

Internet of Things: Assignment 1

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Solution:

- (a) I will build a smart glass for visually-challenged people, which will help them identify objects, obstructions, traffic, road-crossings and also people with the help of a face-recognition system.

It will use machine-learning models for identifying things in real time and with the help of the audio modules, it will be able to convert the visual output to audio format to be perceived by its users. We can also incorporate distance seeking features for better traffic analysis.

- (b) Sensors and devices required for the IoT application are:

1. Raspberry Pi
2. Raspberry Pi compatible camera module
3. Micro SD Card, and
4. Power Supply

- (c) The particular models of sensors or devices that can be used for the mentioned IoT application are:

1. Raspberry Pi 4 model (2 or 4 GB RAM) : The reason behind choosing the particular model is the motive of training a machine-learning model on it. Two Gigabytes of memory should be optimal for our purpose and also it comes with a fairly powerful processor.
2. Raspberry Pi NoIR Camera Board (Sony IMX219 8-Megapixel Sensor): It can perform better in facial recognition tasks than 5MP cameras and it also provides good resolution of images (may be helpful in depth or distance sensing).
3. Any 5V power supply (Type C) : As recommended for the chosen Raspberry Pi model.
4. Any micro SD card (preferably 2 GB or 4 GB).

- (d) The specific power requirements and technical details are:

1. 5V power supply is sufficient to run a Raspberry Pi. Also trained and pickled models can be used while application with adaptive power usage mode in Raspberry Pi to reduce the power usage while running.
2. The mentioned camera sensor is able to produce 1080p and 30Hz (resolution and refresh rate) of video but using high resolution will increase power

usage, so we will lower the resolution down to 720p and 60Hz. It also supports 640x480p and 90Hz which is worth testing if it optimizes the system better.

3. The device's accuracy depends on the accuracy of the machine-learning model, dataset used and its optimizations.
4. If trained and applied properly, the IoT device will be able to predict and identify objects within the range of 2 to 3 meters with an accuracy above at least 80 to 90%.