MSI

**Nursing call**-This segment aims to demonstrate the functionality of a nursing call system in case of emergency messages, integrated with elevator management in a healthcare facility. The system involves several supporting projects acting as simulators, such as ESPAX protocol system for healthcare devices and Modbus for elevators, alongside other medical devices. To ensure clear visibility of the system's operation, Web Sockets have been utilized, to minimize communication delays between web/mobile applications and the security control.
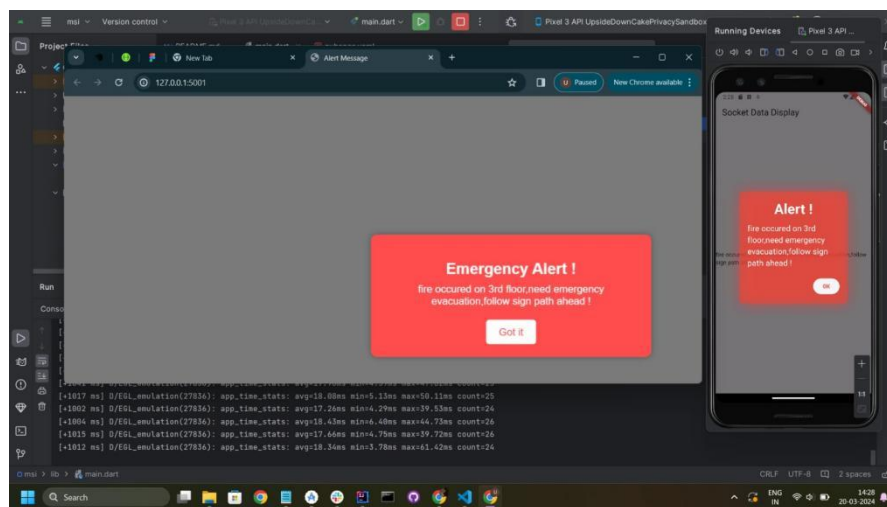
In the demonstration, when a healthcare device transmits an emergency message to a specific IP address over WiFi on a designated port, the message get received by the server running on the same network. Subsequently, the server forwards the message to the application, where the data is saved for the record and pattern observation purpose, and root messages will be extracted, which will be then displayed on the user interface.

Upon user(nurse) approval of the elevator blocking request, the server communicates with the elevator simulation to obtain its current position and the requested emergency floor number. From this point onwards, the server maintains continuous communication with the elevator, receiving updates on its movement floor by floor.However for replication here the elevator client will send json values randomly, every after 1 second ,as if it is sending moving information.

To ensure the stability and regulation of elevator movement, the system requires specific data updates, including:

1-Elevator's current floor

2-Elevator's moving direction (in case of pre-occupancy or during movement)

Additionally, the system needs to convey several requests to the elevator simulation, such as:

1-Requested floor number

2-Sending updates after every floor crossed in route to the destination floor number (for estimating arrival time accurately)

3-Requesting an alarm message upon arrival at the destination floor.

Upon the elevator's arrival, the application receives a notification message.

This process concludes at this stage and restarts only when a new alarming incident occurs. The project ensures that two concurrent incidents do not conflict with each other.

