

EL213 - ANALOG CIRCUITS

GROUP PROJECT

Group Number : 10

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PROJECT PROBLEM

Detect whether a person is dead or alive using Arduino Nano and a BPM sensor. Transmit the message using Zigbee module to your PC.

COMPONENTS

- Arduino Nano



- Zigbee Module



- BPM Sensor



- Zigbee Module Adaptor



APPROACH

- Reading Data from BPM Sensor (Heart Rate Sensor):
 - BPM sensor or Hear Rate Sensor consists of an ambient light sensor (can be related to a type of IR LED) on one side and circuitry on the other side.
 - We need to put the light sensor side on body's specific part so that the sensor directly touches the vein that is just under the skin; for e.g. finger, back of the ear, earlobe etc.
 - The sensor would pick up the resistance value according to the light intensity flowing through the oxygenated blood.

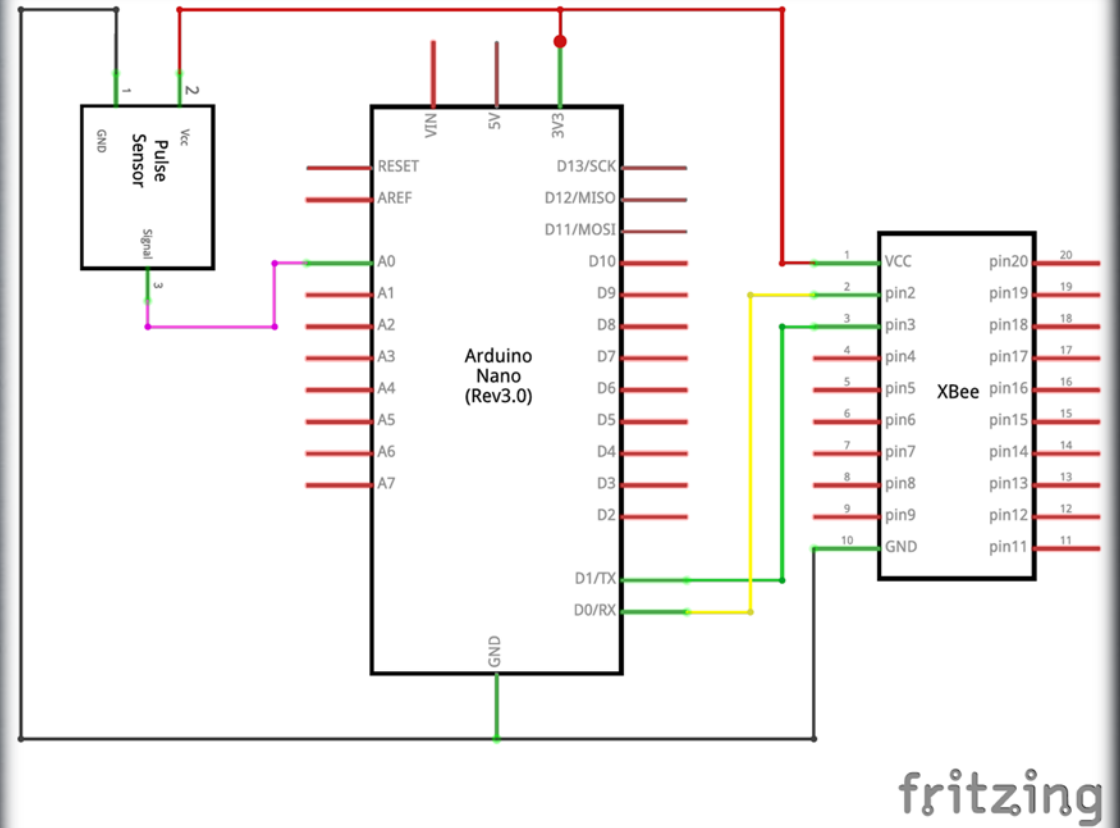
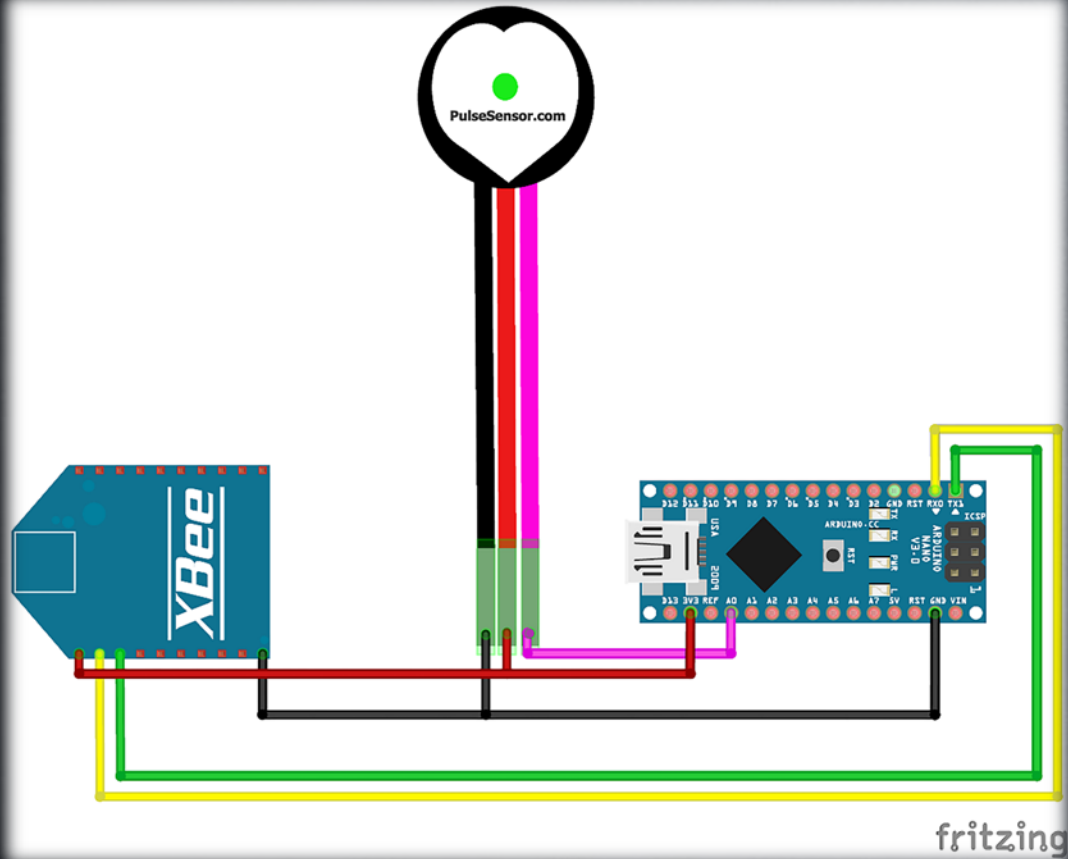
APPROACH

