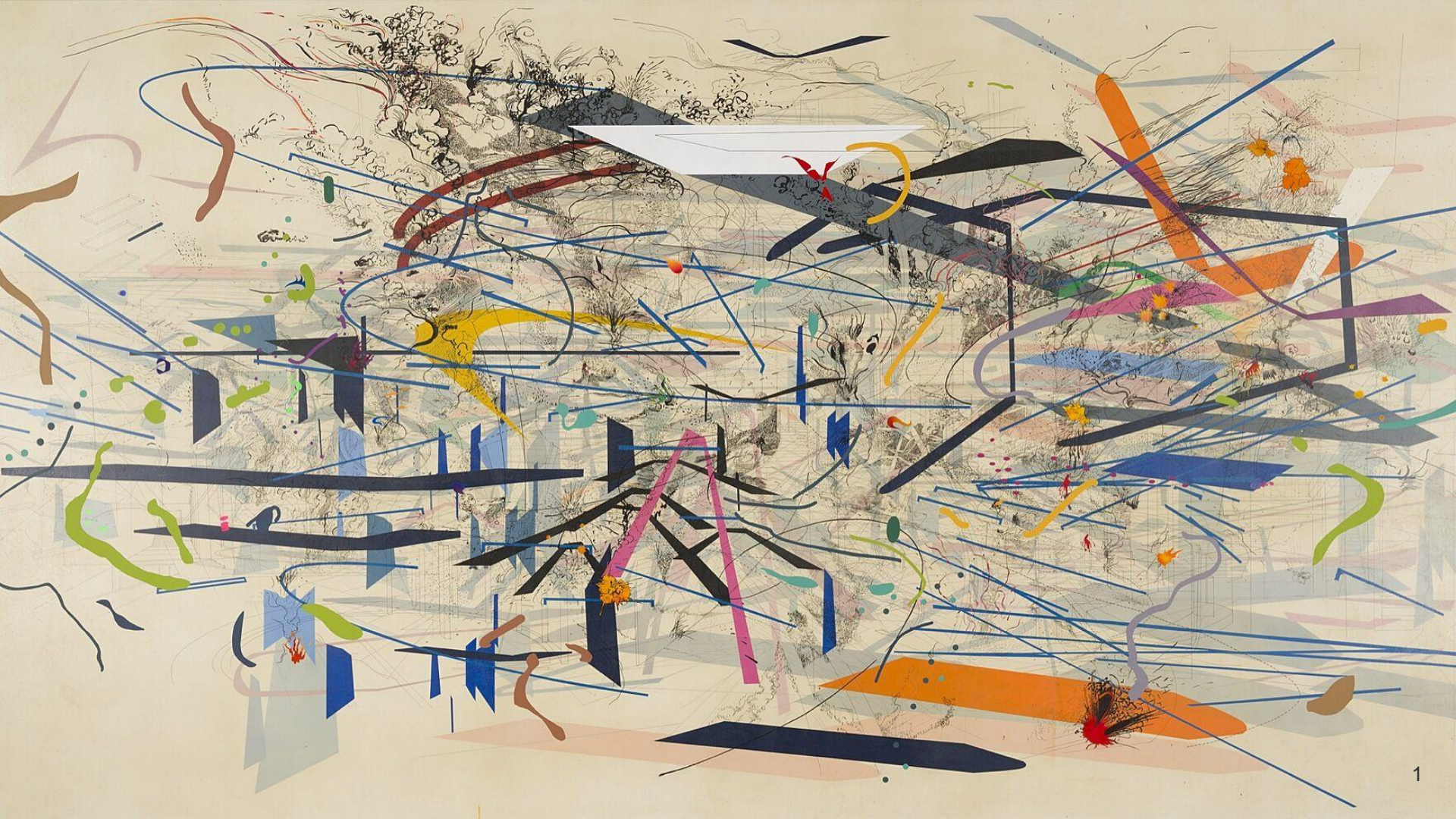
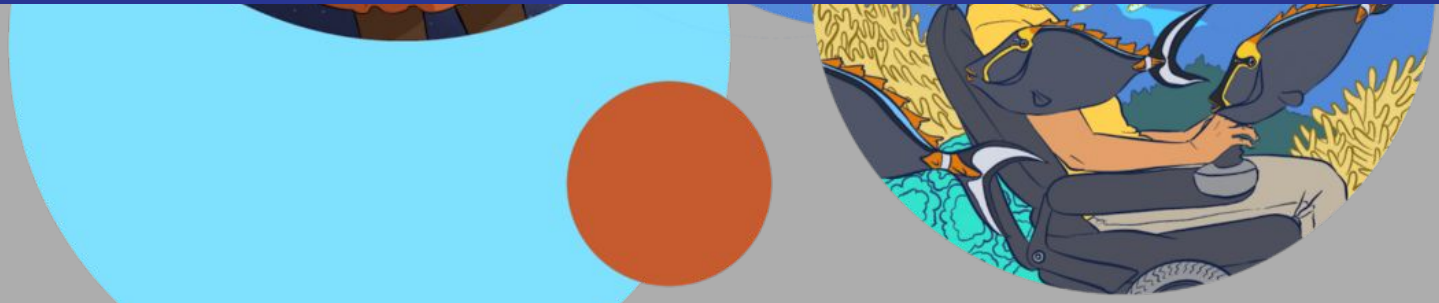


