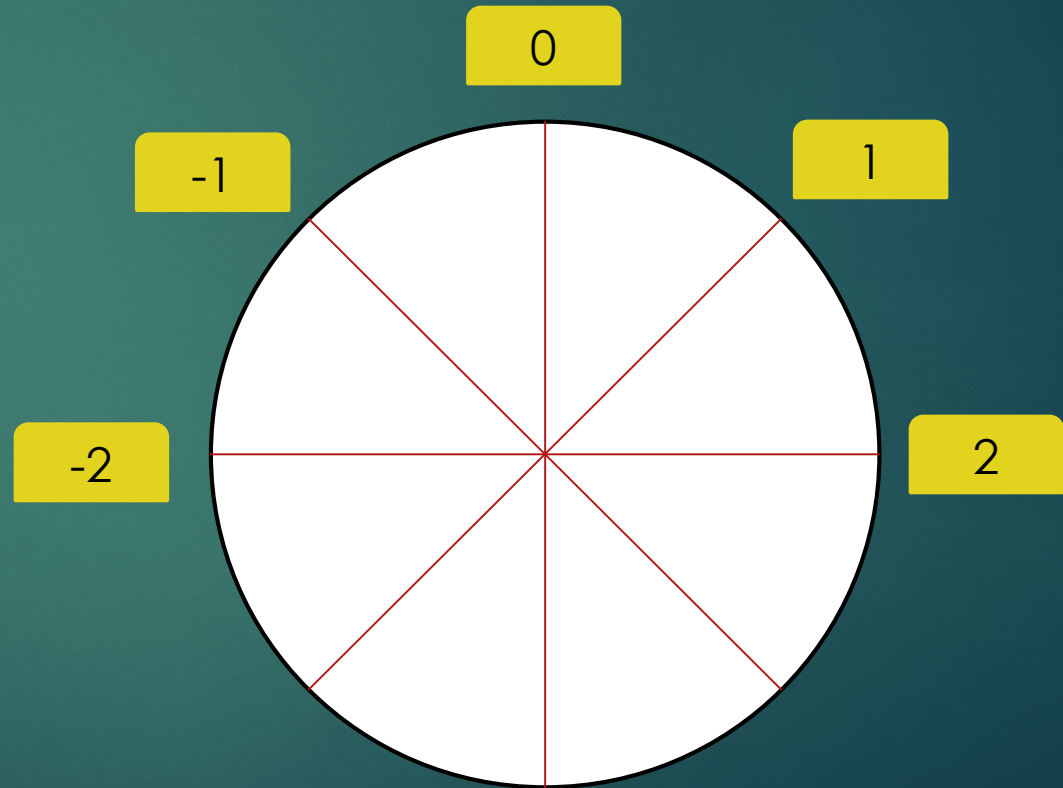
- ▶ Perceptual hash algorithms describe a class of comparable hash functions. Features in the image are used to generate a distinct integer and these integers are comparable.
- ▶ Steps involved
 1. **Reduce size.**
 2. **Reduce color.**
 3. **Average the colors.**
 4. **Compute the bits**
 5. **Construct the hash**

4. Arduino and RF Transmitter Receiver Module

- ▶ RF Module comprises of a transmitter and a receiver that operate at a radio frequency range
- ▶ Arduino is a low cost solution for microcontroller applications with open source hardware and software. Arduino can be used in many small to real time applications with simple programming and hardware components.
- ▶ By combining the two objects i.e. wireless communication with Arduino, we can create a wide range of applications like simple data transfer .

5. Customized algorithm for motor rotation

```
rotate(curr_slot,dest_slot)
{
    curr_slot=0;
    new_dest=dest_slot-curr_slot;
    curr_slot=new_dest;
}
```