- Communication with ZigBee Module:
 - As we know that ZigBee technology is somewhat same like Bluetooth or Wi-Fi technology, we are going to use two of the ZigBee modules- one as coordinator and other one as an end device.
 - The end device will be attached to the PC and would be modified using Xbee USB Xplora that would receive message from other ZigBee module.
 - The coordinator would be connected to Arduino that would collect the data from the BPM sensor.

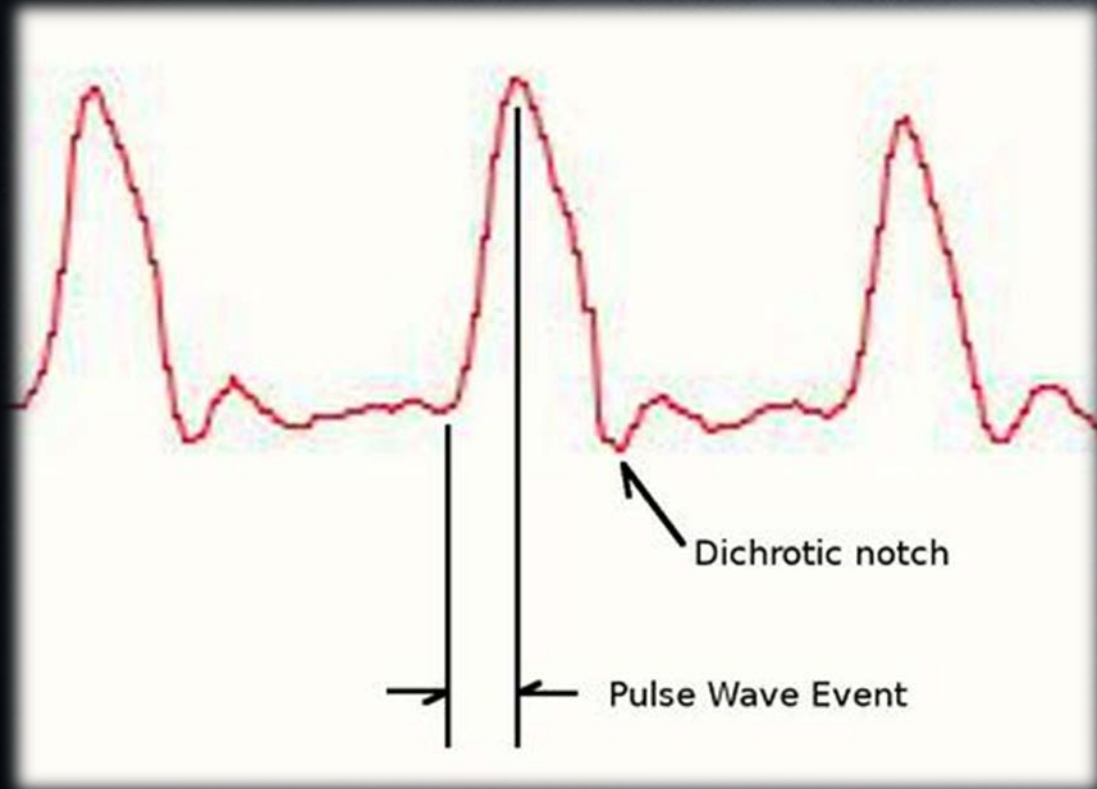
APPROACH

- How will we do it??
 - We'll connect BPM sensor and ZigBee module (router) to Arduino Nano and the other ZigBee module will be connected to PC.
 - We'll program an algorithm such that if the BPM sensor picks up a same value or a bunch of zeros for a specific time, the Arduino would send the text that the person is dead; otherwise it'd send the text that the person is alive and will show the heart-rate in bpm (beats per minute).