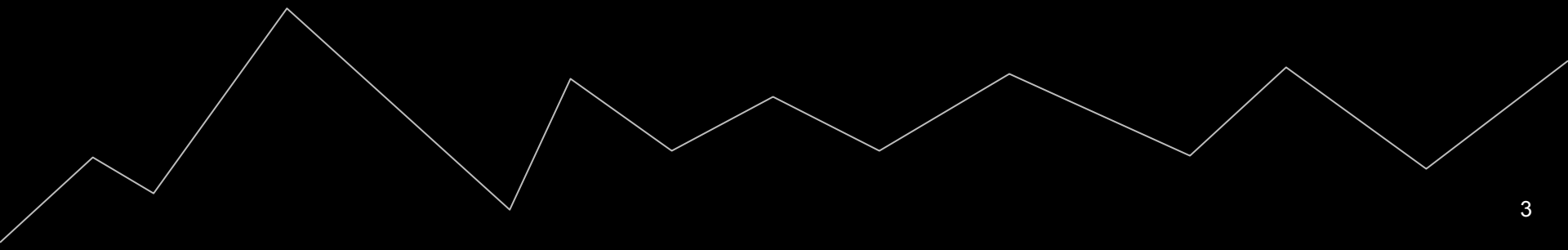
Smart Spectacles for Image Recognition of Art

