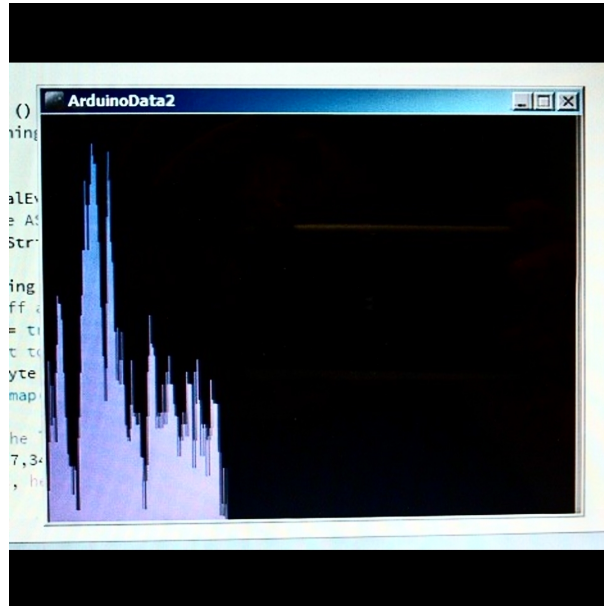


Understanding the code

Using Arduino we processed the data for attention level of the person. Following is the reference site to perform the above action:

<https://learn.sparkfun.com/tutorials/hackers-in-residence—hacking-mindwave-mobile>



Steps:

- Download the Processing software for Arduino.
- Burn the programs present in the above site for attention level detection.
- Wear the headset on the head.
- Observe the graph on your laptop/PC.

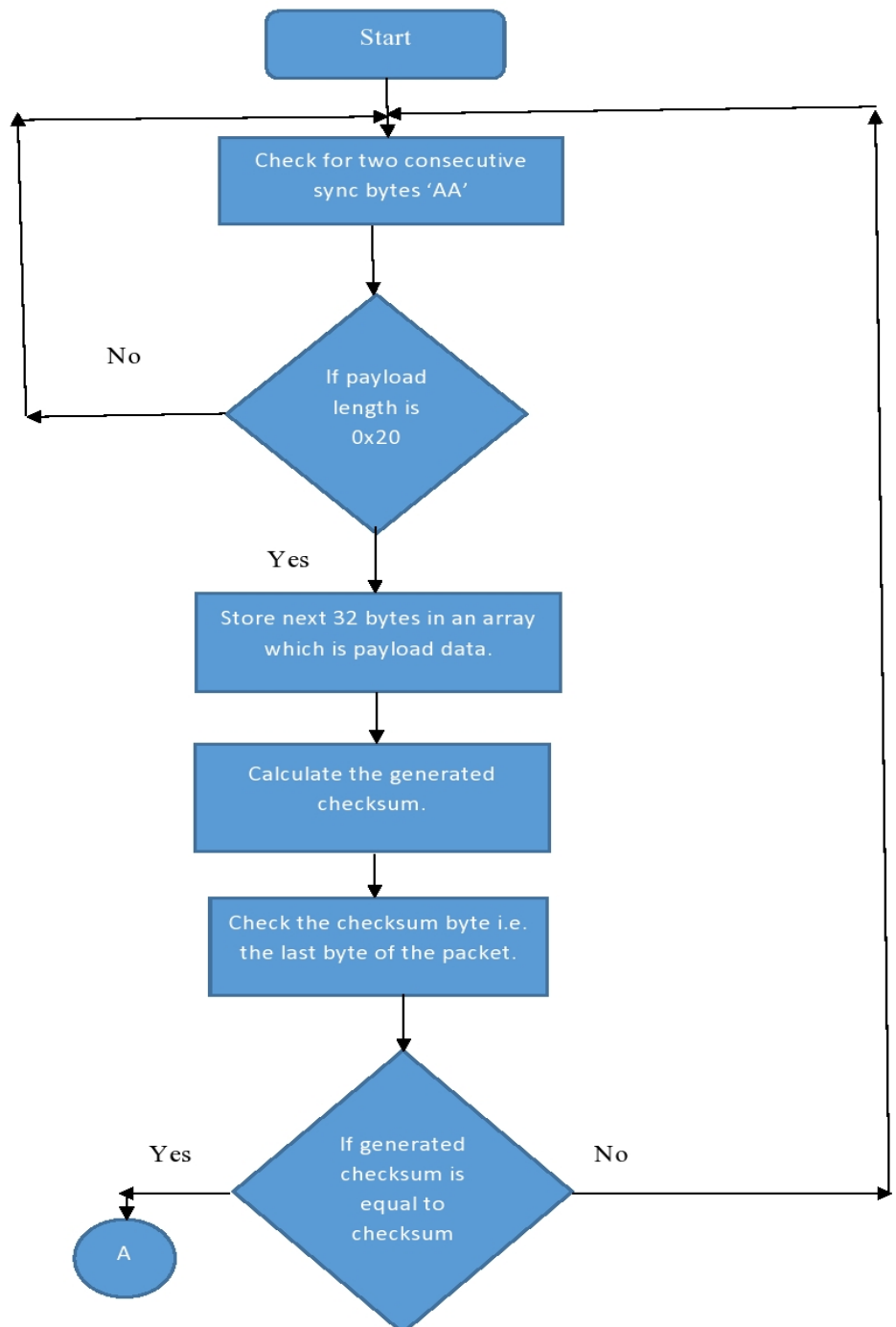
Program Descriptions:

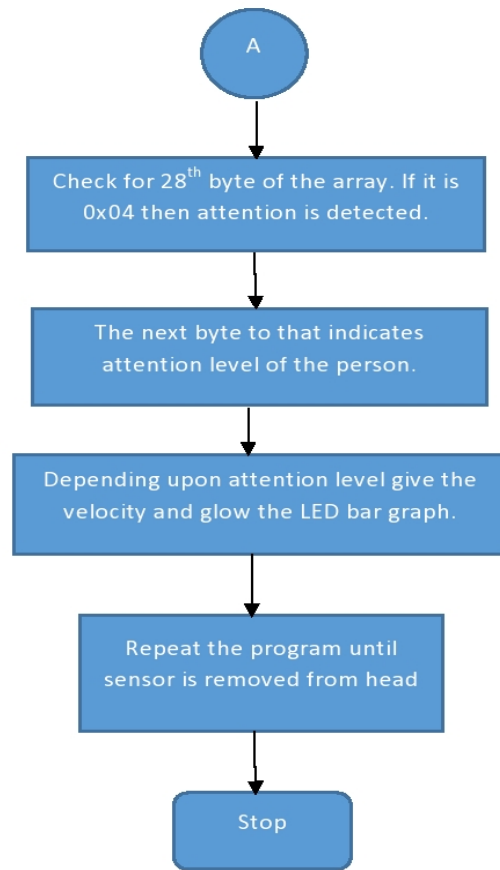
1. Program to display on LCD and LED bar graph the attention level of the person

(a) Algorithm:

- i. Initialize all required ports.
- ii. Check for two consecutive SYNC bytes AA.
- iii. Check for third byte which is the payload length.
- iv. If payload length is 0x20, then store the next 32 bytes in an array. If payload length is 0x04 then move to step no. 11
- v. Calculate the generated checksum.
- vi. If the last byte i.e. checksum byte of the data packet is equal to the generated checksum then check for 28th byte of the array.
- vii. If 28th byte is 0x04, then attention detected.
- viii. Then 29th byte indicates attention level of the person between 0-100.
- ix. If attention level lies between 0-10, it indicates mind wandering level. Indicated it with 1 LED glow.
- x. If attention level lies between 10-30, it indicates poor attention level. Indicate with 2 to 3 LEDs glow.
- xi. If attention level lies between 40-60, it indicates neutral. Indicate it with 4-5 LEDs glow.
- xii. If attention level lies between 60-80, it indicates slightly elevated. Indicate with 6-7 LEDs glow.
- xiii. If attention level is above 80, it means elevated level of attention. Indicate with all LEDs glow.

