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# REPORT

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*Submitted by:*

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## **STEPS FOR DEVELOPING THE PROPOSAL:**

### **CASE UNDER CONSIDERATION:**

Two rooms in an old age home are under surveillance occupied by 1 inmate each. Each of the inmates has to be closely observed to ensure them complete safety in terms of medication, care and attention at the right time.

### **MODEL 1(Wireless Configuration)**

#### **Assumptions:**

Number of rooms under surveillance: 2

Number of inmates under observation: 2

Number of cameras under use: 2

Number of GPU-enabled high processing systems: 1

Number of single board computers: 2

### **SETUP DESCRIPTION:**

- 1 Camera (IR + RGB) each is to be setup in each of the two rooms.
- Cameras are to be connected to the Single board computers (Rpi).
- The single board computers can act as the servers serving the higher end system, used for real-time monitoring, which can act as the client.

### **SETUP ELABORATION:**

The feed of the cameras are taken into the single board computers via standard wirings. Further to which it's passed on to a custom object detection model, running within the board, specifically designed to detect humans (With reference to the solution in the previous report). As the output of the detection model, frames with bounding boxes around the humans are obtained.

The bounding boxes can be taken as references for cropping those specific portions of the frames where a person is detected. These can be further fed to

the high end client system upon request or at regular intervals for pose estimation of the target inmate.

The interaction between the client system and the server single board computers can be with micro-services based frameworks like Flask.

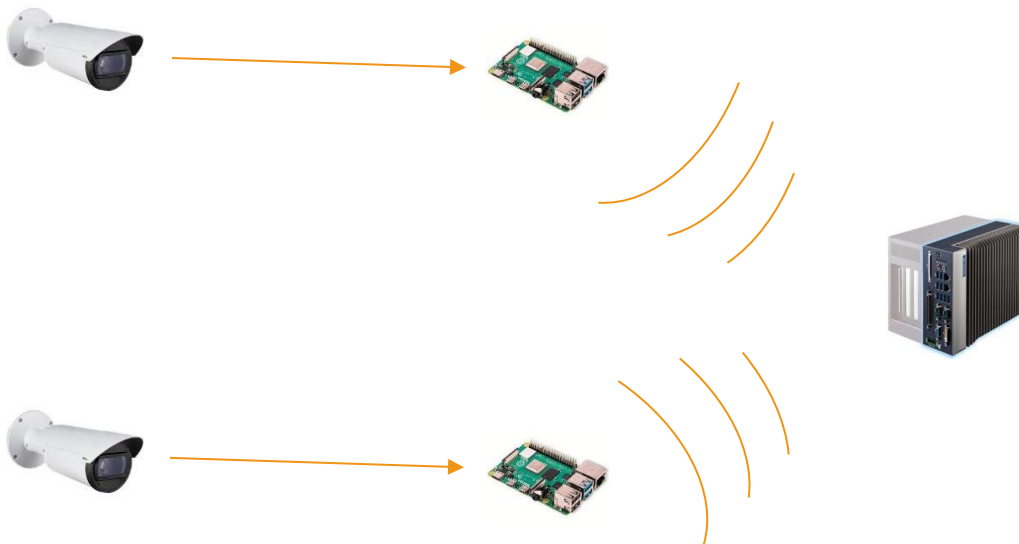


Fig 1: Setup Visualization for the model 1

## **MODEL 2(At the Edge)**

### **Assumptions:**

Number of rooms under surveillance: 2

Number of inmates under observation: 2

Number of cameras under use: 2

Number of GPU-enabled moderately-high processing systems: 1

Number of single board computers with edge computing stick/

Edge computing dev boards : 2

## SETUP DESCRIPTION:

- 1 Camera (IR + RGB) each is to be setup in each of the two rooms.
- Cameras are to be connected to the Edge computing devices.
- The Edge computing devices can act as clients and the moderately higher end system can act as the central server.

## SETUP ELABORATION:

Unlike the previous setup, in this case all the required processing happens end-to-end at the edge with help of the advanced edge computing devices capable of performing complex computations.

Henceforth, the edge devices can perform the real-time surveillance of the inmates and report back to the server end only at the time of emergencies. Like mentioned in the previous setup, in this case also the complete interaction between the server and the client can be wrapped in a micro-service based framework using Flask.

