

CONCEPTUAL DESIGN DEVELOPMENT

T E A M P O S T - C H A I R N O B Y L

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TAKEAWAYS FROM QFD

CUSTOMER REQUIREMENTS

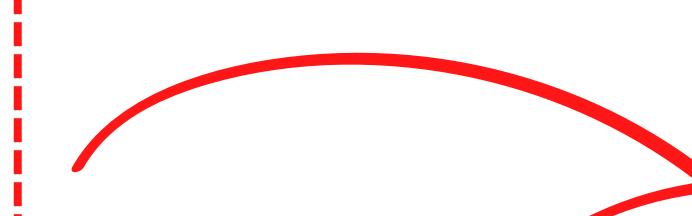
Parameter	Weight	D/W
Economical	3	W
Compact	1	W
Reliable	5	D
Easy to use	4	D
Efficiency	4	D
Speed	3	D
Ergonomic	2	D
Accuracy	5	D

INPUT-OUTPUT STATES

INPUT/OUTPUT RELATIONSHIP

INPUT STATE:

1. Sorting from a randomised list is a hassle, whether it is sorting for destination, or sorting for beat-wise.
2. Tracking a lost package is a hassle.
3. Authentication is done with much manual effort- stamping seals on the day of delivery.
4. Dates need to be changed manually.
5. Items need to be scanned manually for validity, it is a time-consuming and tedious process.
6. Items to be processed, tend to have faulty information.
7. Postal workers required to constantly move back and forth around the post office for limited tasks.



OUTPUT STATE:

1. Package gets scanned quicker and reliably
2. Smoother operations for postal workers in one place.
3. Authentication is done with less manual effort.
4. tracking a lost package is easier.
5. Dates are corrected with ease.
6. Information on task completion for postal workers.

SNPS

SOLUTION-NEUTRAL PROBLEM STATEMENT

Expectations:

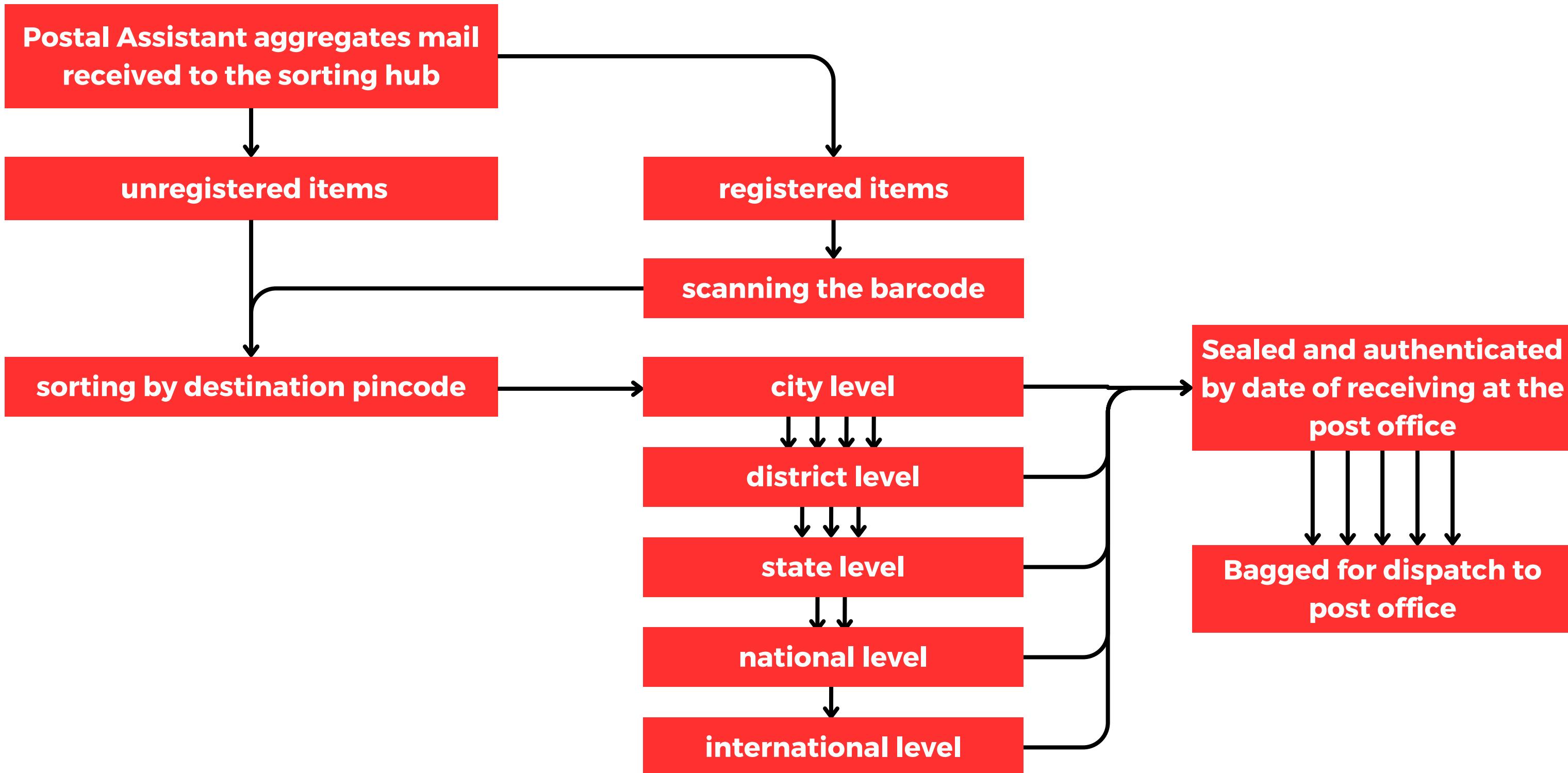
1. Helps authenticate quicker.
2. Less manual effort required
3. Consistency, reliability & accuracy of mark
4. Easy to use
5. Reduce number of tasks in task hierarchy
6. Allows for consolidated and smooth operation
7. Less wait time for customer and user
8. Able to cater to different needs, such as weight of package, size of package, postage requirement, ability to mark on varied surfaces that packages come in.

SNPS:

India Post requires a retrofit solution for postal workers in their Head Post offices, that is efficient, user-friendly, reliable and ensures accurate scanning, sorting and authentication of diverse types of mail and packages.

