

# Edith

## Part1. What are we trying to do?

We'd like to create an in-time instructor by designing a Point-Detecting System to help those who are in need. Also, we need hardware to deploy this system, then comes the issue of devices.

For example, Google accomplished a product named Smart Glass in 2015, which can use existing Google application like Google Map and Gmail or third-party application like Twitter or Instagram.

However, we should learn from Smart Glass failed experience that we are supposed to create a device which are simple in usage and outlook with several complete functions.

Therefore, we want to develop a simply-used light device for those who need auditory education & convenience.

## Part2. How is it done today? What are the limits of current practice?

Nowadays, the technologies of detecting fingers, things and articles are very common and we can learn from the open source.

However, we didn't see people make up them together to create a system or devices to help specific people.

As for the limit, it would be how to design a proper device for people to use, like:

1. Camera + PC-software (unportable)
2. Smart glass (kind of expensive)
3. Smart headband (great)

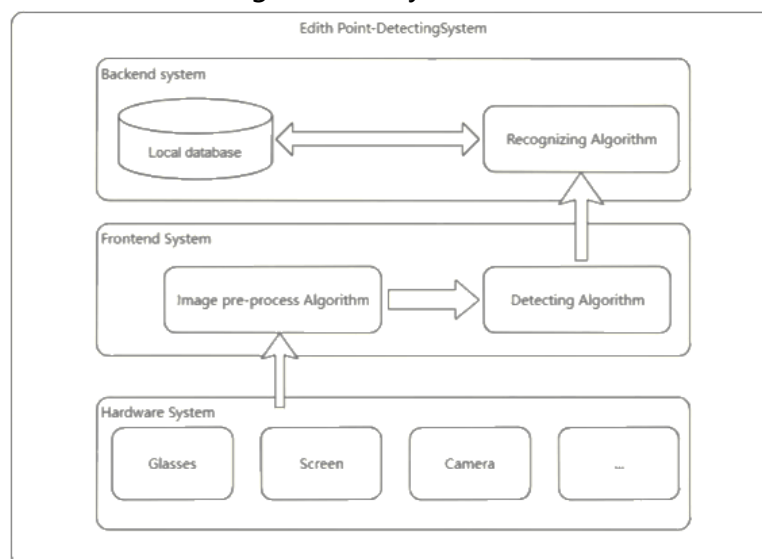
## Part3. What is new in your approach? Why do you think it will be successful?

The superiority is that this system is able to transit the images to auditory information, which help specific people to read, learn and live.

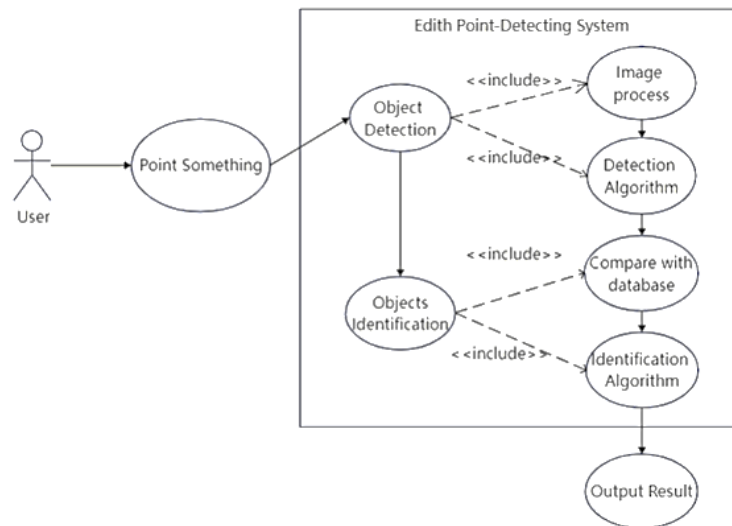
We would say that would be a successful project cause we don't need to care too much on prime cost and information security compared with Google Glass. Also, we are going to create different products for certain people:

1<sup>st</sup> : A smart glass, which can carry lens with diopter or sunglass.