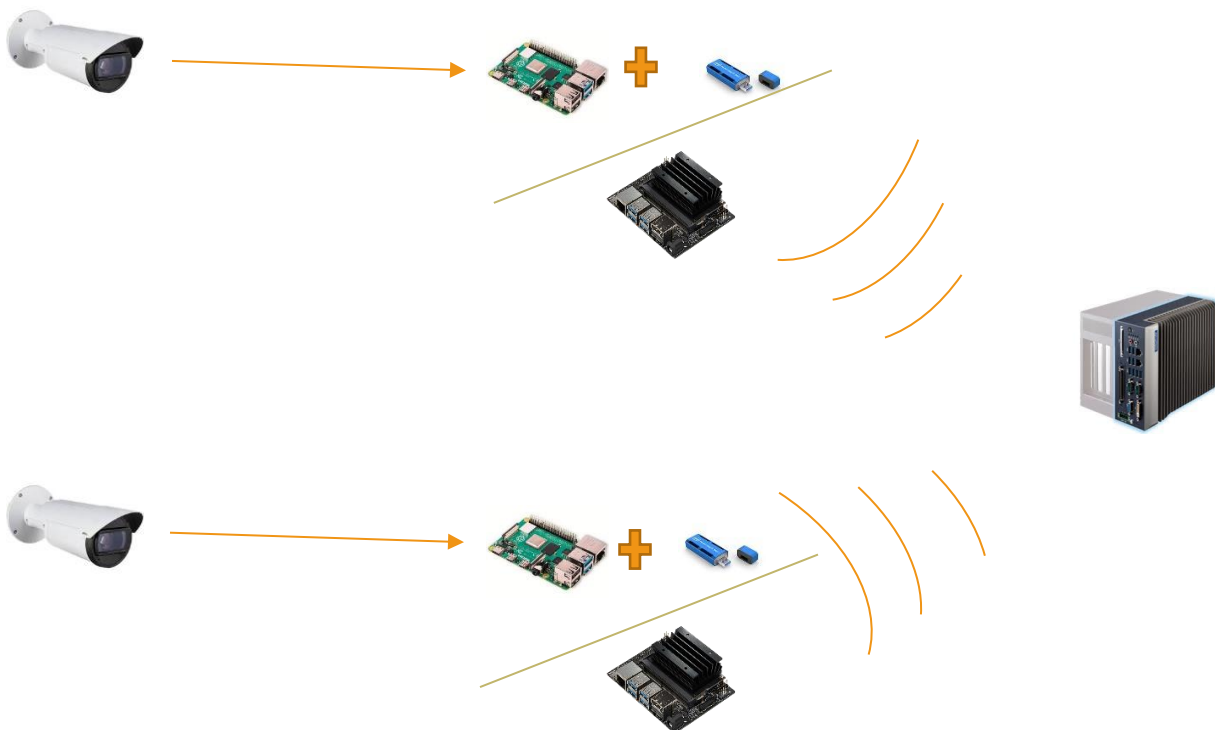


Fig 2: Setup Visualization for the model 2

## COST OF IMPLEMENTATION:

### Model 1:

Component	Unit X Cost/Un	Cost				
Cameras	2x(3000-5000)	~(6000-10,000)				
GPU enabled High-end Processor	~2,00,000	~2,00,000				
Single board computers(Rpi)	2x(4500-5000)	~(9000-10,000)				
<b>Total Cost = ~(2,15,000-2,20,000)</b>						
** All prices are in INR						

### Model 2:

Components	Unit X Cost/Unit	Cost
Cameras	2x(3000-5000)	~(6000-10,000)
GPU enabled High-end Processor	~(1,50,000-1,75,000)	~(1,50,000-1,75,000)
Single board computers(Rpi) with Compute Sticks / Nvidia jetson nano / Coral Dev Board	2x((4800)+(8500)) / 2x 10,000 / 2x 12,000	~26,600 / ~ 20,000 / ~24,000
<b>Total Cost = ~(1,76,000-2,11,600)</b>		
** All prices are in INR		

## **References:**

1. <https://towardsdatascience.com/google-coral-edge-tpu-board-vs-nvidia-jetson-nano-dev-board-hardware-comparison-31660a8bda88>
2. <https://coral.ai/docs/dev-board/datasheet/>
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5. <https://dev.to/sahilrajput/install-flask-and-create-your-first-web-application-2dba>
6. <https://software.intel.com/en-us/articles/raspberry-pi-4-and-intel-neural-compute-stick-2-setup>