Social Distancing Detection Algorithm Based on Bluetooth

By: Hessa AlBawardi

Social distancing is one of the main preventive measures followed to help in controlling the spread of COVID-19. An application of Bluetooth can be used to help people keep the safe distance by generating an alert when the distance between two users is less the 2 meters. Each user will have a wearable node based on BlueNRG-1 which is a low power Bluetooth low energy (BLE). The nodes continuously scan for similar beacons within the range. The design has three areas:

- Risk area: 2 meters or less
- Pre-risk area: 3 meters
- Safe area: more than 3 meters

The proximity detection algorithm will work by advertising and scanning simultaneously. It will send signals and scan for other beacons. If a signal is detected, the distance will be calculated using the formula:

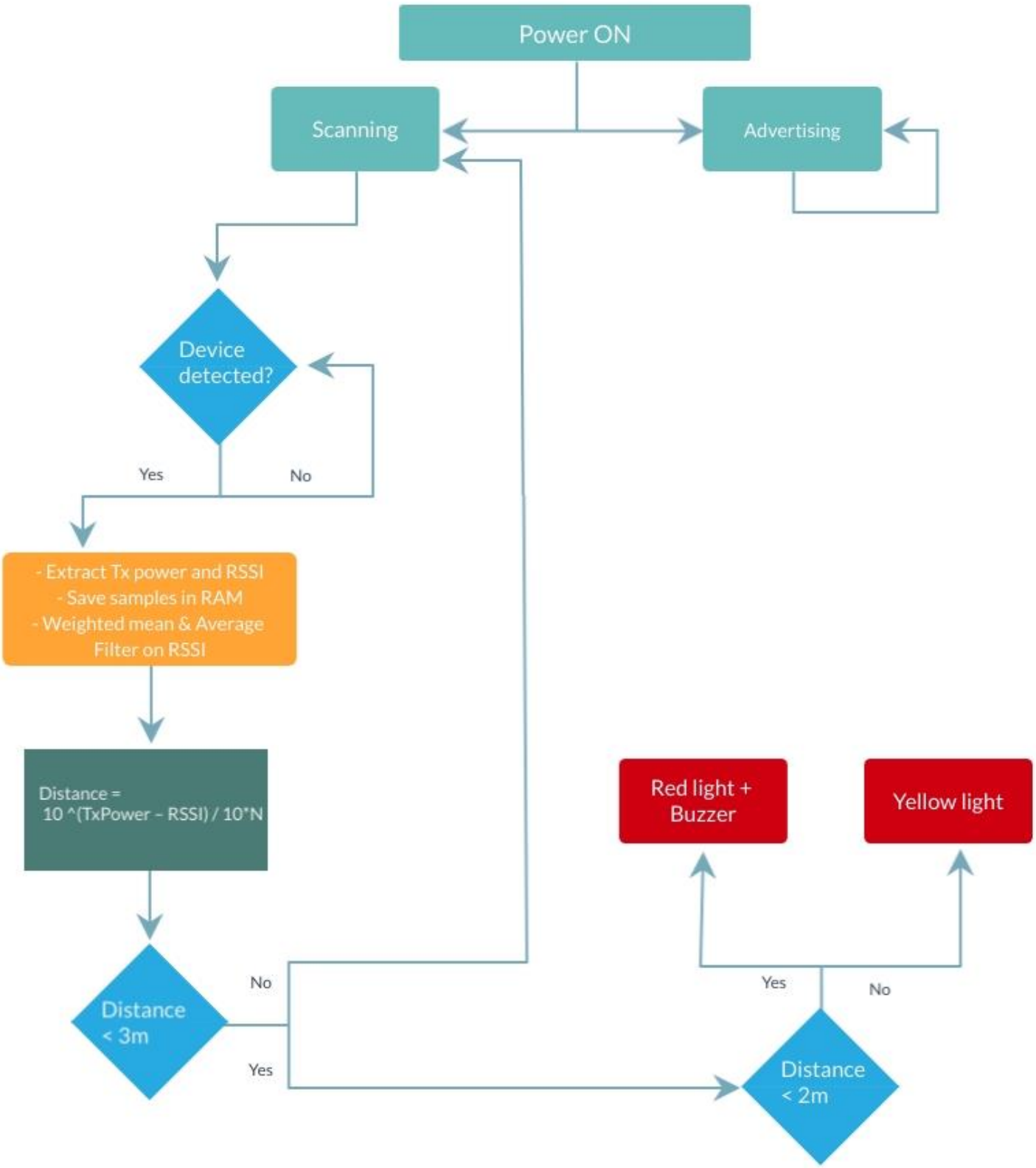
Distance = 10 ^ TxPower – RSSI / 10*N

TxPower: Transmitted power

RSSI: Received signal strength indication

N: Environmental factor

When the distance is in the risk area a red light will be generated along with a buzzer. If it is in the pre-risk area a yellow light will be generated and in the safe area there will be no alert. The flowchart of the algorithm is shown below.


Power ON
Scanning
Advertising
Device detected?
Yes
No
- Extract Tx power and RSSI
- Save samples in RAM
- Weighted mean & Average Filter on RSSI
Distance =
10 ^(TxPower – RSSI) / 10*N
Distance < 3m
No
Yes
Red light + Buzzer
Yellow light
Yes
No
Distance < 2m