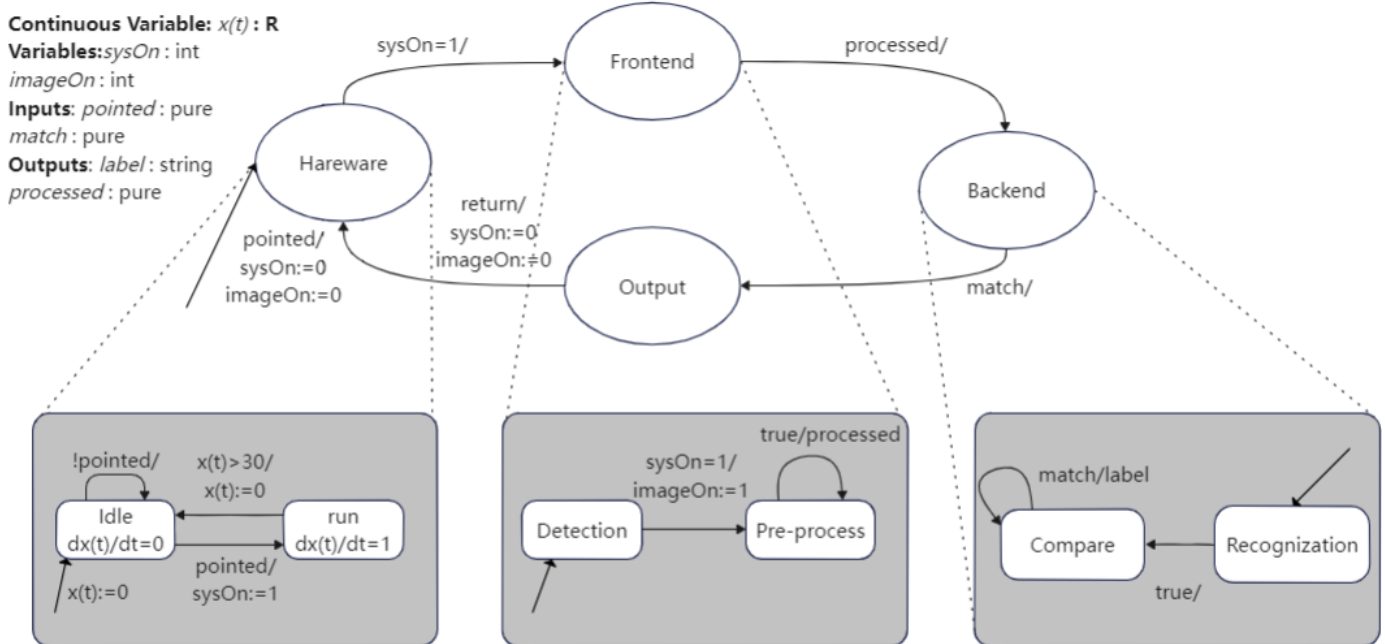
2<sup>nd</sup> : A smart headband, which is light and easy to wear.



Pic1. System Architecture



Pic2. Use Case Diagram



Pic3. State Machine

For this state machine, we have one continuous variable to control the run time of our system, and two variables,  $sysOn$  and  $imageOn$  to identify whether the system is running and whether the image is processed. The whole procedure goes like this: first, the system is in idle state, which means it is idle and waits for signal. Then the pointed signal comes, it is produced by processor once the user points at something, then the system is on Run state and begins calculating time using  $x(t)$  variable.

Then the system goes to the Frontend state and applies the detection algorithm in the Detection state. Once the image is detected, it outputs the  $imageOn$  signal to represent the image has been detected, the system goes to the pre-process procedure. If it completes, it will output a signal named  $processed$  to signal it, and the system goes to Backend state. Inside the backend state, we first use the recognition algorithm to recognize the features of the image, then we compare the image with the local database, and if it matches, we output the label of the image inside the output state.

Finally, if everything goes well, the system will return to run state; if no more action is 30 seconds, the system will go to idle to save energy.

#### Part4. Who cares? What difference will it make if you are successful?

The parents with young kids and blind people and their family care a lot. It will help blind people to recognize this world.

As for blind people, in the past, they can touch without knowing what it is, but they can point the things with fingers after touching them, and the system will tell them what the thing is.

As for young kids, they are able to learn more about this world when their parents are not together with them. Also, it helps parents to release some pressure of family education.

As for normal people, some of them prefer listening to reading, so with the help of such system & device, their dream finally come true and it really brings great convenience.

### Part5. What are the risks?


1. Special environment might influence the accuracy of identity and pointing-detect models. (eg: strong light environment)
2. Errors exist in the identity model, which may be dangerous for blind people. (eg: regard a knife as some silver hard things they need)
3. Price. The past products, such as Google Smart Glass, is too high to afford for the public, especially blind people who have low income. Also, we know that low price with high quality brings more customers. Hence, we need to balance the price and sales volume.

\*Learning from Google Glass failure:  
Three main reasons for its failure:

1. General Functions: We basically don't have this risk, since we narrow down the functions to a very specific point.
2. Battery Issue: Google glasses only can work 4 hours. The limits of battery needs us to concerns.
3. Comfort level: Long time using -> heating issue. This will be a critical risk for our product.
4. Language issue: Google Glass only worked properly with a native English speaker. Since we want to help blind to know the world, the language model has to be as many as possible.

### Part6. How much will it cost? How long will it take?

Under \$100. (Main cost is hardware)



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Pic4. Price of devices

Development periodic check	duration/day	day 0-7	day8-14	day15-24	day25-32	day26-40
stage1: hardware pre-development						
glass camera	7					
headband camera	7					
stage2: AI development						
gesture recognition	14					
item&object recognition	14					
edge AI conversion	7					
stage3: deploy & intergation						
code deploy	7					
hardware integration	7					

Pic5. Timetable

### Part7. What are the mid-term and final "exams" to check for success?

Midterm exam:

1. Finger& gesture detection
2. Item classification
3. Characters Recognition &reading

Final exam:

1. The effect of making up them together
2. The effect of deploy the program on the devices
3. Producibility (balance of price and usage mode: smart glass or headband)