Caring Indians Project

Vitals Monitor for an Isolated Ward of up to 100 patients

Objective: Design a system that monitors vitals of a patient that promptly alerts a caregiver/responder when the vitals are found to be outside of a pre-determined range, so the caregiver/responder may rapidly intervene.

Description: The system comprises of two parts - (1) A bedside station for individual patients that collects measurements of the patient's vitals and transmits them wirelessly to a central monitoring station, and (2) an external central monitoring station that recieves, processes and displays parameters of all patients on a large display where they may be monitored collectively at a single location. The central station will also sound an alarm and indicate the patient(s) that is (are) in need of immediate intervention.

The following parameters are to be monitored by this instrument.

(i) Blood pressure

(ii) Blood oxygen saturation level (aka pulse oximeter)

(iii) Electrocardiogram (ECG) waveform and some calculations pertaining to the waveform (QT interval, RR interval)

(iv) Respiratory rate

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| Fig. 1: Schematic of proposed system |

Parts List:

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| --- | --- | --- | --- | --- | --- | --- |
| S.N. | Part | | Qty | | Examples | |
| 1 | Oxygen saturation sensor | |  | |  | |
|  | Off-the-shelf Finger-mount | | 1 per bed | | Masimo (US)      HEART (MAX30100-based pulse oximetry & heart rate sensor compatible w. arduino boards)  (banggood.in)    MAX30102 Pulse Oximeter / Heart-Rate Sensor Module I2C Interface  (robokits.co.in, China) | |
| 2 | Electrocardiogram Electrodes + cable for attachment (pre-wired or separate) | | 5 per bed | | medicoelectrodes.com | |
| 3 | ECG prefabricated module (these modules may be hard to source, it is also possible to build the circuit from discrete components on a soldered PCB) | | 1 per bed | | AD8232 heart ECG monitoring sensor module Kit For Arduino  robu.in    silverelectronics.in | |
| 4 | Respiratory sensor  Interface with existing ventilator machine or pulse oximeter.  May be build separately with discrete components | | NIL | |  | |
| 5 | | Arduino board + wifi/BT module - collect measured data and wirelessly transmit to central station  5V adaptor | | 1 per bed  1 per bed | | Arduino Uno or Nano |
| 6 | | Raspberry PI / PC + network card to receive all patient data and display on a monitor  16GB microSD Card  5V adaptor | | 1 per ward  1 per ward  1 per ward | |  |
| 7 | | Large monitor for all patient data display | | 1 per ward | | 15-20" monitor |
| 8 | | Alphanumeric LCD screens  Display numbered vitals (Ox sat, resp rate, BP, ecg calculated intervals) | | 1 per bed | | rhydolabz.com |
| 9 | | Portable plug and play Display for ECG + USB based receiver to get waveform from arduino | | 1 per ward | |  |
| 10 | | Jumper cables | | 1 set (M-M, M-F, F-F) | |  |
| 11 | | Electronics kit (misc. items)  Wire spool, alligator clips, resistor set, capacitor set, breadboard/general purpose PCB, PN diodes, soldering station) | | 1 set | |  |
| 12 | | LED for Alerting | | 1 per bed | |  |
| 13 | | Beep for Alerting | | 1 per bed | |  |
| 14 | | Android Tablet (OTG capable + cable) | | 1 per bed | | This is variable units. |
| 15 | | Box | | 1 per bed | | To hold the electornics system – rubber material at edges |
| 16 | | Clamp + base plate | | 1 per bed | | To fix the box to the bed |