1.1. Flowchart:



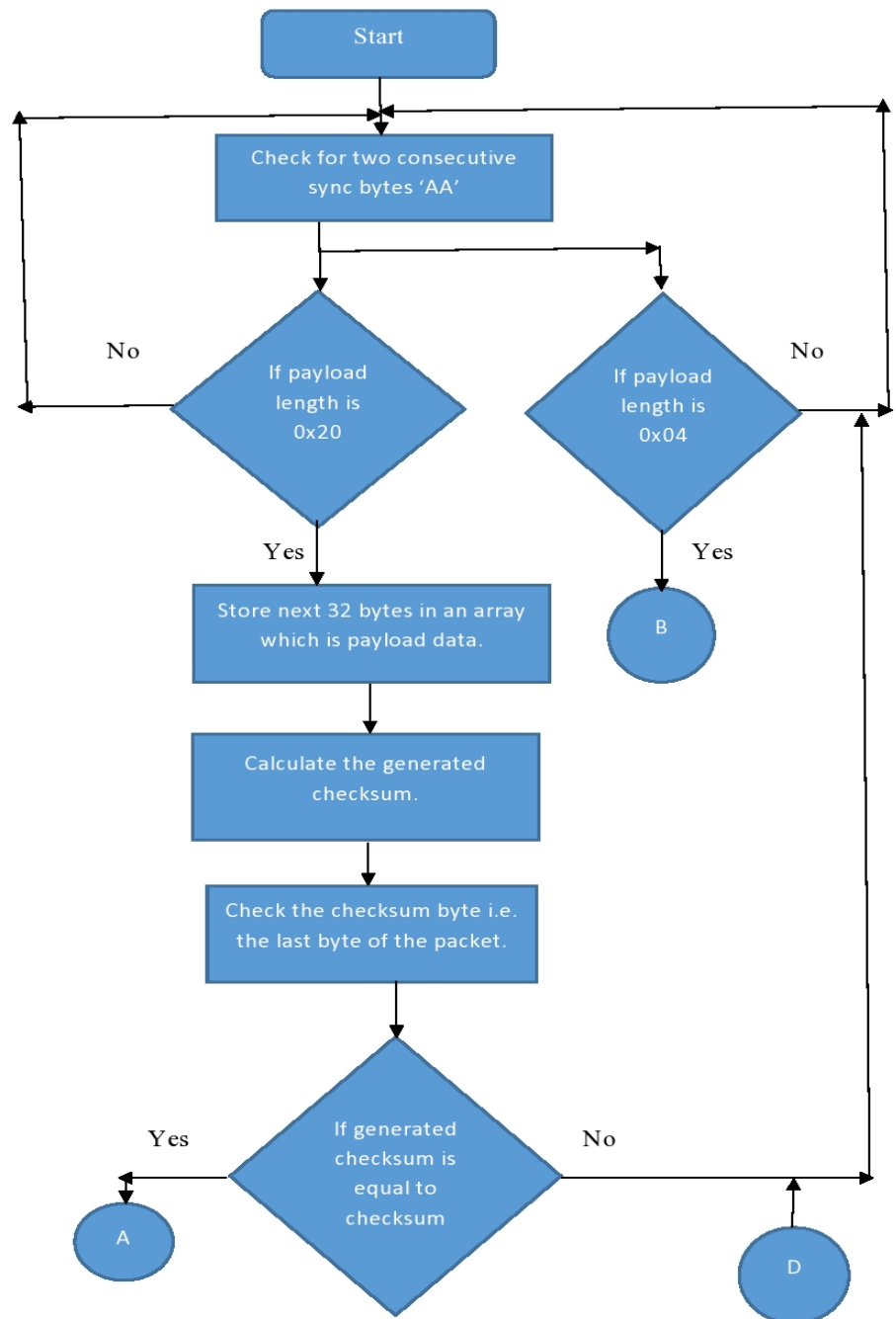


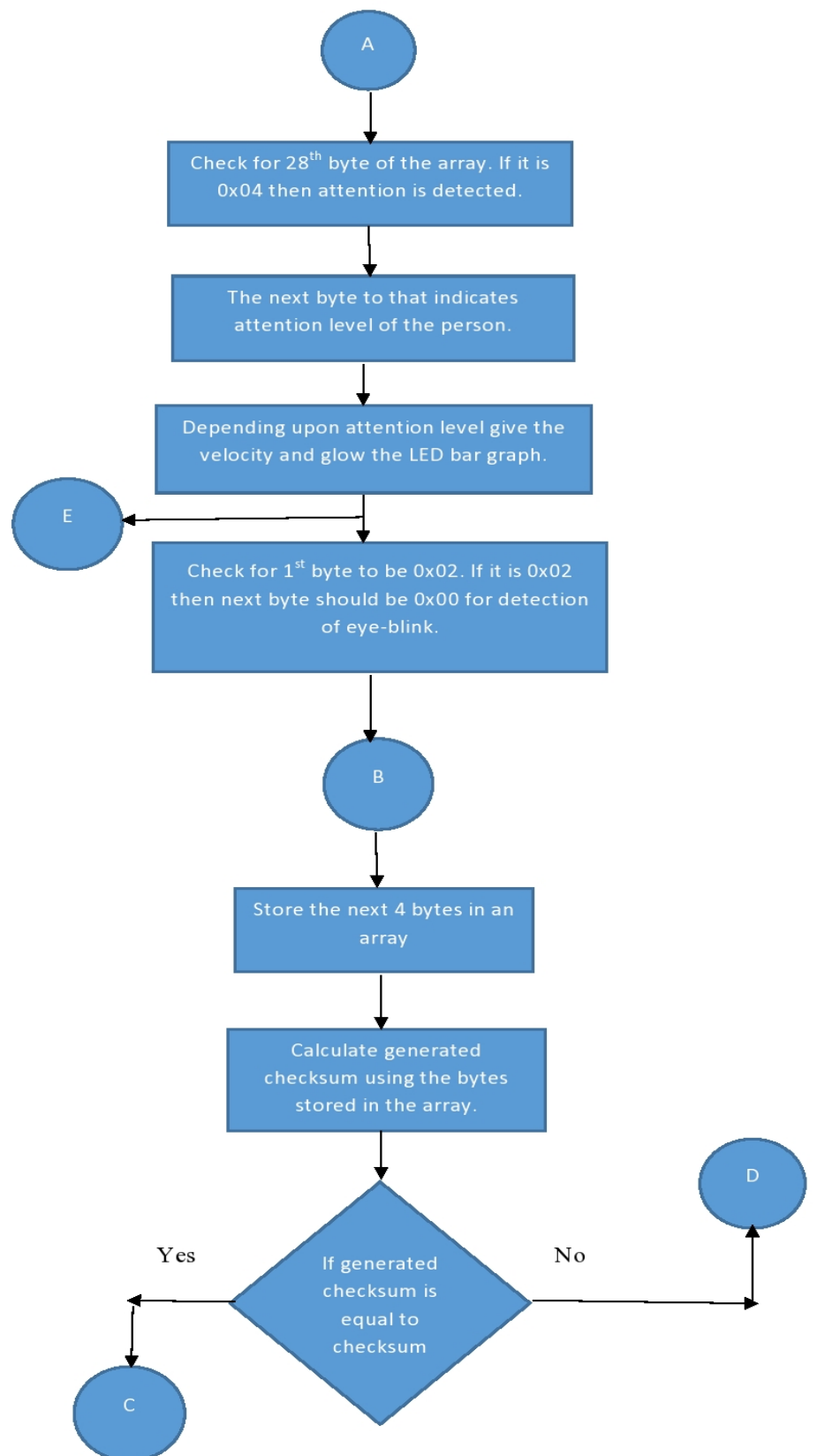
2. Program to control Firebird V using Attention level and eye-blink.