CIRCUIT DIAGRAM



OUTPUT DIAGRAM



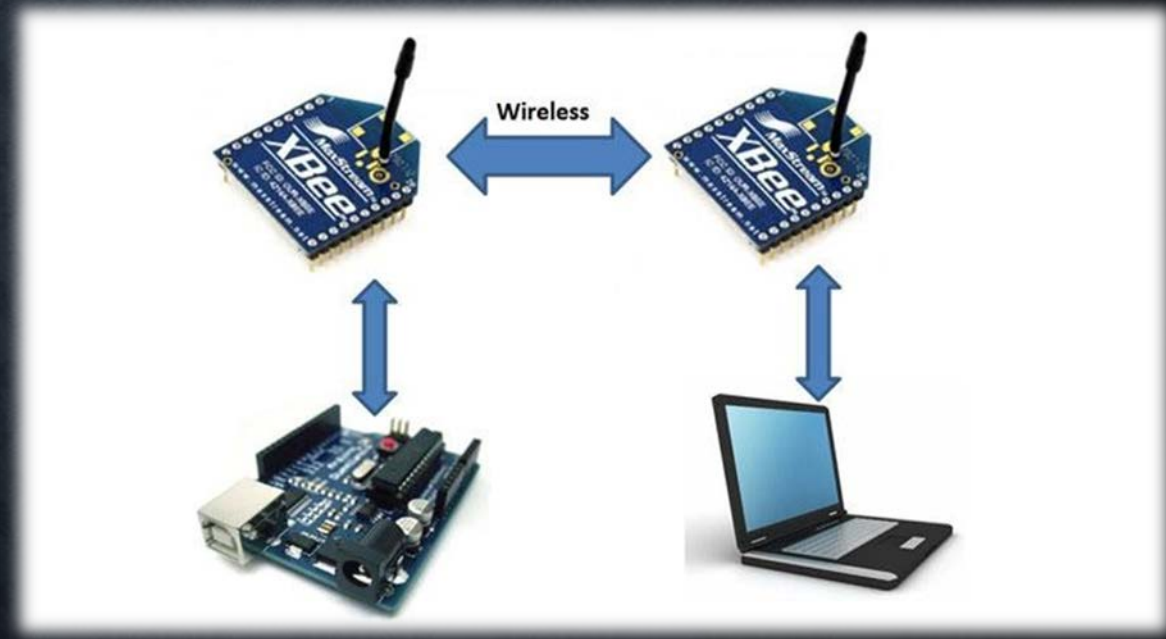
- Output waveform from bpm sensor.
- Arduino watches the analog signal from Pulse Sensor, and decides a pulse is found when the signal rises above the baseline.
- That's the moment when your capillary tissues gets slammed with a surge of fresh blood.
- Then, when the signal drops below the mid-point, Arduino sees this and gets ready to find the next pulse.

CONNECTION BETWEEN MICRO CONTROLLER AND LOCAL PC USING XBEE S2C

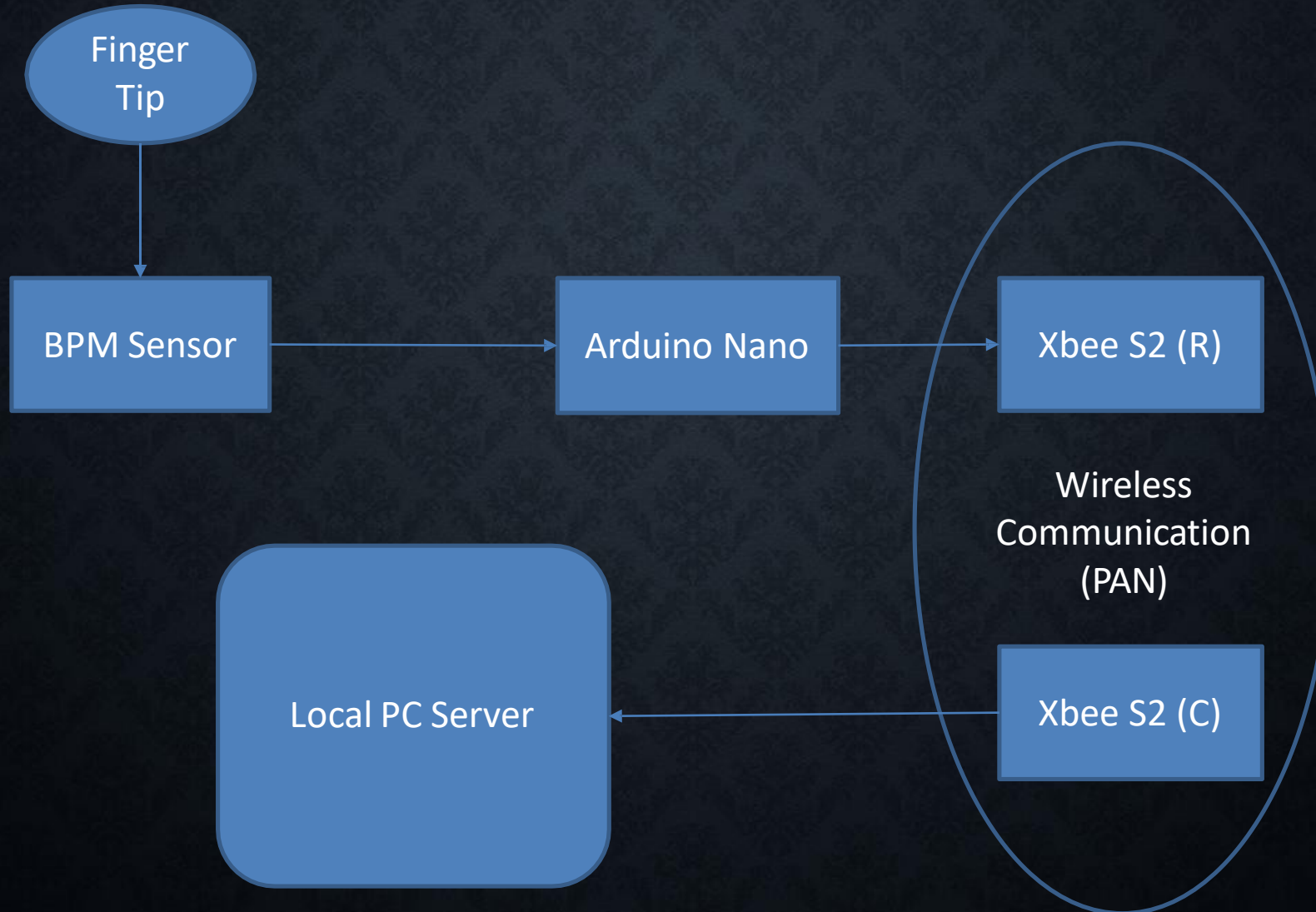
Configure connection using XCT-U Software.