IPTV System- for customizing and regulating purpose, we are using ulr based apple's M3U8 files for operation of channels on which displays will be seen. Program will open a window where user will be asked to load channels,
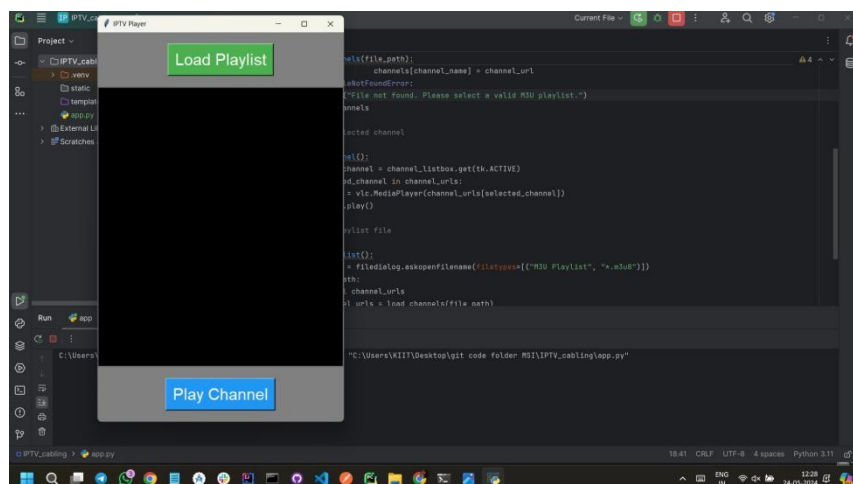
 tapping on which it will ask for the selection of file which stores the urls with respect of channel names.
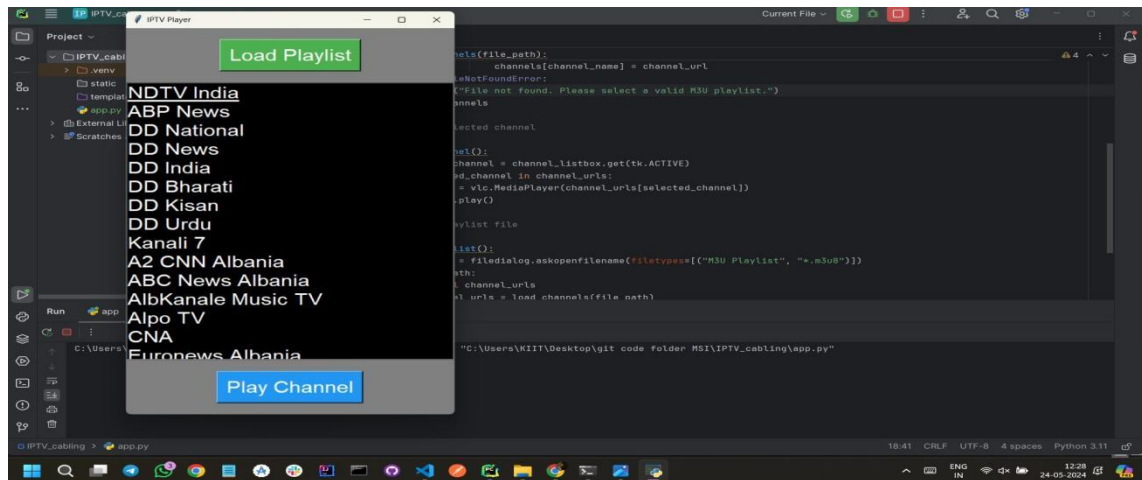
 now it will open a list of channels ,where user can select one from the list. Now tap on play channel and it will start playing the media.
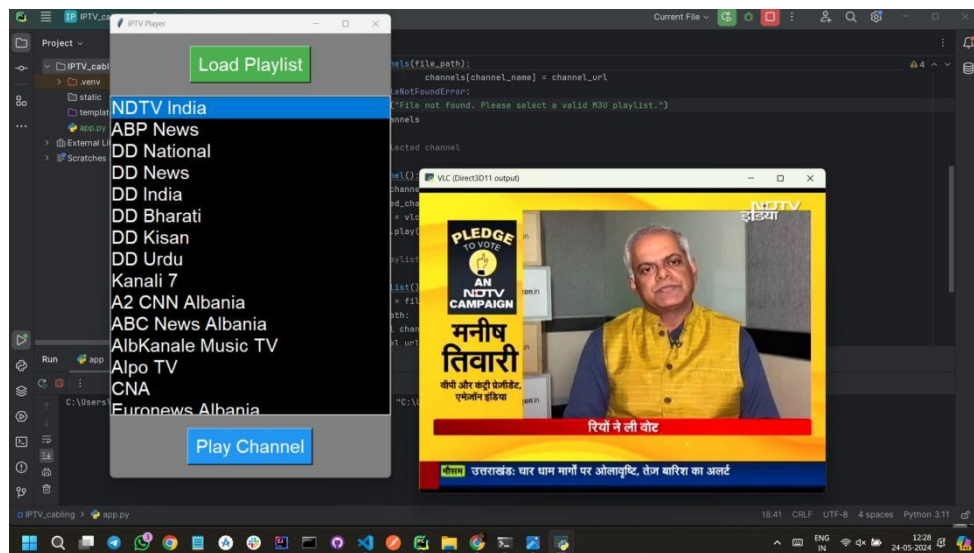

waste management- this segment will handle the message coming from the smart dustbins and laundry (it can be ultrasonic ,weight ,infrared sensor based or etc),the data as fill level ,battery(in case of recharge),location and deviceID will be received in a json format and will be processed and reflected on the application. In case of filling over 80 percent application will receive a popup indicating required action for the particular device.