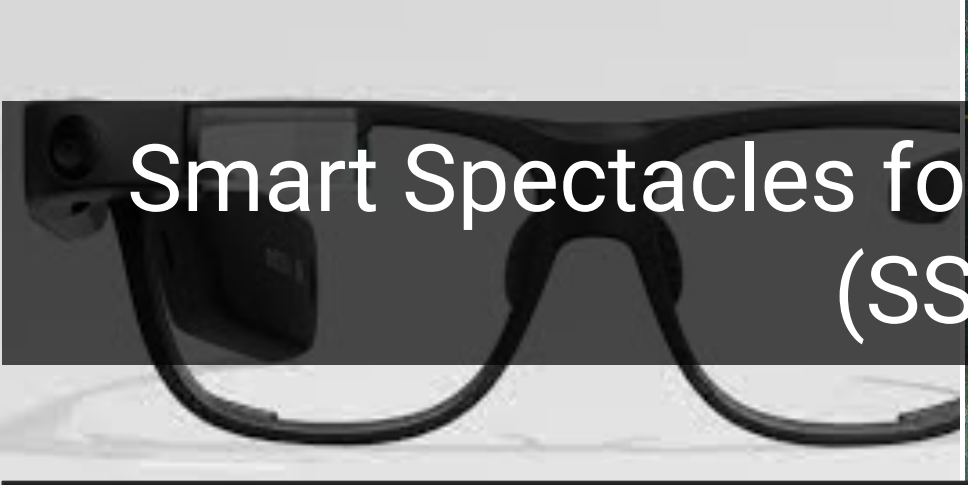
SSIR

Denada Bakiasi · Nicla De Biasi · Vianna Phung · Angela Shen · Warren Waliggo

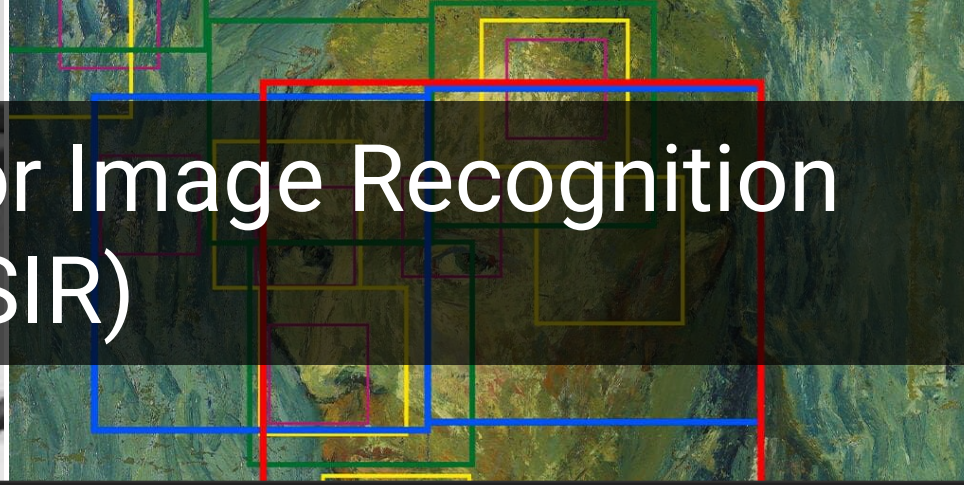


· Project Formulation ·





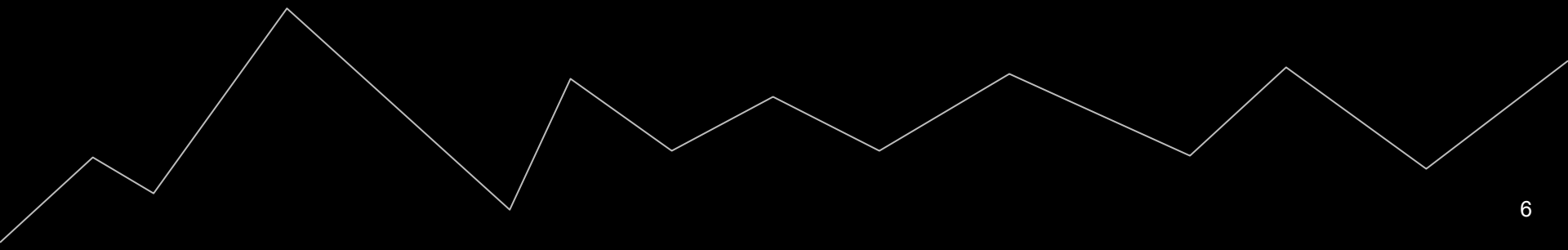
Smart Spectacles for Image Recognition (SSIR)