DETAILED DESIGN

- ▶ Haptic device 1 : For product selection

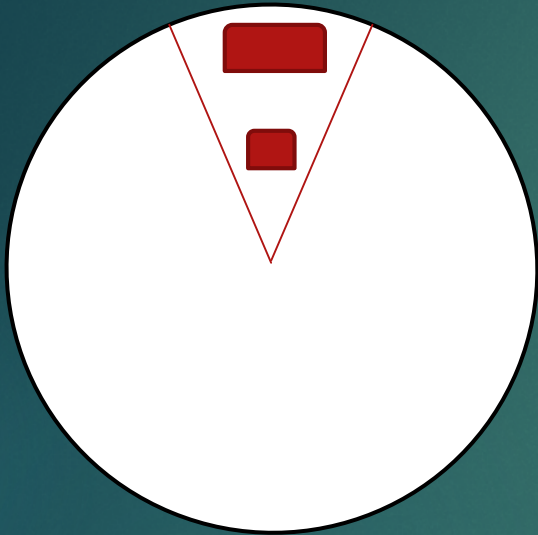


Fig:1

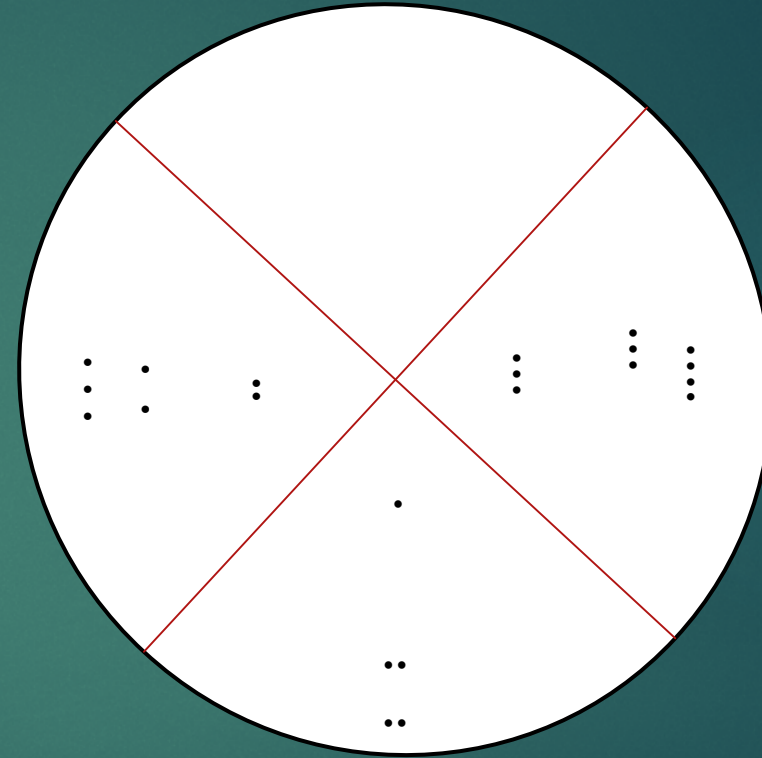


Fig:2

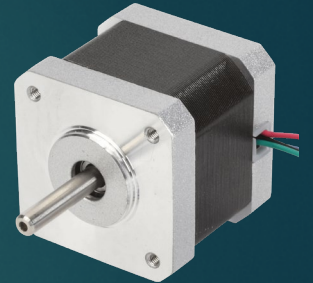


Fig:3

1. Outer disc of the Haptic device
2. Inner disc of the Haptic device
3. Stepper motor for rotation

► Haptic device 2: Cash Transaction

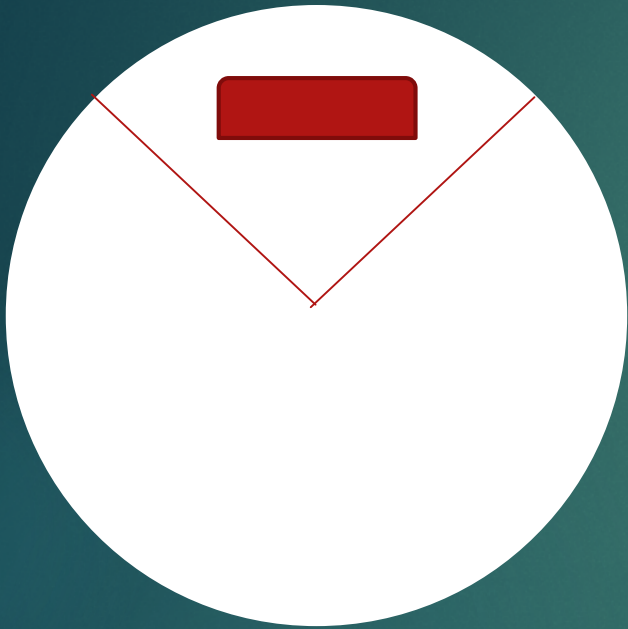


Fig:1

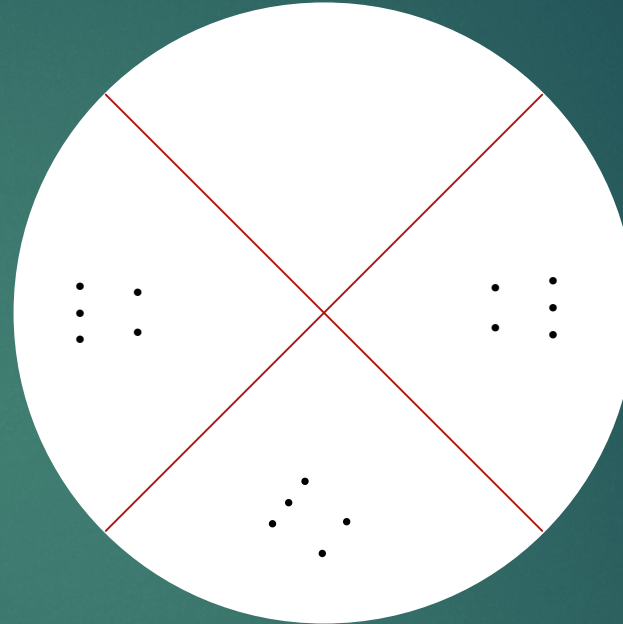


Fig:2

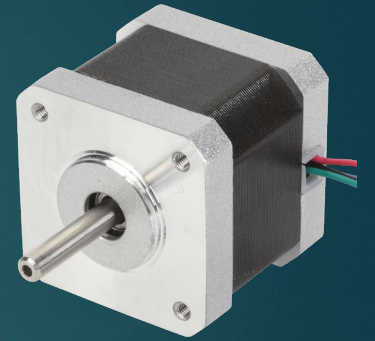