https://www.youtube.com/watch?v=o2fNHdC_xCD0

Communication Between XBee Connected to Arduino and XBee Connected to Xbee Explorer USB



BLOCK DIAGRAM



OUTPUT

- It will show 'Disconnected', 'Connecting..', 'Please hold it properly..', 'Alive!', 'Dead!' accordingly.
- When it was disconnected, it showed 'Disconnected'
- When it was connecting, it showed 'Connecting..'
- When it was not held properly, it showed 'Please hold it properly..'
- When it was held by finger or earlobe, it showed 'Alive!'.
- When it was kept attached to a non-living thing, it showed 'Dead!'.

REFERENCES

- Heart Rate Sensor (BPM sensor) - Working & Application:
 - <https://www.elprocus.com/heartbeat-sensor-working-application/>
- Zigbee Communication:
 - <https://www.mepits.com/project/299/embedded-projects/zigbee-arduino-interfacing>
 - <https://www.elprocus.com/what-is-zigbee-technology-architecture-and-its-applications/>
 - <https://alselectro.wordpress.com/2017/01/23/zigbee-xbee-s2c-how-to-configure-as-coordinator-router-end-device/>
 - https://www.digi.com/pdf/chart_xbee_rf_features.pdf/
- Arduino nano:
 - <https://www.elprocus.com/arduino-basics-and-design/>

REFERENCES

Link: <https://www.youtube.com/watch?v=ABW02F6c80A> - YouTube tutorial about bpm sensor

Link: <https://www.how2electronics.com/heartbeat-pulse-bpm-rate-monitor-using-arduino-pulse-sensor/> - Arduino code for Heartbeat/Pulse/BPM Rate Monitor using Arduino & Pulse Sensor

Link: <https://www.rs-online.com/designspark/basics-of-arduino-nano> Link:

<https://www.youtube.com/watch?v=o2fNHdCxCD0> - Communication

Between XBee Connected to Arduino and XBee Connected to Xbee Explorer USB

Link: <https://ieeexplore.ieee.org/document/7181913> - Monitoring data on server.

- [https://www.rs-online.com/designspark/basics-of-](https://www.rs-online.com/designspark/basics-of-arduino-nano) arduino-nano XBee to Arduino Nano Testing
- <https://www.youtube.com/watch?v=9DVVMejIG8E>
- TunnelXP tutorials for Xbee basics. Five video tutorial:
<https://www.youtube.com/watch?v=odekkumB3WQ>

THANK YOU...!!