Smart UltraSonic Dustbin Data

| Device ID	Timestamp	Fill Level	Location (Latitude)	Location (Longitude)	Battery Status	Temperature	Humidity	Operational Status	Alerts
bin1234	2024-05-24T06:33:38Z		40.7128	-74.006		16.69032311467902	87.65510791413767	normal	
bin1234	2024-05-24T06:33:48Z		40.7128	-74.006		30.65382159701022	45.389979894623394	normal	
bin1234	2024-05-24T06:33:58Z		40.7128	-74.006		31.578368681487557	57.74109732865466	normal	
bin1234	2024-05-24T06:34:08Z		40.7128	-74.006		32.75863901696769	64.194554348433	normal	
bin1234	2024-05-24T06:34:18Z		40.7128	-74.006		32.158636054961704	31.33283174614154	normal	
bin1234	2024-05-24T06:34:28Z		40.7128	-74.006		33.2113096498846	34.95986974834693	normal	
bin1234	2024-05-24T06:34:38Z		40.7128	-74.006		28.493763500531788	69.887522282363086	normal	
bin1234	2024-05-24T06:34:48Z		40.7128	-74.006		30.459256386135586	45.93542932665624	normal	
bin1234	2024-05-24T06:34:58Z		40.7128	-74.006		22.065343217755938	70.38766466656742	normal	
bin1234	2024-05-24T06:35:08Z		40.7128	-74.006		22.557058371889326	49.38118805830332	normal	
bin1234	2024-05-24T06:35:18Z		40.7128	-74.006		31.66722292017757	81.70867923330013	normal	
bin1234	2024-05-24T06:35:28Z		40.7128	-74.006		32.391028803220564	48.35752460034531	normal	