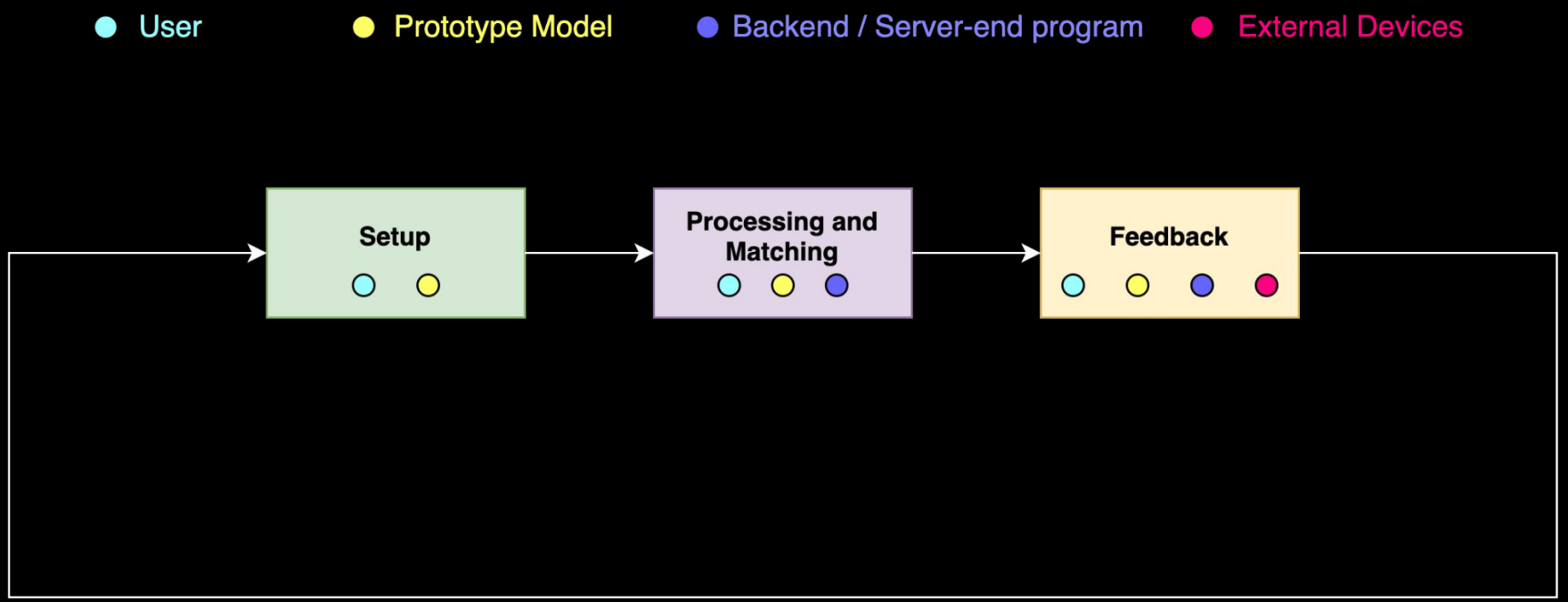


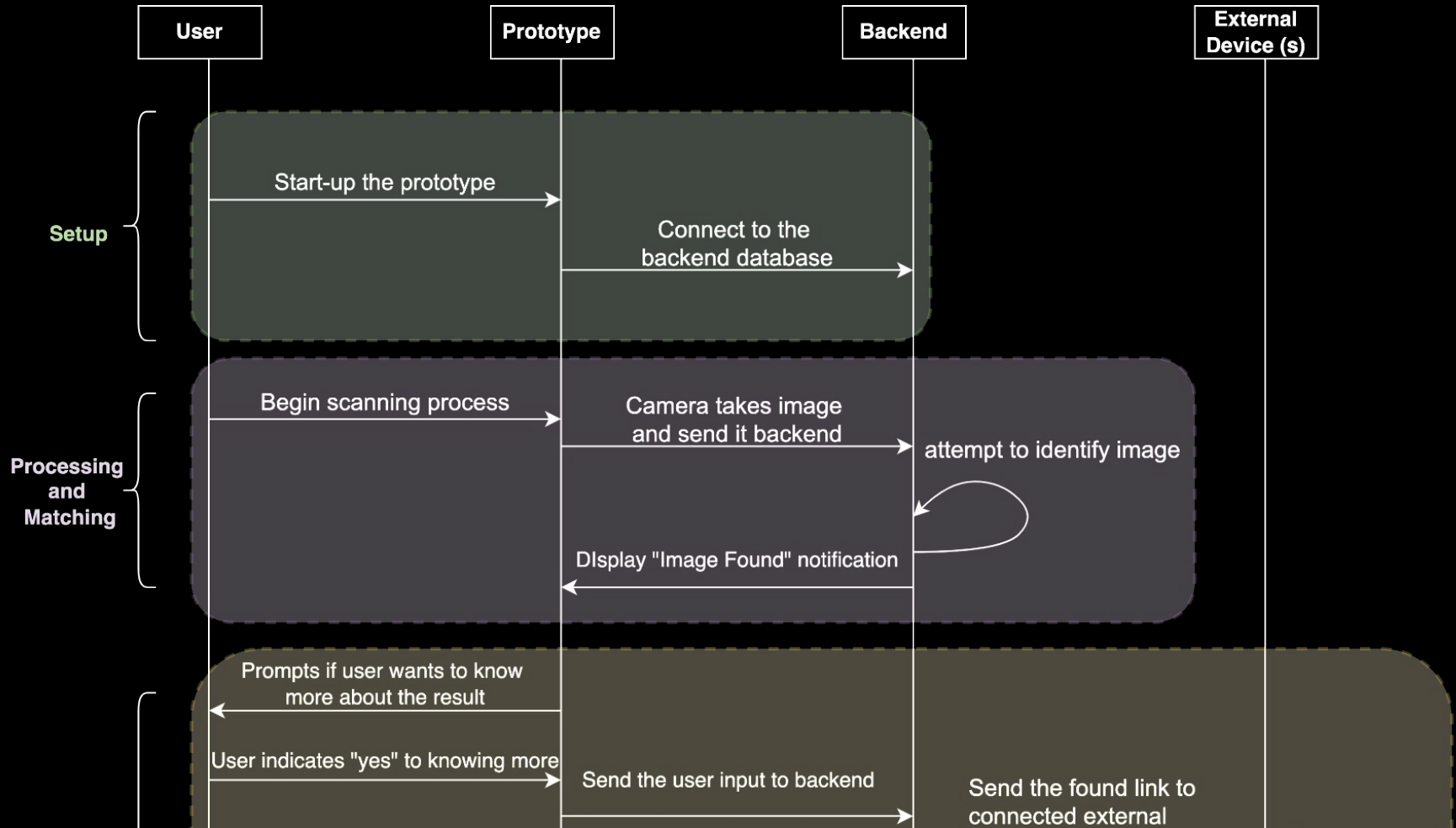
- K4 wanted to pursue a project related to wearable technology with a unique purpose
- The purpose of SSIR is to scan a piece of art and to relay and display information about it to the user
- SSIR will be an external piece of hardware that will serve as an add on to a pair of glasses
- Bringing SSIR to life will involve an intensive hardware and software prototyping process