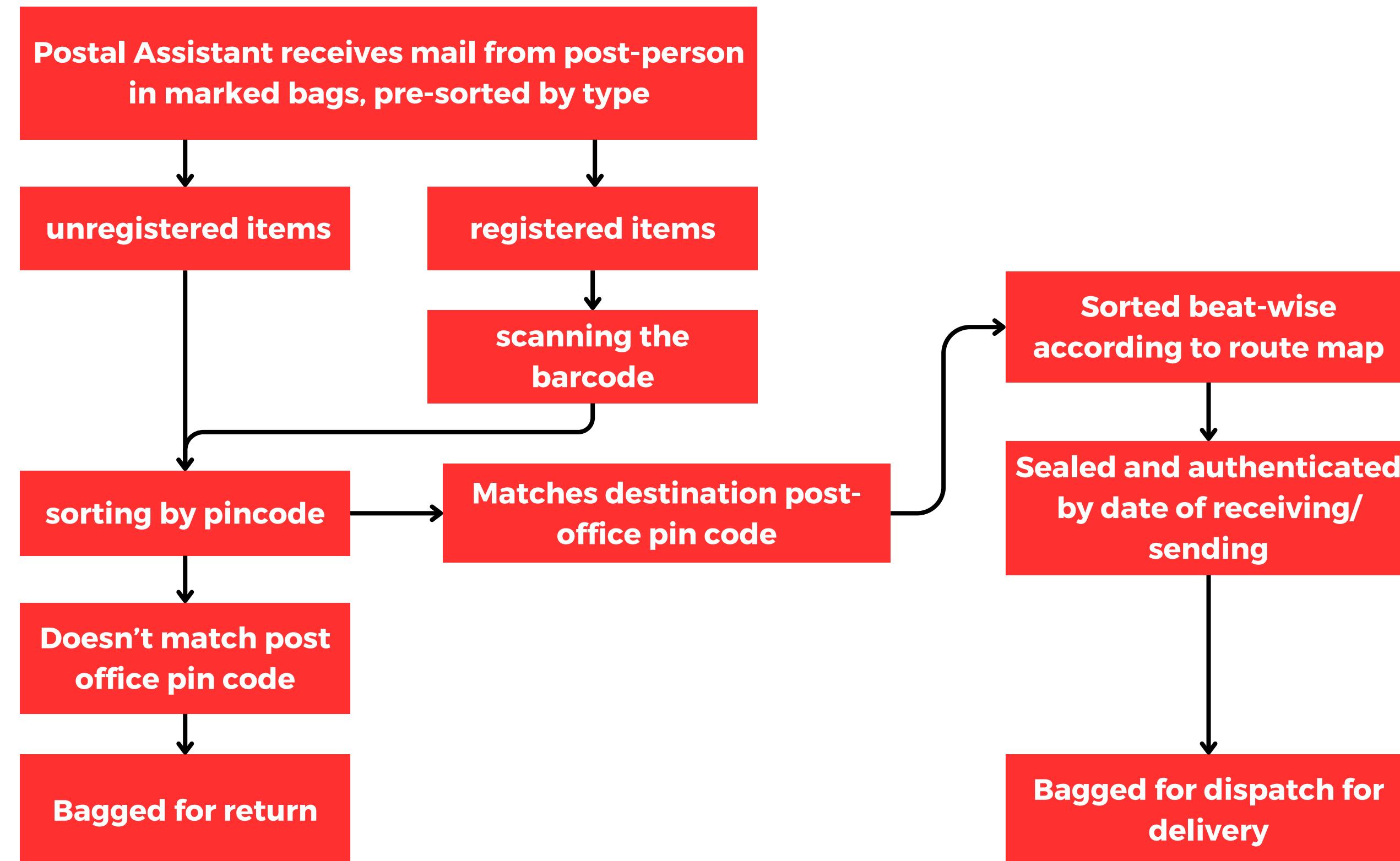
PROCESS FUNCTION STRUCTURE

INBOUND MAIL SORTING & AUTHENTICATION



PROCESS FUNCTION STRUCTURE

OUTBOUND MAIL SORTING & AUTHENTICATION



DESIRED FUNCTION STRUCTURE

Scan the item for address and/or barcode

Validate the item

Segregation action performed based on condition

Segregated item collected in compartments matching condition

Transfer mark of authentication on item



BRAINSTORMING

BRAINSTORMING

FUNCTION 1: SCAN THE ITEM FOR ADDRESS AND/OR BARCODE

1. **Make it a QR code for scanning.**
2. **Implementation of AI based OCR.**
3. **Camera based identification setup.**
4. **Multi-directional scanner for variety of orientations of surfaces.**
5. **Divide the letters by their zones.**
6. **Employ a person who can read it.**
7. **No change.**
8. **Magnify all the addresses, so that it can be easier to read.**
9. **Use AI-Assistant such as Alexa.**
10. **Change the shape of the envelopes based on destination.**
11. **Scanning glasses.**
12. **Inspect barcodes manually.**
13. **Throw them in a bucket manually.**
14. **Using flashlight to scan it manually.**
15. **Metal detector to scan the barcode.**
16. **Don't use postage stamp, use different weights in envelope.**
17. **Manually write down the barcode numbers.**
18. **Unique music for every destination.**

BRAINSTORMING

FUNCTION 2: VALIDATE THE ITEM

1. Send pigeon on address.
2. Google search each address.
3. Have an address database with all possible addresses.
4. Cross check it with randomly generated addresses.
5. Randomly say, that doesn't sound like a real address to me.
6. If you know the neighbouring streets, you know the address is valid.
7. Contact the sender or receiver to verify.
8. Bio-metric validation.
9. Make them write the address twice.
10. Validate the item by rolling the dice.
11. Digitally printed label, can be sorted on the route-map.
12. Sending item to magic fortune teller for validation.
13. Have a drone go to the address and check validity.
14. Asking a stranger for their opinion.
15. Time-travel, and going to see if it is the right sender.
16. Add the GPS plus code.

BRAINSTORMING

FUNCTION 3 : SEGREGATION ACTION PERFORMED BASED ON CONDITION

1. Colour them according to the destination.
2. Scanning the item based on pin codes.
3. Shoot the items to each receptacle.
4. Robotic arm picks it up and puts it somewhere.
5. Sorting the item based on number of vowels in the address.
6. Ribbon by destination.
7. Sort by weight.
8. Sort by language written for address
9. Using tags such as fragile, priority
10. Tell each letter to go sit where it belongs.
11. Automated mechanical system based on size, shape, etc.
12. Adding chips, autonomous identification system.
13. Put a packet of Kheer in the IISc bucket.
14. Scent tagging the mail.
15. Segregation based on favourite colour.
16. Each letter converts into pigeons.
17. Different shapes for segregation.



SYNECTICS

Segregated item collected in compartments matching condition

Problems as given	Goals as Understood
<ul style="list-style-type: none">• Difficult to have segregated mails, chance of mixing up, due to distance.• Slow and tiring process because of manual work.• All the letters look the same.• Standards may not be followed, as customers and postal workers may make mistakes.• It's a boring process, people might get carried away.• It's a tedious effort, to collect mail.• Illegible font, or handwriting.• Need for distinct compartmentalisation for effective use.• Inconsistency in number of mails for different destination population.• More prone to faulty segregation , due to human errors.	<ul style="list-style-type: none">• Faster processing• Less manual effort• Less error• Making it less tedious• Making it easily distinguishable

Segregated item collected in compartments matching condition

Example - EX: Less error	Examination - EXAM: Dictatorship	Force Fit - FF
<ul style="list-style-type: none"> • machine • specialised workers • army • accuracy • reliability • rockets • nuclear power station • mathematics • calculators • precision • dictatorship • monopoly • automation • surgical procedure • microscope 	<ul style="list-style-type: none"> • adolf hitler • monopoly • control • order • elements of design • injustice • fixed • predefined • prejudiced • restricted • more scope of economic development • forced • less freedom • rigid • unethical • narcissistic • uniformity 	<ul style="list-style-type: none"> • standardisation • self validation • restricted access • centralised system • incentive for more accuracy • background knowledge • severe punishments for error

Transfer mark of authentication on item

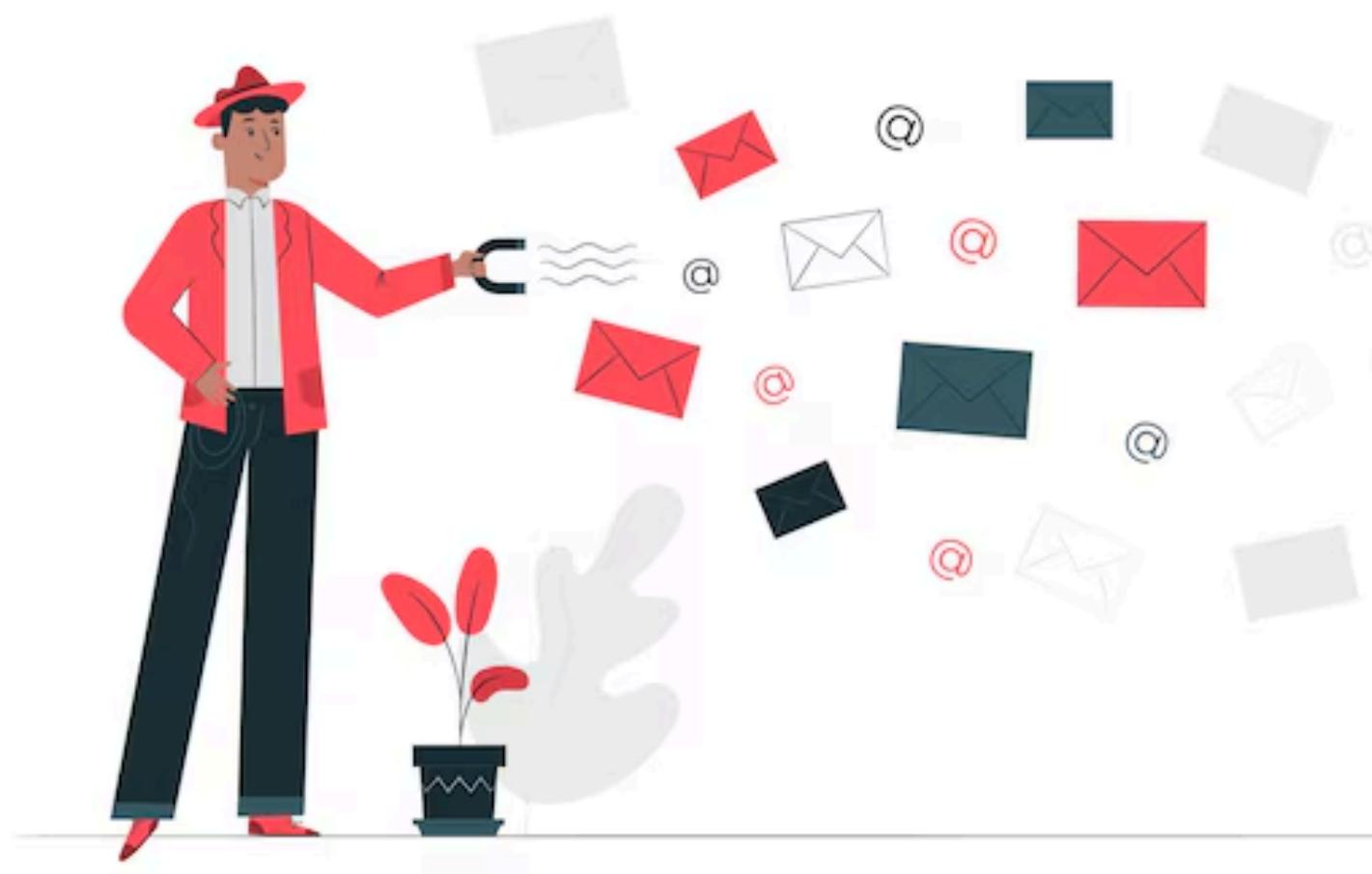
Problems as given	Goals as Understood
<ul style="list-style-type: none">• Lot of manual effort required to make the indent.• The date has to accurate/fitting.• Legibility of the authentication.• Safe indentation without damaging package contents.• Indentation may lead to RSIs for worker.• Need to wait for the ink to dry.• The device is likely to get damaged from the impact force.• It can be easily duplicated, leading to security concerns.• Repetitive and boring.• Ink has to be reapplied frequently.	<ul style="list-style-type: none">• clear and distinct authentication• non replicable• easier to carry out, less effort• more ergonomically fit• efficient continuity of task.

