A report from the AAA Foundation shows that 16.5% of deadly car accidents are due to drowsy driving. Sleeplessness reduces your alertness, judgment, and reaction time just like drug and alcohol use. Drowsy driving, therefore, can be compared to drunk driving and both are really dangerous for drivers especially at night.

To put an end to such incidents, we have come up with an IOT-based solution. The solution involves a dashboard camera, RaspberryPi, and a speaker as its only hardware components. To facilitate sleep detection, we use dlib and OpenCV libraries to track 68-facial landmarks of the driver to measure his Eye-Aspect Ratio (EAR) and Yawn percentage. The EAR is calculated based on the following formula (p1-p6 signify the landmarks) :

$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

We compare the values with a statistically set threshold to send alerts to the driver and wake him up.

After the EAR and the yawn data is obtained from the raspberry Pi, we have built a dashboard that serves the purpose of monitoring the status of drivers virtually. For this purpose, wesend the data of both EAR and yawn to an IOT Hub as a message in json format. The data received by the IOT Hub is then routed to a built-in end point(a default Event Hub) that serves as an intermediate for Stream Analytics job on the Azure Portal. The Stream Analytics is capable of performing Edge Computing on the data.

Finally, we have deployed an application at the URL: https://drow-deploy.herokuapp.com/ showing the calculated data graphically in real time on a dashboard built using PowerBI.