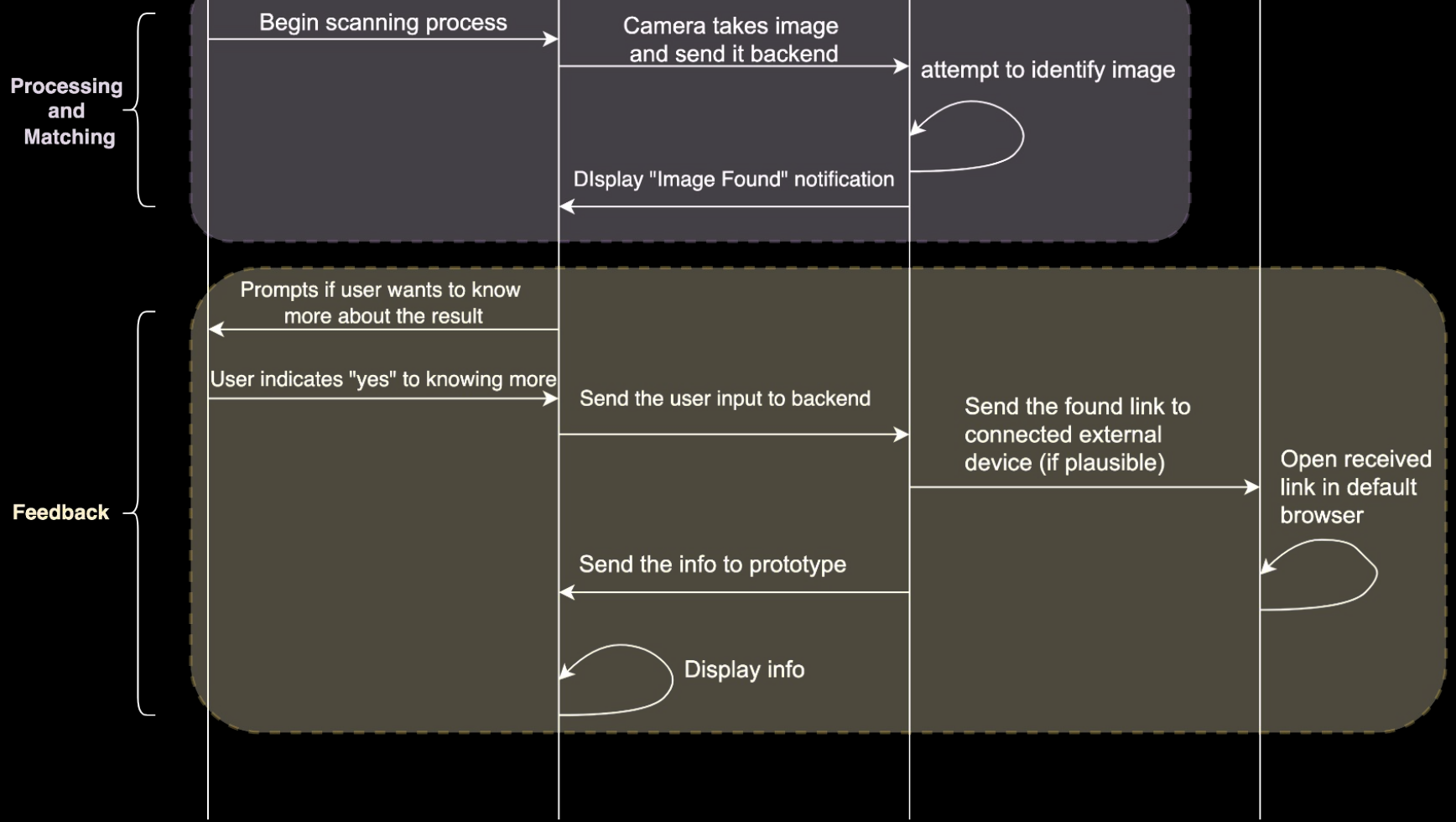
One of its kind!!

· Project Overview ·

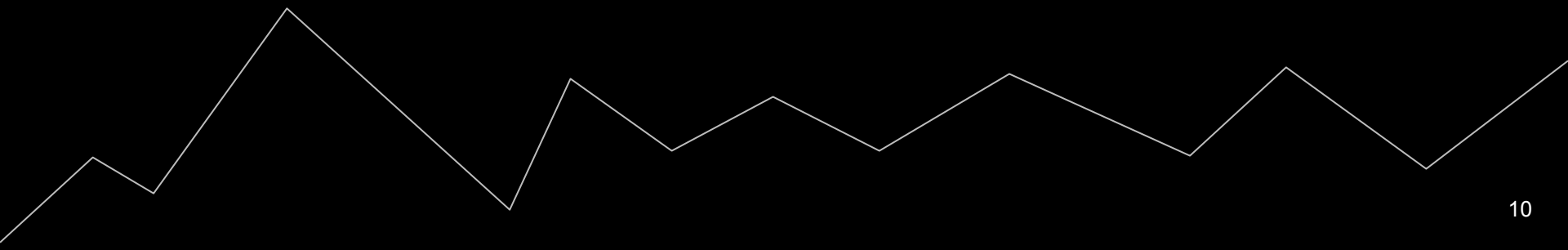



User
Prototype Model
Backend / Server-end program
External Devices
Setup
Processing and Matching
Feedback


User
Prototype
Backend
External Device (s)
Setup
Start-up the prototype
Connect to the backend database
Processing and Matching
Begin scanning process
Camera takes image and send it backend
attempt to identify image
DIsplay "Image Found" notification
Prompts if user wants to know more about the result
User indicates "yes" to knowing more
Send the user input to backend
Send the found link to connected external