Transfer mark of authentication on item

Example - EX: Clear, distinct authentication	Examination - EXAM: Snowflake design	Force Fit - FF
<ul style="list-style-type: none"> • passport/ ID • finger print/ DNA • currency • roll no/ sr no. • Address • standards • snowflake design • cymatics pattern • cryptocurrency • symbols • password • qr code • pattern 	<ul style="list-style-type: none"> • Hexagon • Unique • Temporary • UFO • Emergent • Fragile • Small • Natural • White • Skiing • Intricate • Fractal • Crystallise 	<ul style="list-style-type: none"> • Stacked clearly • 2 step verification • Non replicable • OTP • Classified information • Recognisable • Tampering assessment • Compact/ fitting • Intuitive • smooth operation • Self referencing • Self sufficient • End to end encryption

MORPHOLOGICAL MATRIX

Scan	Validate	Segregate	Collect	Authenticate
Make it a QR code for scanning.	Have an address database with all possible addresses.	Colour them according to the destination.	Robotic arm picks it up and puts it somewhere.	2 step verification
Camera based identification setup.	Bio-metric validation.	Scanning the item based on pin codes.	Self-Validation	Non replicable
Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting



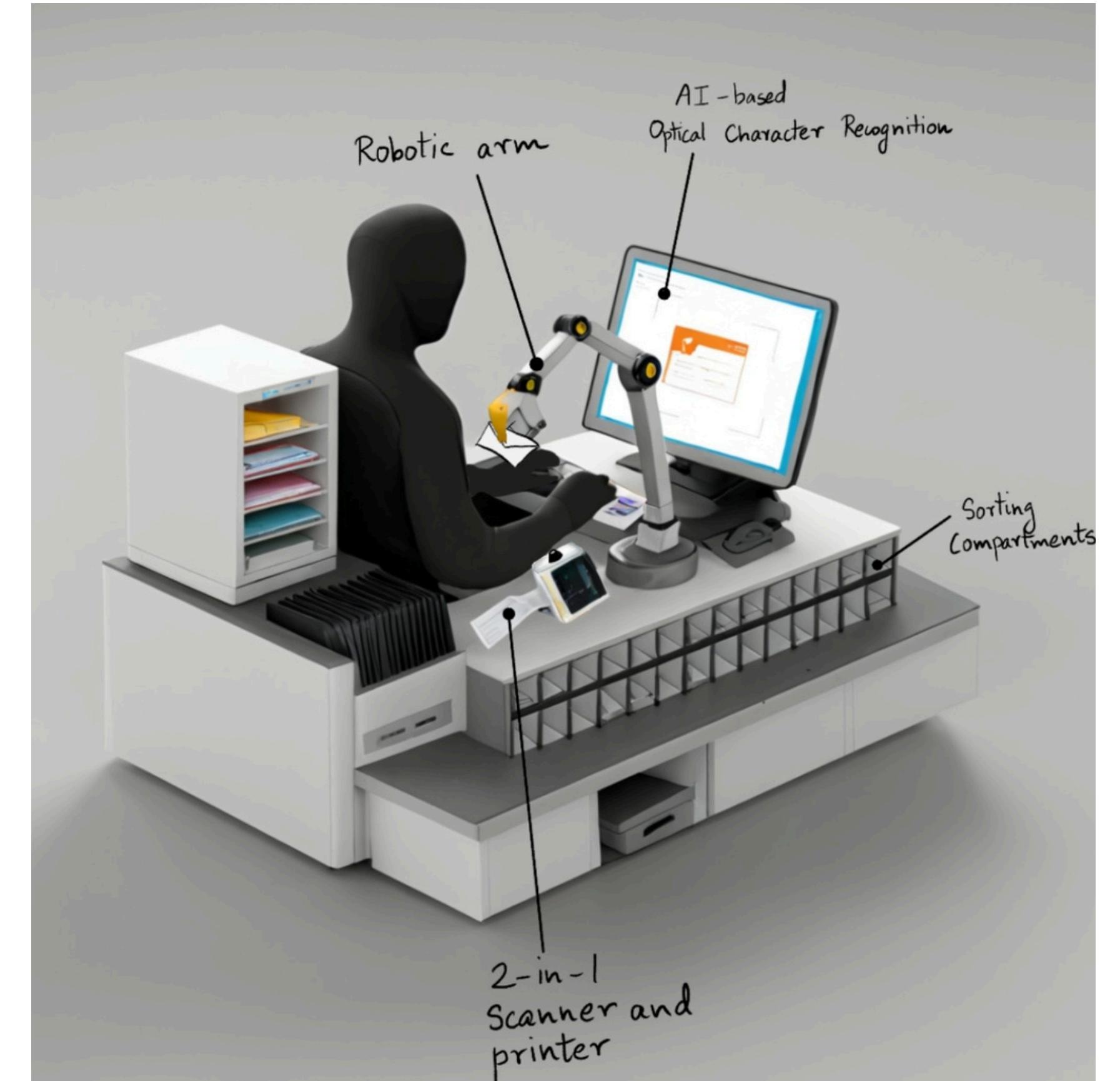
CONCEPT DESIGN

CONCEPT 1

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CONCEPT 1

- Camera based scanning setup
- Address database available to validate
- AI-based OCR to make sorting decisions
- Robotic arm for actual sorting of mails
- Compact authentication system
- Computer to integrate all functions