Fig:3

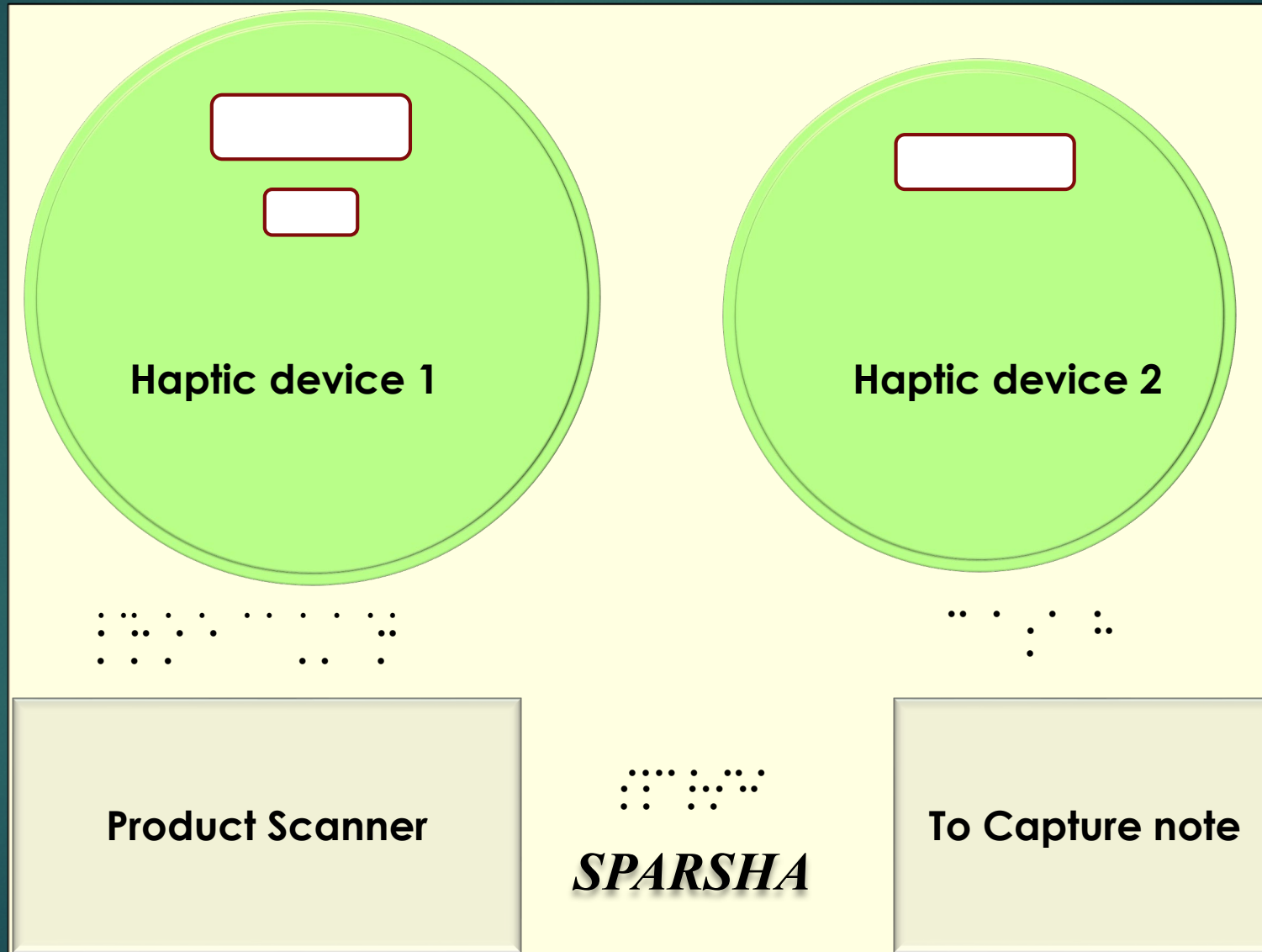
1. Outer disc of the Haptic device
2. Inner disc of the Haptic device
3. Stepper motor for rotation

Final Design:

20 inch

15
inch

4
inch



8 inch

6 inch

4 inch

References:

1. <https://www.pyimagesearch.com/>
2. <https://www.cse.iitb.ac.in/~ajitvr/CS763/SIFT.pdf>
3. How-To: Python Compare Two Images by [Adrian Rosebrock](#)
4. Robust Digital Image Hashing Algorithms for Image Identification by Xudong Lv

THANK YOU