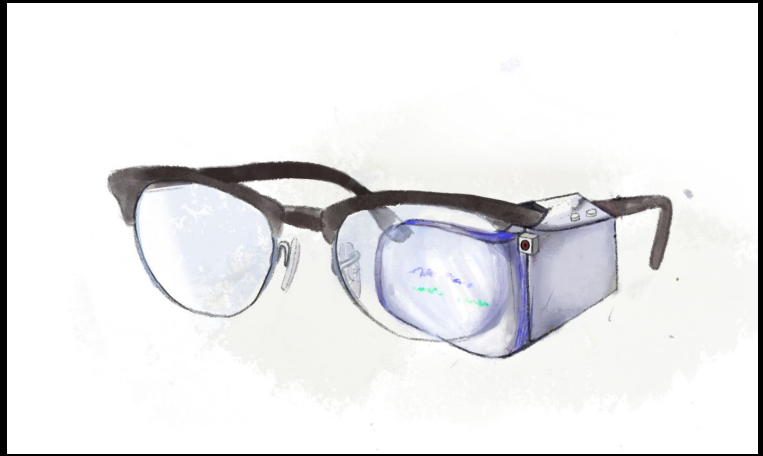

Processing and Matching
Begin scanning process
Camera takes image and send it backend
attempt to identify image
DIsplay "Image Found" notification
Feedback
Prompts if user wants to know more about the result
User indicates "yes" to knowing more
Send the user input to backend
Send the found link to connected external device (if plausible)
Open received link in default browser
Send the info to prototype
Display info