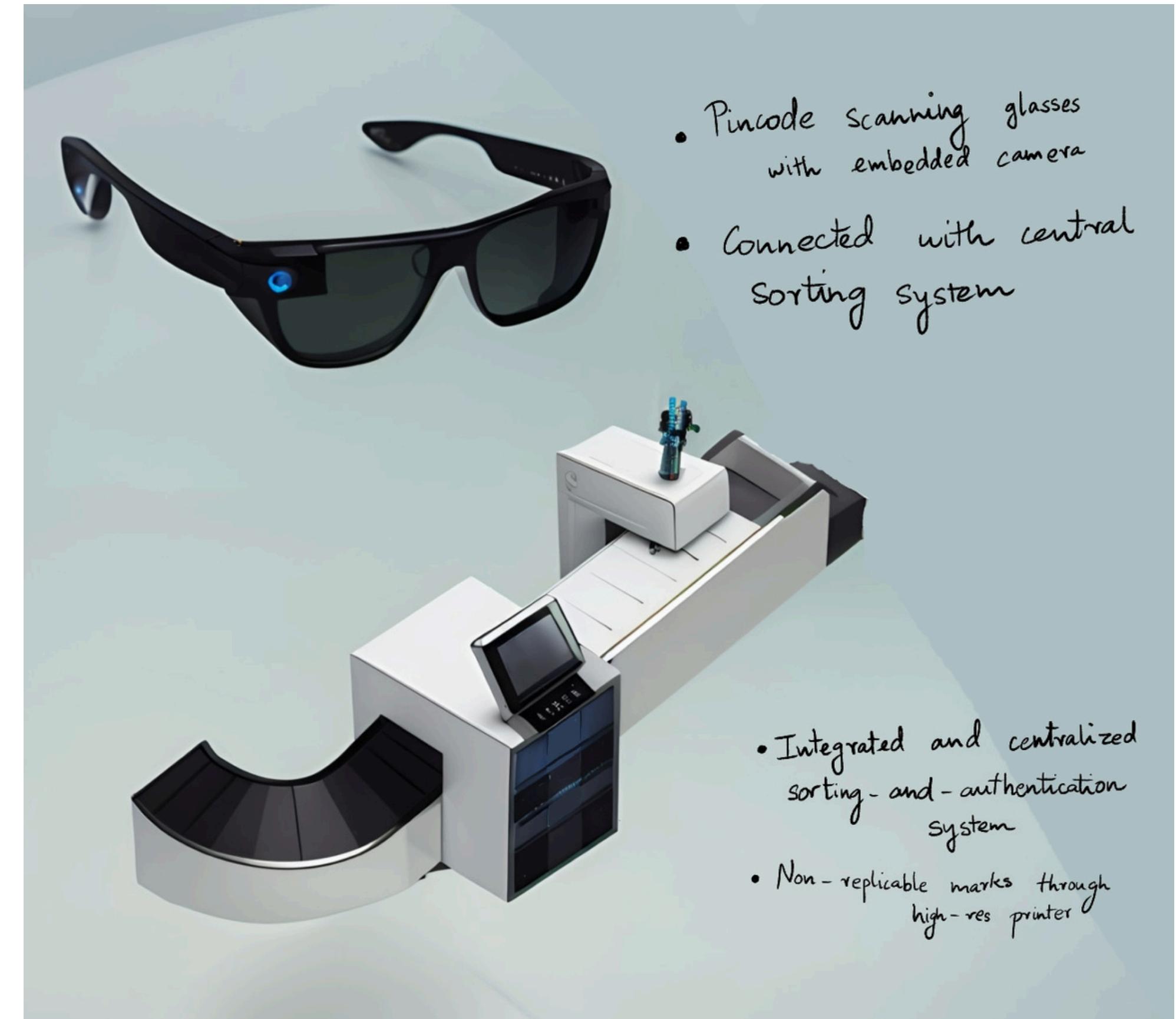
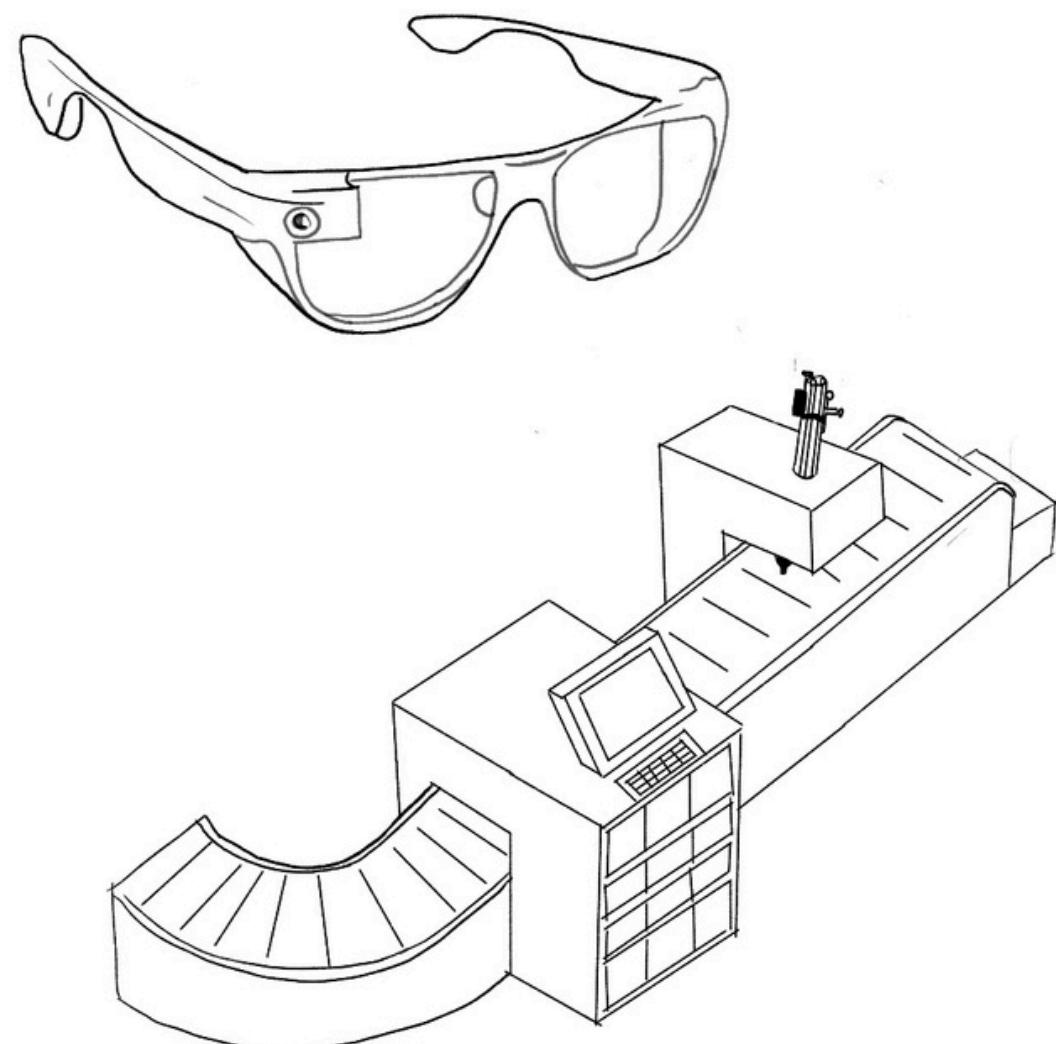


CONCEPT 2

Scan	Validate	Segregate	Collect	Authenticate
Make it a QR code for scanning.	Have an address database with all possible addresses.	Colour them according to the destination.	Robotic arm picks it up and puts it somewhere.	2 step verification
Camera based identification setup.	Bio-metric validation.	Scanning the item based on pin codes.	Self-Validation	Non replicable
Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT 2

- Scanning glasses with pincode scanner
- Digital labels on mails for easy scanning
- Centralized and integrated system
- Non- replicable authentication marks