GPS- GPS ,RFID(radio frequency) based sensors will send the latitude and longitude of assets of hospital to the server(in this case my mobile phone is sending the data via own tracks application) and the server will transmit the data to the application where it will be shown in a user friendly map way. For closer proximity BLE (low frequency Bluetooth devices) can be used. Any change in data will be recorded as a movement of asset in the server.
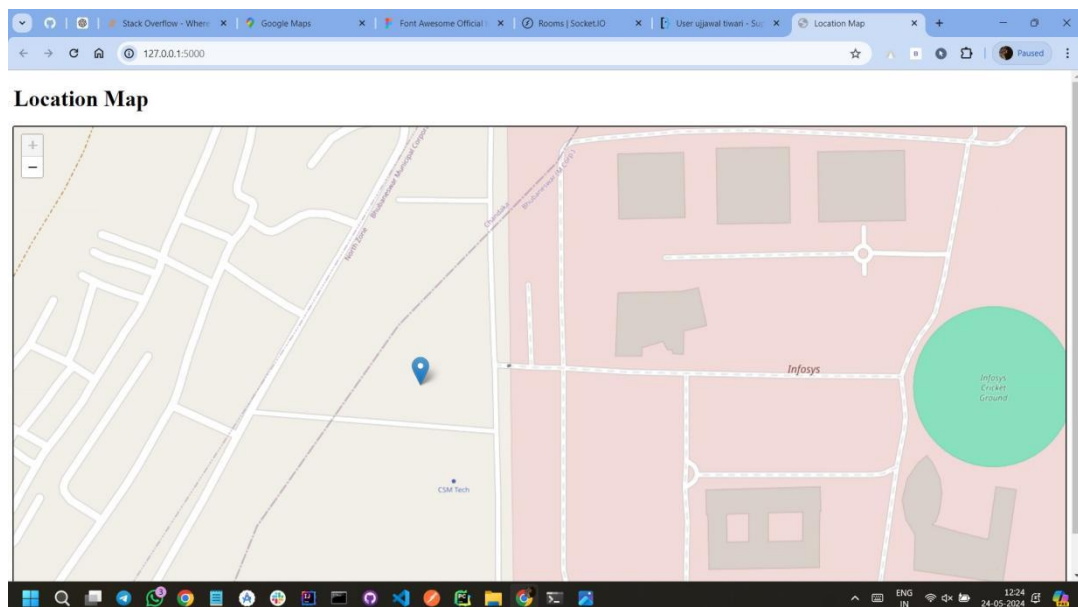
ECG- machine will send the heart rate frequency as decimal data to the server and server will transmit data to app to plot graph on the nursing page.