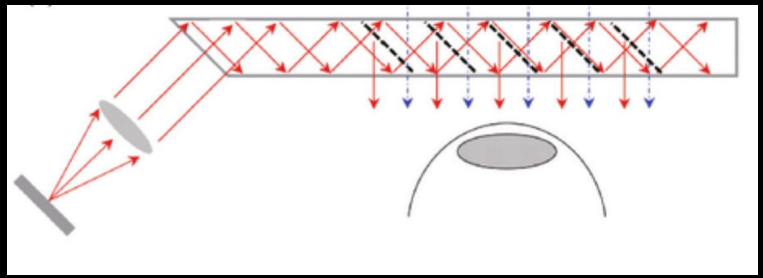
· Design and Analysis·

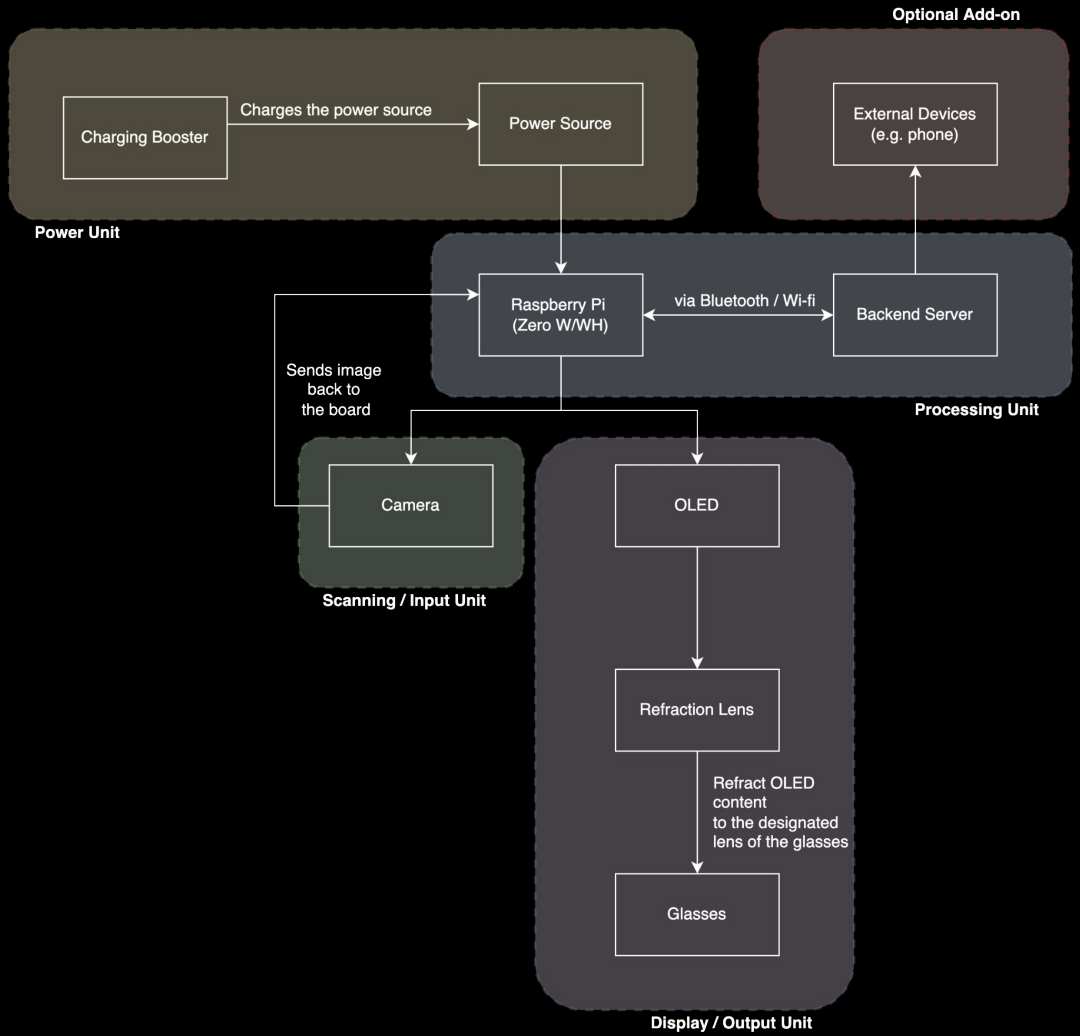


Hardware Design

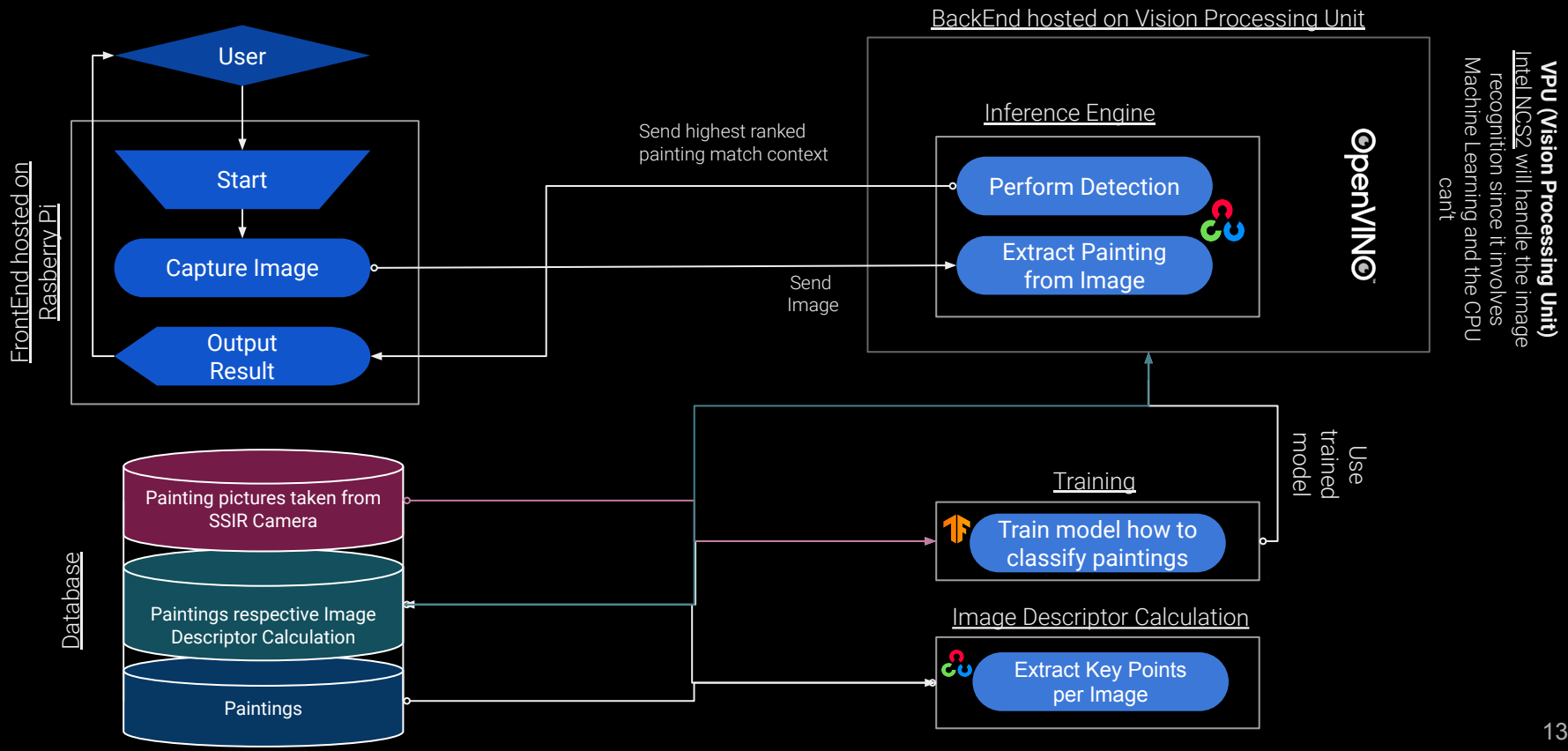
- **Mechanical Frame Design**
  - Simplest optical path to maximize light intensity of OLED → no lens in glasses
  - 3D printed case for electronics
- **Electronics Design Specifications**
  - Size and Availability
  - Rechargeable
  - Wifi + Bluetooth
  - Sufficient computational power for machine learning






Optional Add-on
Charging Booster
Charges the power source
Power Source
External Devices
(e.g. phone)
Power Unit
Raspberry Pi
(Zero W/WH)
via Bluetooth / Wi-fi
Backend Server
Sends image
back to
the board
Processing Unit
Camera
OLED
Scanning / Input Unit
Refraction Lens
Refract OLED
content
to the designated
lens of the glasses
Glasses
Display / Output Unit