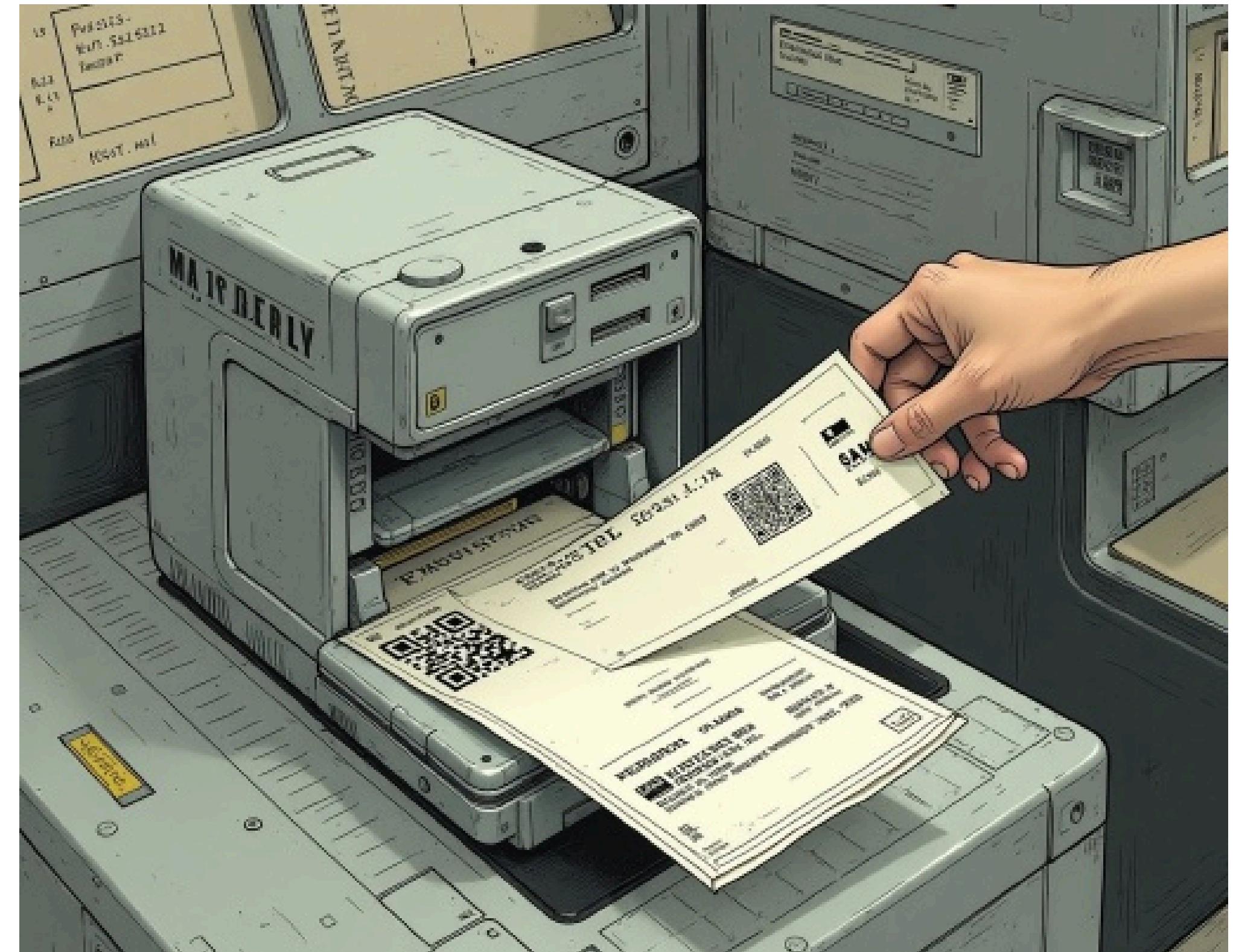
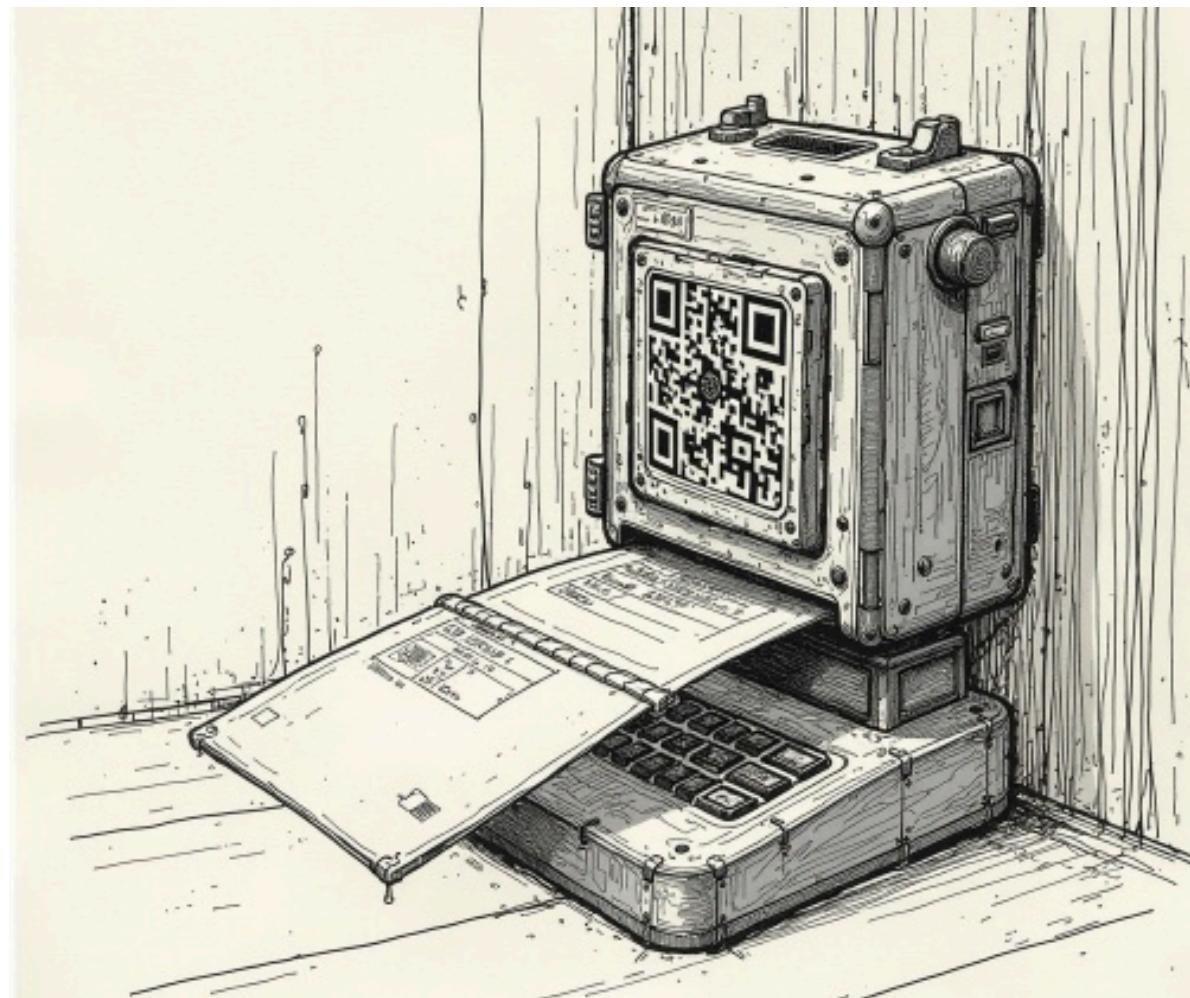


CONCEPT 3

Scan	Validate	Segregate	Collect	Authenticate
Make it a QR code for scanning.	Have an address database with all possible addresses.	Colour them according to the destination.	Robotic arm picks it up and puts it somewhere.	2 step verification
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Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT 3

- Scanning device with QR scanner
- QR helps in identifying the sender's and receiver's information.
- Distinct segregation level may appear on the screen itself.



CONCEPT 4

Scan	Validate	Segregate	Collect	Authenticate
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Camera based identification setup.	Bio-metric validation.	Scanning the item based on pin codes.	Self-Validation	Non replicable
Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT 4

- An authenticating machine that automatically prints the authentication seal.

