Component	Specifications	Reason(s)
Nvidia Jetson Orin Nano Super Developer Kit	CPU: 6-core ARM Cortex-A78AE 64-bit, GPU: 1024-core NVIDIA Ampere, Storage: microSD (Expandable), RAM: 8GB LPDDR5, Interfaces: 2x USB 3.2, 1x HDMI, 1x M.2 Key M, 1x M.2 Key E, Camera: 2x MIPI CSI-2	● Run images through model quickly ● Push data to cloud without compromising system performance ● Has CUDA acceleration and dedicated GPU cores for our workload
PI NOIR CAMERA V2 IMX219 8MP	Resolution: 8MP (3280 × 2464), Sensor: Sony IMX219, Interface: MIPI CSI-2, Features: No IR filter for night vision	● 8MP because the subject is within 1m ● No IR to capture images in any lighting conditions ● Manufacturer and Community supported
4.3-inch HDMI LCD 800x480 IPS Capacitive Touch Screen	Resolution: 800 × 480, Display Type: IPS LCD, Touch: Capacitive, Interface: HDMI + USB (for touch), Power: 5V	● Small screen that isn't intrusive when driving ● Touch for easy interaction (dismissing alerts) ● Compatible with Jetson over DisplayPort (manufacturer supported)
DC 3.3-5V Passive Low-Level Trigger Buzzer Alarm Module	Voltage: 3.3V-5V, Trigger: Low-level signal, Type: Passive buzzer	● To distinguish from regular speaker noise ● Simple and constant tone that is loud/irritating ● Easy to program tunes using PWM signals
GY-521 MPU-6050 3-Axis Accelerometer and Gyroscope	Sensor: MPU-6050, Interface: I2C, Axes: 3-Axis Accelerometer + 3-Axis Gyroscope, Voltage: 3.3V-5V	● To collect vehicle metrics to determine the state of the car and driver ● Industry-standard and highly compatible six-axis IMU providing all position vectors needed to find out information about the driver
Thin Film Pressure Sensor Flex Bend Sensor	Type: Thin Film Pressure Sensor, Range: Up to 10kg, Interface: Analog	● Used to measure pressure applied to steering wheel as a metric for determining drowsiness

SF15 600 10kg		• Thin and flat, able to fit on steering wheel without impeding driver
Digital ADC Module 16-Bit ADS1115 I2C 4-Channel ADC	Resolution: 16-bit, Channels: 4, Interface: I2C, Voltage: 2V - 5.5V	• Interface between pressure sensor and Jetson because Jetson doesn't have an onboard ADC • Highly configurable chip
Heart Rate Sensor Module MAX30102	Measures: Heart Rate, SpO2 (Blood Oxygen), Interface: I2C, Voltage: 1.8V - 3.3V	• Used to measure heart rate of driver as a metric for determining drowsiness • Small and compact, allowing easy integration without impeding driver and other components
Infineon BGT60TR13C 60 GHz mmWave Sensor	Frequency: 60 GHz, Range: Up to several meters, Resolution: High-precision motion and vital sign detection, Interface: SPI, Power: Low-power operation	• Tracks human vitals (heart rate, respiration) without contact • Works in any lighting condition • Detects through obstructions (e.g., clothing, blankets)
AW-CB375NF Dual-Band Wireless NIC	Wi-Fi: IEEE 802.11a/b/g/n/ac, Dual-Band 2.4GHz (up to 300Mbps) and 5GHz (up to 867Mbps), Interface: NGFF (M.2 A/E Key) Bluetooth: Version 5.0, Supports BLE, Voltage: 3.5V	• Provides high-speed wireless connectivity and Bluetooth support for devices with an M.2 A/E Key slot.