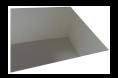
Software Design Strategy and Analysis



Cost Analysis

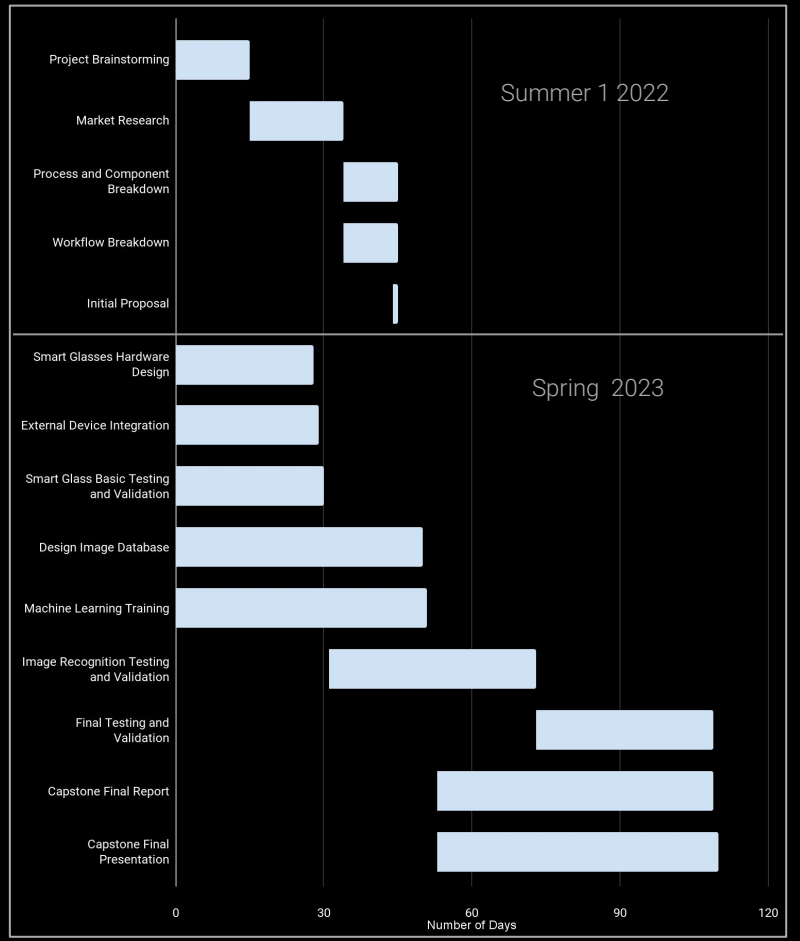
Product	Unit Price	Quantity	Total Price
 **Transparent Graphical OLED Breakout**	**$42.95**	**2**	**$85.90**
 Rechargeable 5V Circuit	$14.95	2	$29.90
 **Raspberry Pi Compute I/O board**	**$39.99 - $99**	**2**	**$79.99 - $198**
 Li-po Battery	$10.49	2	$20.98
 **Rasberry Pi HQ Camera**	**$50.00**	**1**	**$50.00**
 **Rasberry Pi HQ Camera Lens**	**$25.00**	**1**	**$25.00**
 Connector Wires	$4.95	1	$4.95
 Flex Connector	$6.41	1	$6.41
 Push Button	$5.95	4	$23.80

Cost Analysis

Product	Unit Price	Quantity	Total Price
 Mini USB Microphone	$16.59	2	$33.18
 Mini USB Speaker	$14.95	2	$29.90
 Raspberry 4 Port USB Hub	$12.99	1	$12.99
 **Intel Neural Compute Stick 2**	**$83.41 - $201.73**	**1**	**$83.41 - $201.73**
 BiConvex Lens	$1.75	4	$6.99
 Acrylic See-Through Mirror	$16.99	1	16.99
			$497.31 - $725.64

Division of Tasks and Proposed Timeline

Task Name	Assignment	Start Date	End Date	Day #	Duration
Milestone #1 - Preparation					
Project Brainstorming	All	5/10	5/25	0	15 days
Market Research	All	5/25	6/13	15	19 days
Process and Component Breakdown	Angela	6/13	6/24	34	11 days
Workflow Breakdown	Warren	6/13	6/24	34	11 days
Initial Proposal	All	6/23	6/24	44	1 days
Milestone #2 - Hardware					
Smart Glasses Hardware Design	Warren	1/9	2/6	244	28 days
External Device Integration	Nicla	1/9	2/7	244	29 days
Smart Glass Basic Testing and Validation	Vianna	1/9	2/8	244	30 days
Milestone #3 Software - Image Recognition					
Design Image Database	Angela, Denada	1/9	2/28	244	50 days
Machine Learning Training	Angela, Denada	1/9	3/1	244	51 days
Image Recognition Testing and Validation	Angela, Denada	2/9	3/23	275	42 days
Final Testing and Validation	All	3/23	4/28	317	36 days
Milestone #4 - Presentation					
Capstone Final Report	All	3/3	4/28	297	56 days
Capstone Final Presentation	All	3/3	4/29	297	57 days



Conclusion

- K4 strives to develop a prototype that will leave its user more informed of the art they are viewing
- This model will give the user an easy and accessible way to learn in an interactive manner
- We hope to combine machine learning with smart glass technology to develop a product that can be feasibly used by the public

· Q&A ·