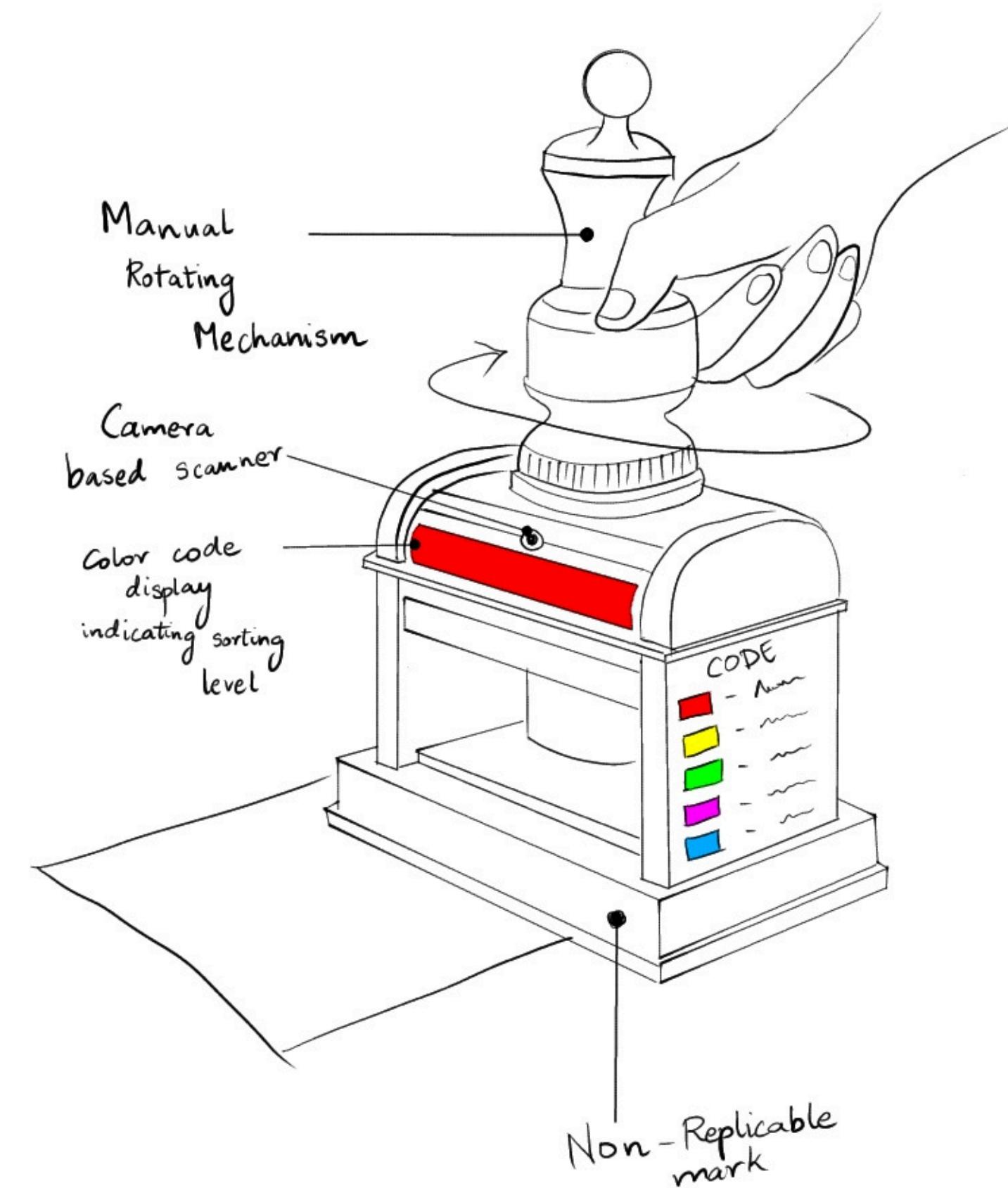
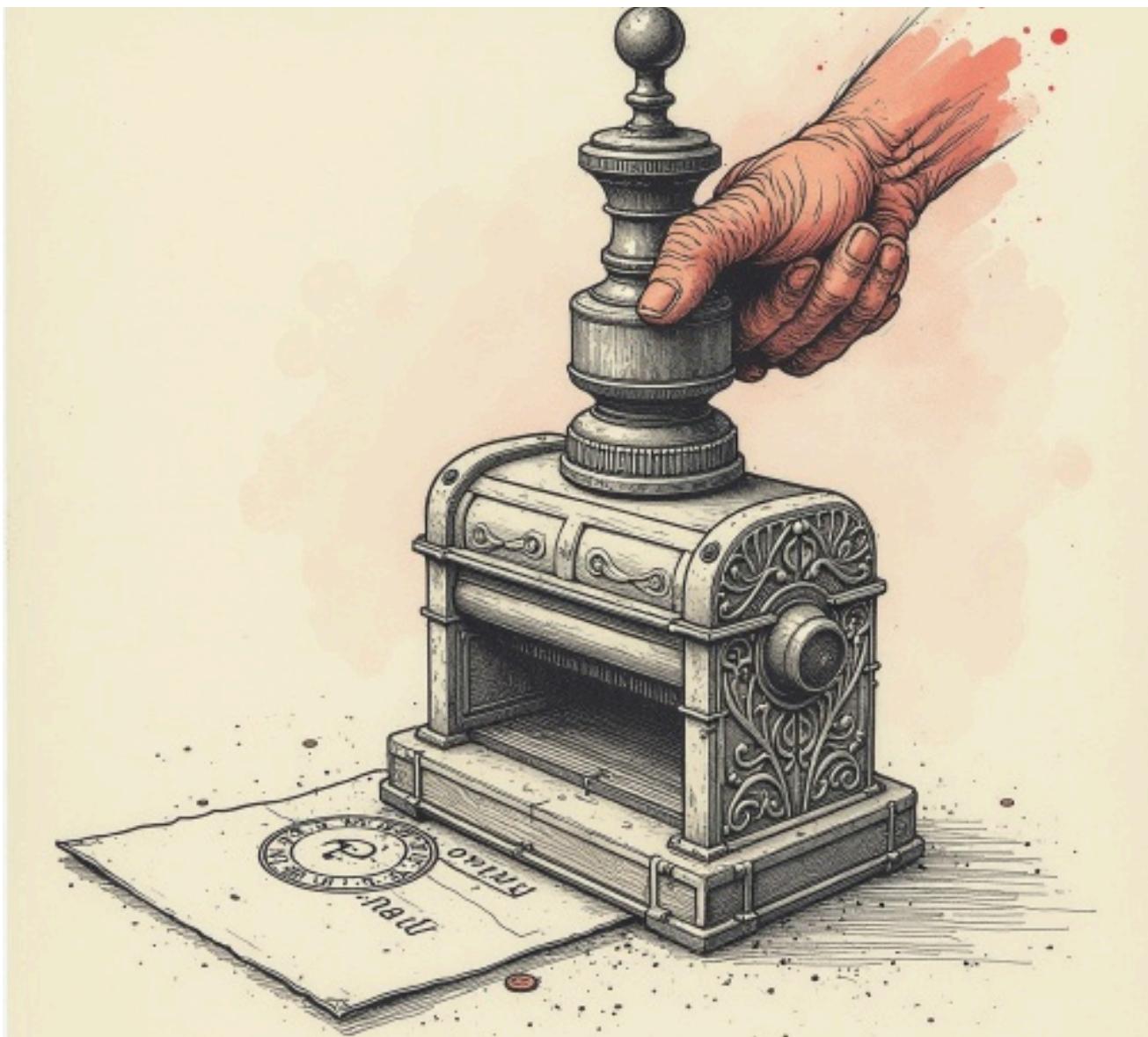


CONCEPT 5

Scan	Validate	Segregate	Collect	Authenticate
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Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT 5

- A manually rotating device that would reduce physical effort for authentication.
- The authentication can also be digitally printed with a compact device.



Manual
Rotating
Mechanism

Camera
based scanner

Color code
display
indicating sorting
level

Non-Replicable
mark

CODE

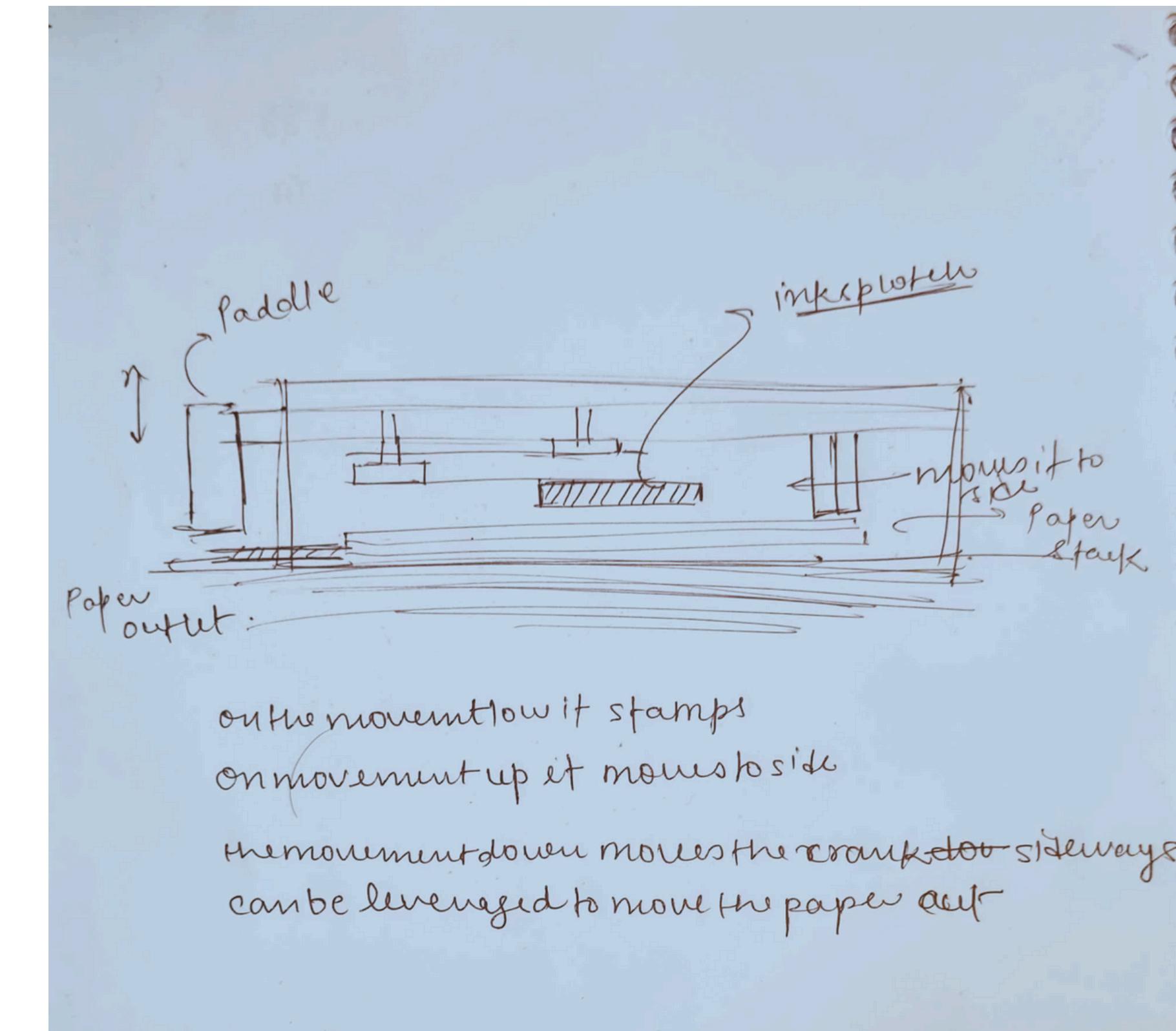
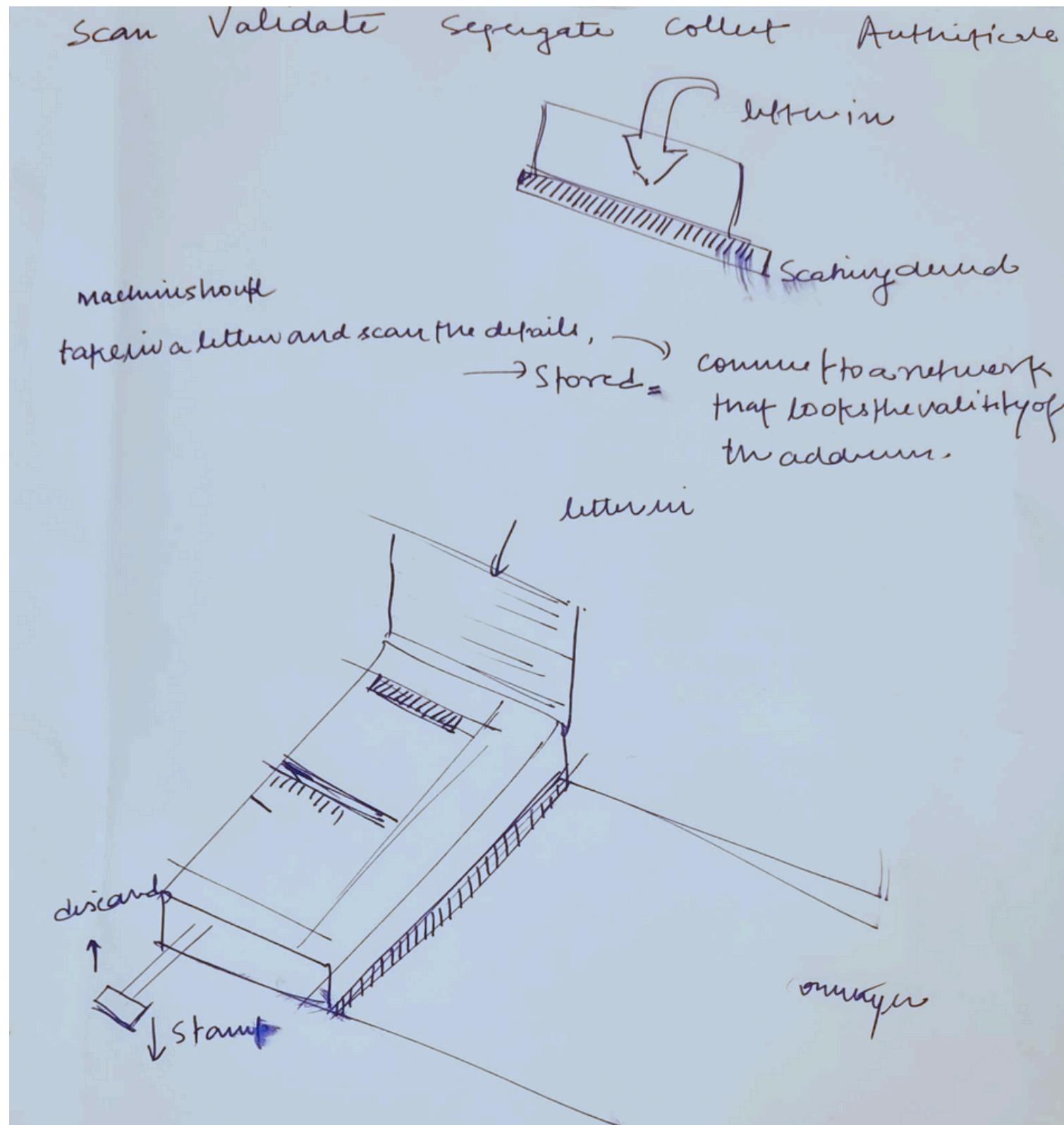
Red	-
Yellow	-
Green	-
Magenta	-
Blue	-