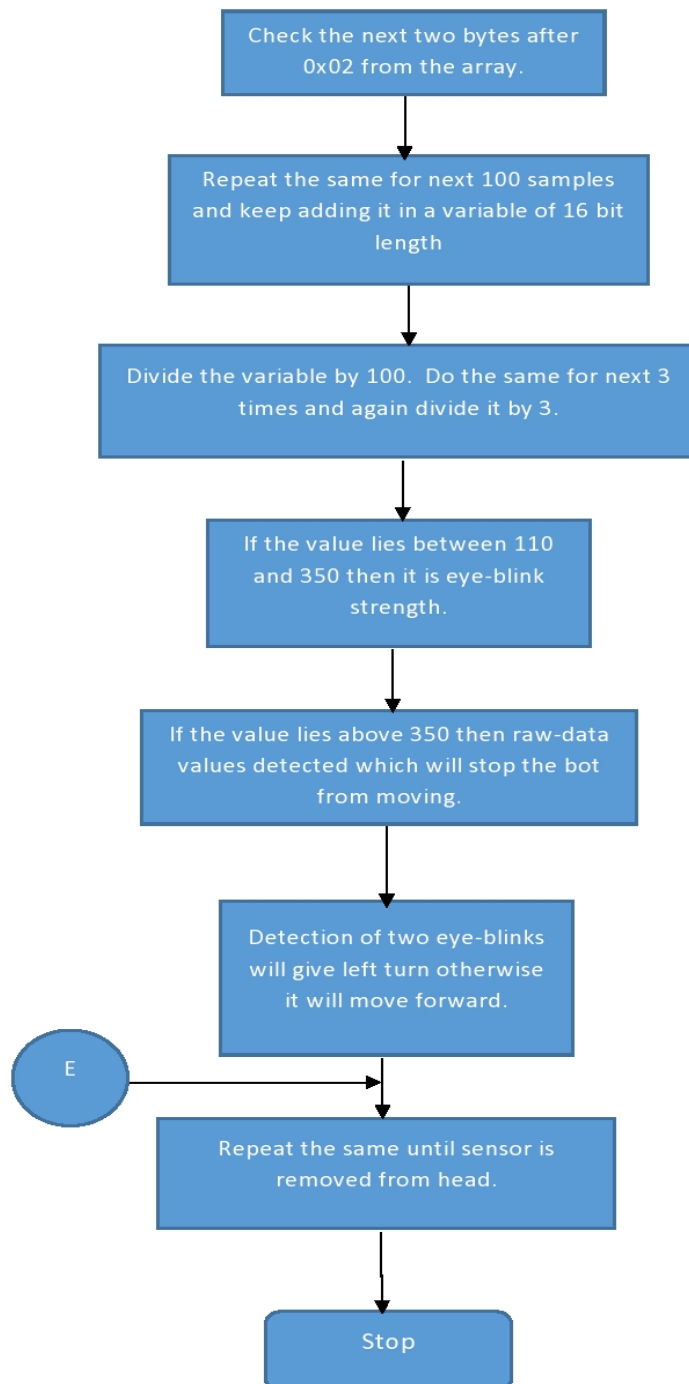
(a) Algorithm:

- i. Initialize all required ports.
- ii. Check for two consecutive SYNC bytes AA.
- iii. Check for third byte which is the payload length.
- iv. If payload length is 0x20, then store the next 32 bytes in an array. If payload length is 0x04 then move to step no. 11
- v. Calculate the generated checksum.
- vi. If the last byte i.e. checksum byte of the data packet is equal to the generated checksum then check for 28th byte of the array.
- vii. If 28th byte is 0x04, then attention detected.
- viii. Then 29th byte indicates attention level of the person between 0-100.
- ix. Give velocity to the bot depending on the attention level.
- x. Check for 1st byte of the array. If it is 0x02, then next byte to it should be 0x00, then eye-blink can be detected.
- xi. If payload length is 0x04, then store the next 4 bytes in an array.
- xii. Store the 1st and 2nd byte after 0x02 of the array in a variable and keep adding it for next 100 data packets.
- xiii. After taking average by 100, Eye-blink strength is between 110 and 350 and raw data values ranges above 350.
- xiv. Now repeat from step 11 and 12 three times and check the eye-blink strength.
- xv. If eye- blink is given then its value will range between 110 and 350.
- xvi. Detection of such two eye-blinks will turn the bot left.
- xvii. In order to stop the bot, remove the sensor from head. It will give values above 350.

(b) Flowchart:







In this way if you understand the concept of data packets and analysed the data values properly it is possible to code for attention level, eye-blink and also for meditation level.