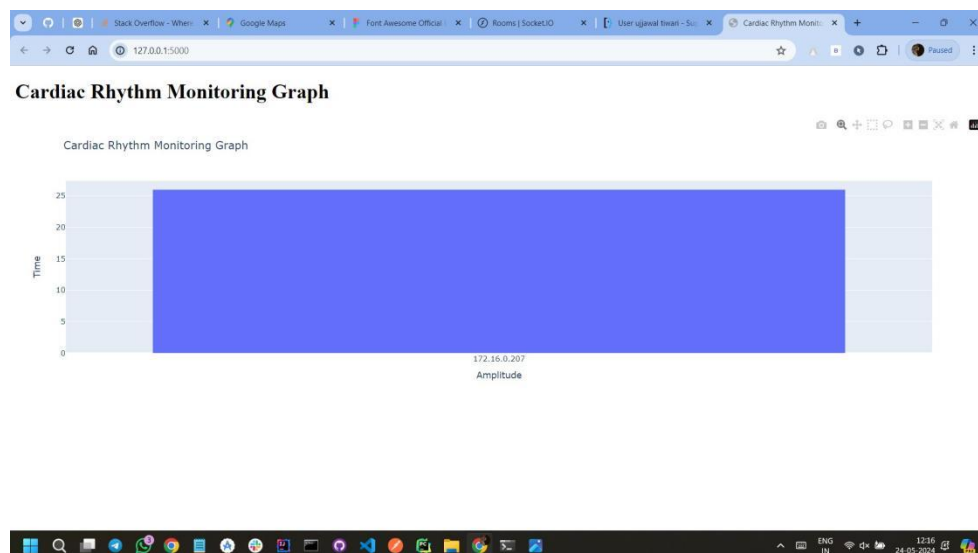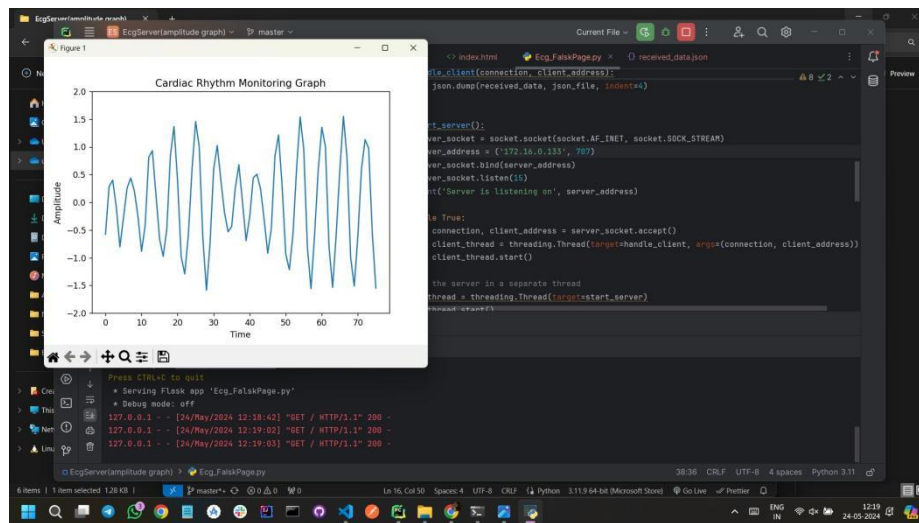
CCTV & optics- this segment involves three branch, security ,regulation and entrance services. the security camera will be integrated with this ML program to identify objects and backgrounds of over 80 types. And any anomalies can be reported quickly.
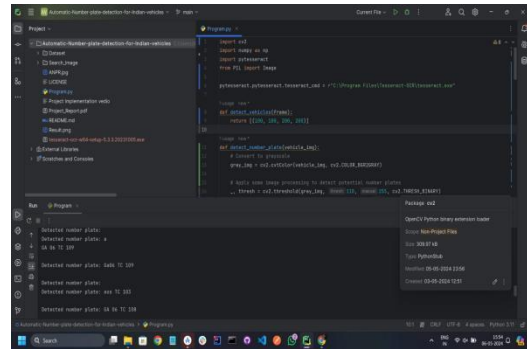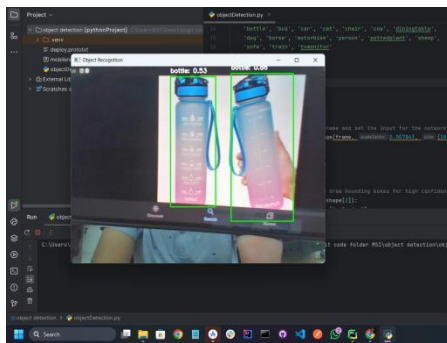
the regulatory camera will ensure the entrance permission of only authorized person. This program, have a record(Picture) related to the person and when it matches with the optics coming will allow the pass.
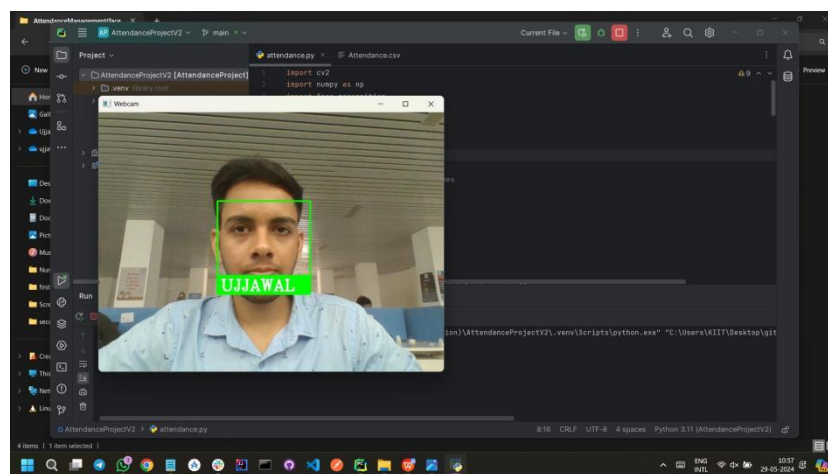