CONCEPT 6

Scan	Validate	Segregate	Collect	Authenticate
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Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
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CONCEPT IDEA 6

Manual press for franking and validation that has a scanner

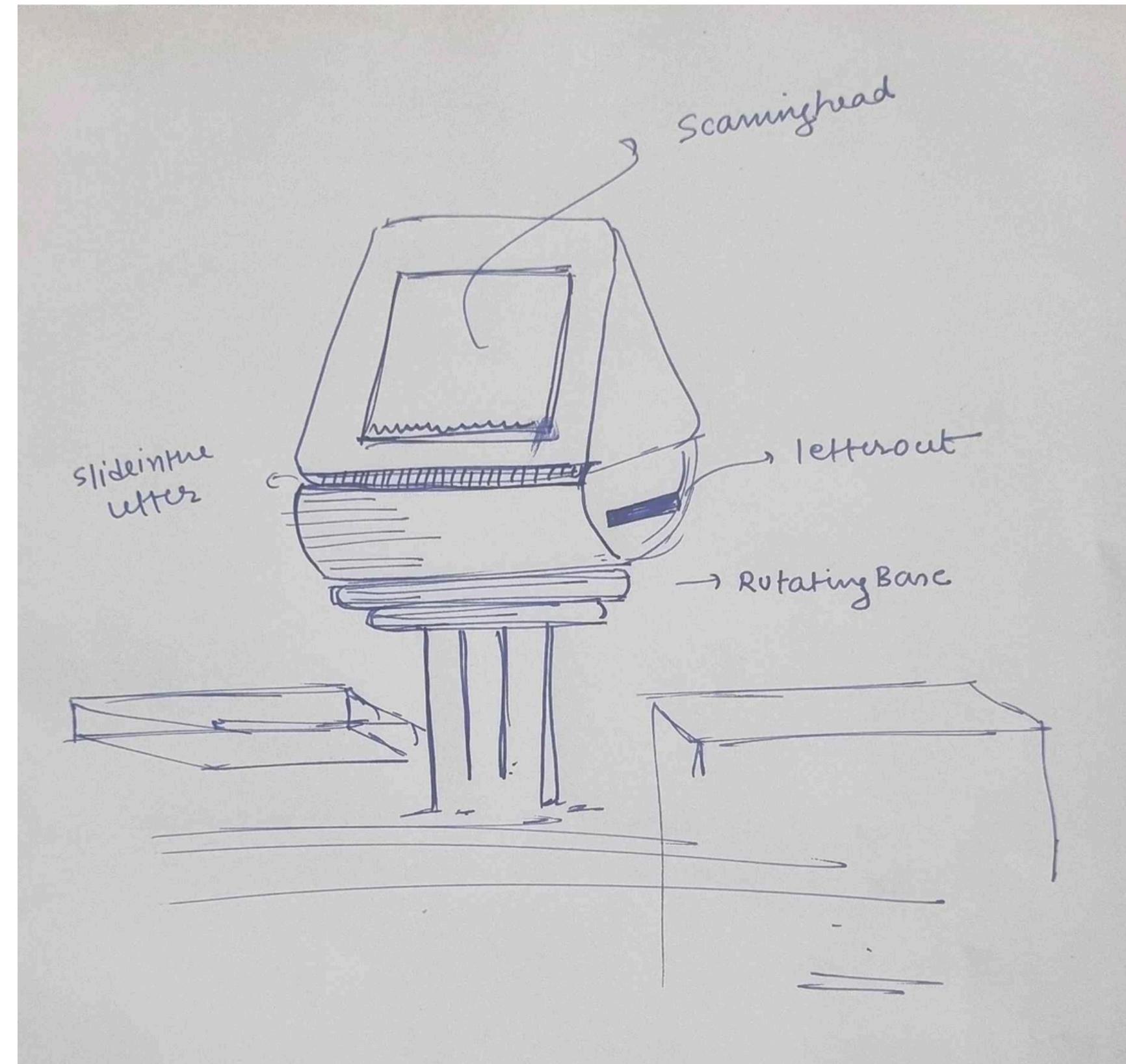


CONCEPT 7

Scan	Validate	Segregate	Collect	Authenticate
Make it a QR code for scanning.	Have an address database with all possible addresses.	Colour them according to the destination.	Robotic arm picks it up and puts it somewhere.	2 step verification
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Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT IDEA 7

ROTATING HEAD DISTRIBUTER WITH A SCANNING HEAD



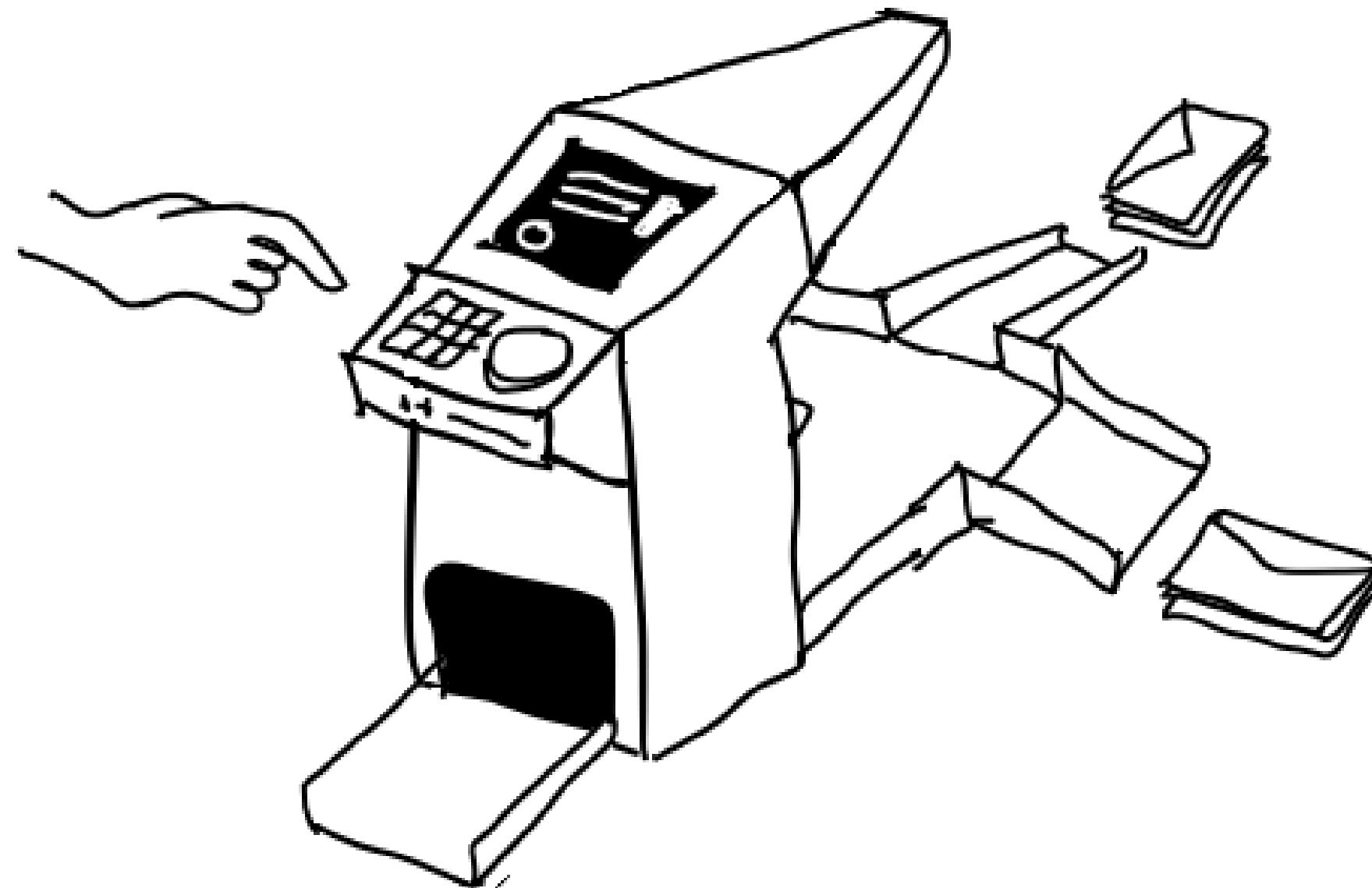
CONCEPT 8

Scan	Validate	Segregate	Collect	Authenticate
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CONCEPT IDEA 8

ROTATING HEAD DISTRIBUTER WITH A SCANNING HEAD

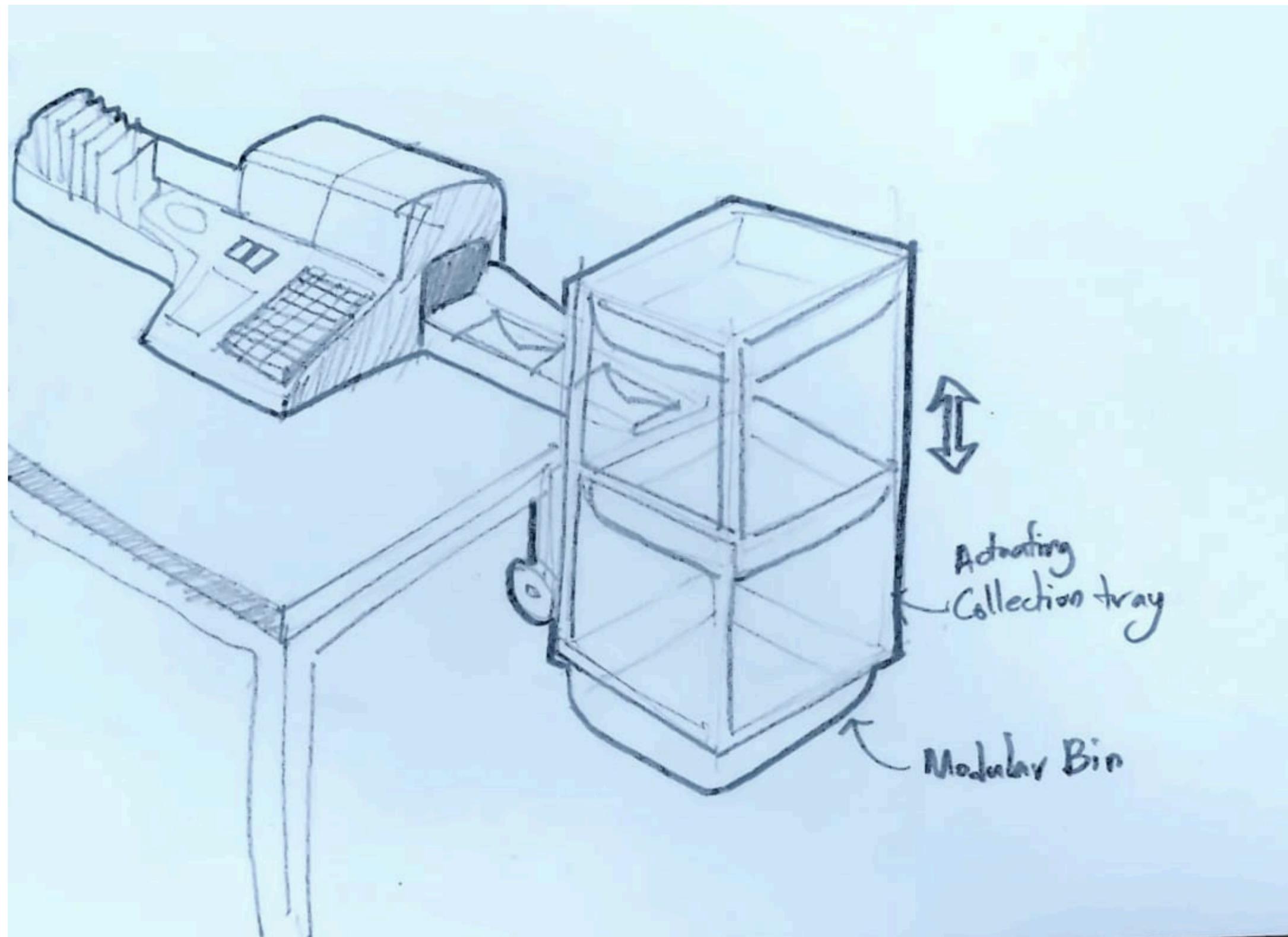
- A device that is a centralised sorting, that does a trinary sorting action, with 3 possible outcomes.
- It scans, validates, sorts, and authenticates.



CONCEPT 9

Scan	Validate	Segregate	Collect	Authenticate
Make it a QR code for scanning.	Have an address database with all possible addresses.	Colour them according to the destination.	Robotic arm picks it up and puts it somewhere.	2 step verification
Camera based identification setup.	Bio-metric validation.	Scanning the item based on pin codes.	Self-Validation	Non replicable
Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT IDEA 9



A bin based scanning, sorting, validating and authenticating device, where the bins are tagged and actuated based on the sorting condition, with a centralised sorting command.

CONCEPT 10

Scan	Validate	Segregate	Collect	Authenticate
Make it a QR code for scanning.	Have an address database with all possible addresses.	Colour them according to the destination.	Robotic arm picks it up and puts it somewhere.	2 step verification
Camera based identification setup.	Bio-metric validation.	Scanning the item based on pin codes.	Self-Validation	Non replicable
Scanning glasses.	Digitally printed label, can be sorted on the route-map.	AI-based OCR	Centralized system	Tampering assessment
Self-aligning scanner head	Add geographical plus code	Have different stamps, based on destination.	Standardization	Compact/ fitting

CONCEPT 10

- A device that does segregation using AI-based OCR , Bio-metric validation of letters and Robotic arm picks it up and puts it somewhere.



THANK YOU