Next it car number plate detection camera which is extracting the texts and digits from the car's number plate. Using of COCO(common objects in context) have reduced the work load significantly as this module already have over 440000 images as pretrained model.

The below image represents a complete list of 80 classes that COCO has to offer.

person	fire hydrant	elephant	skis	wine glass	broccoli	dining table	toaster
bicycle	stop sign	bear	snowboard	cup	carrot	toilet	sink
car	parking meter	zebra	sports ball	fork	hot dog	tv	refrigerator
motorcycle	bench	giraffe	kite	knife	pizza	laptop	book
airplane	bird	backpack	baseball bat	spoon	donut	mouse	clock
bus	cat	umbrella	baseball glove	bowl	cake	remote	vase
train	dog	handbag	skateboard	banana	chair	keyboard	scissors
truck	horse	tie	surfboard	apple	couch	cell phone	teddy bear
boat	sheep	suitcase	tennis racket	sandwich	potted plant	microwave	hair drier
traffic light	cow	frisbee	bottle	orange	bed	oven	toothbrush

Hospital Navigation System-
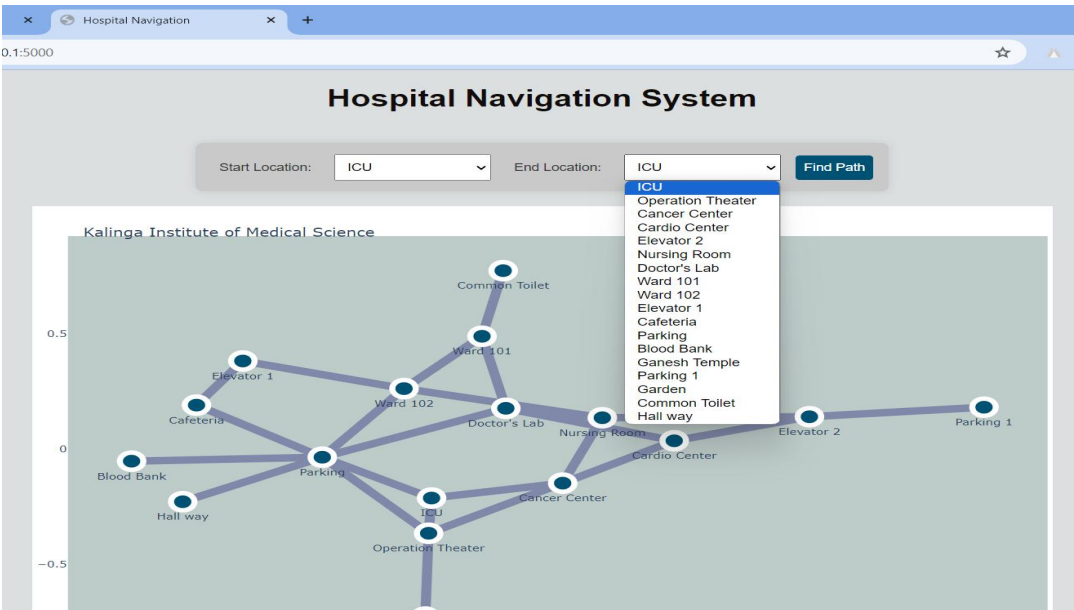
In a big Health facility Infrastructure (for example KIMS) another challenge is to find appropriate and convenient route to your desired station which can not be traced by google map or other global maps .

To solve this issue,A web application can be developed which can navigate user through shortest possible path.User just need to select starting and destination point from the drop down menu of the top left corner in the screen. And then click on "find path" , then user will realize a yellow highlighted path in between the initial and final point. This is the suggested path user can follow.
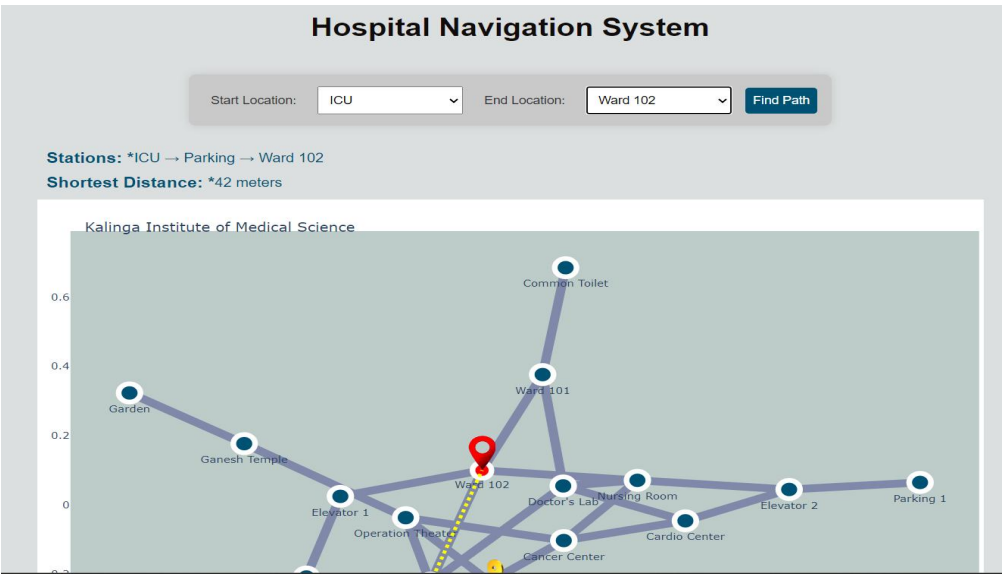
This flask application is using nx.networkx (nx.shortest_path) named library in python which works same as Dijkstra algorithm to find shortest path,in a given graph. The graph is getting generated by connecting nodes(ex- ICU,Ward 102 etc) Connecting nearby nodes to each other this program finds a route and show it on the app.

Shortest path- will write all the stations in between the destination ,and gives calculated distance in meters.