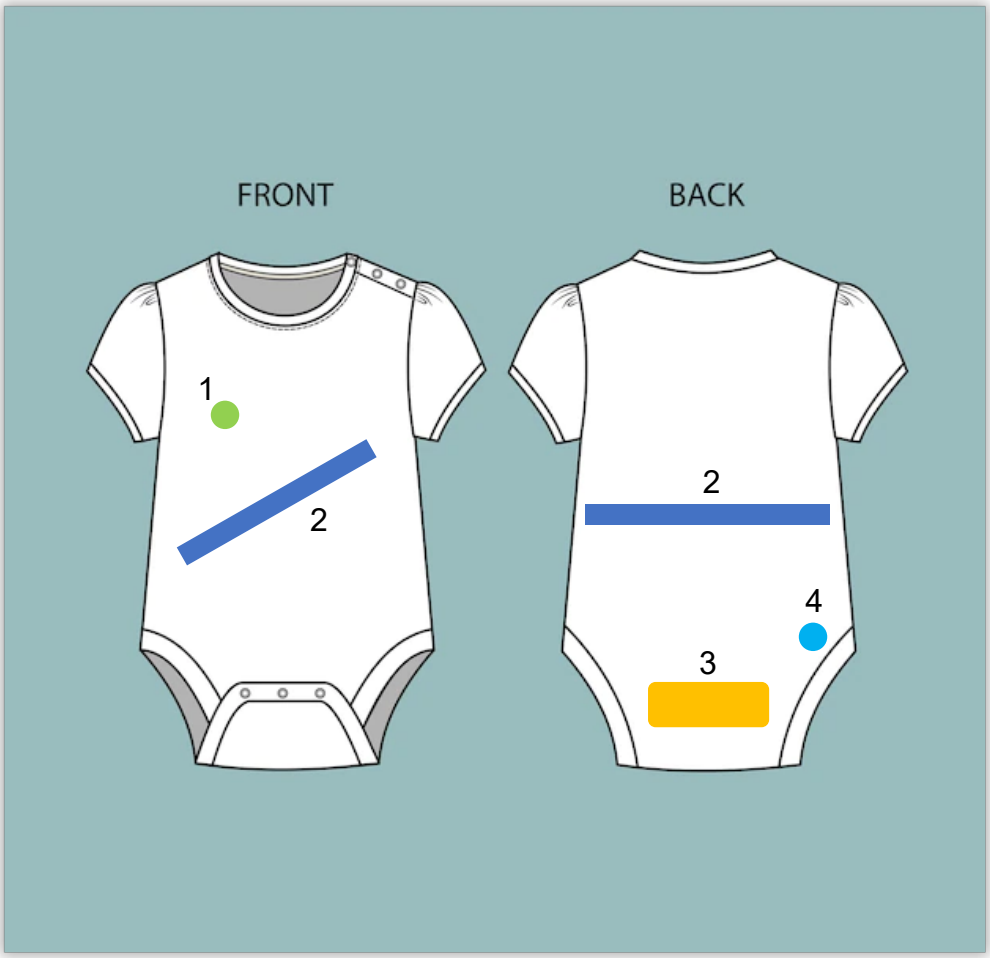
A Bodysuit Protecting Newborns from Sudden Infant Death Syndrome

The aim of this system is to prevent sudden infant death syndrome. It is intended to monitor the infant respiration, body temperature and activity. The sensors and associated electronics will be embedded into the fabric of a bodysuit. The system will be powered by harvesting the ubiquitous surrounding RF energy. Several types of alerts (temperature too low or too high, no respiration, low battery, no movements) will be sent to an appropriate device (e.g., a smartphone) thru a low-energy Bluetooth link.

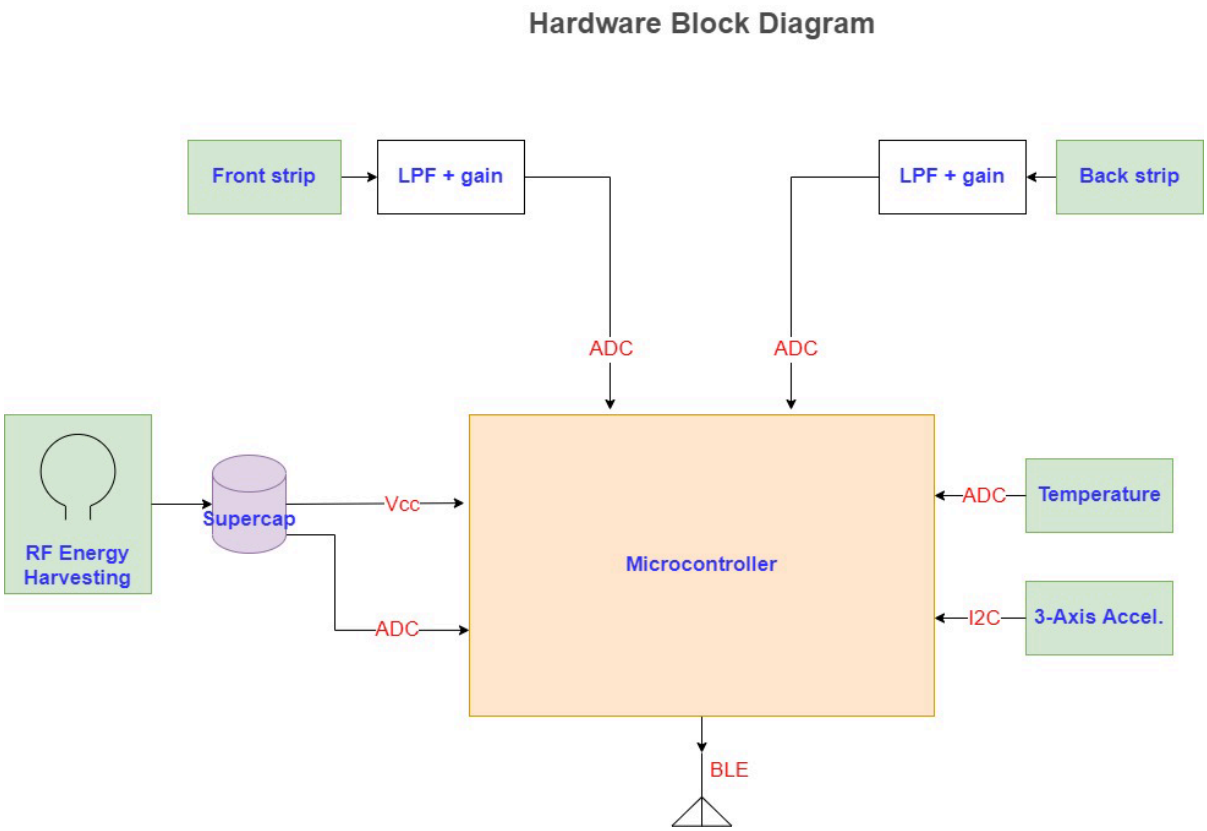
Location of the sensors

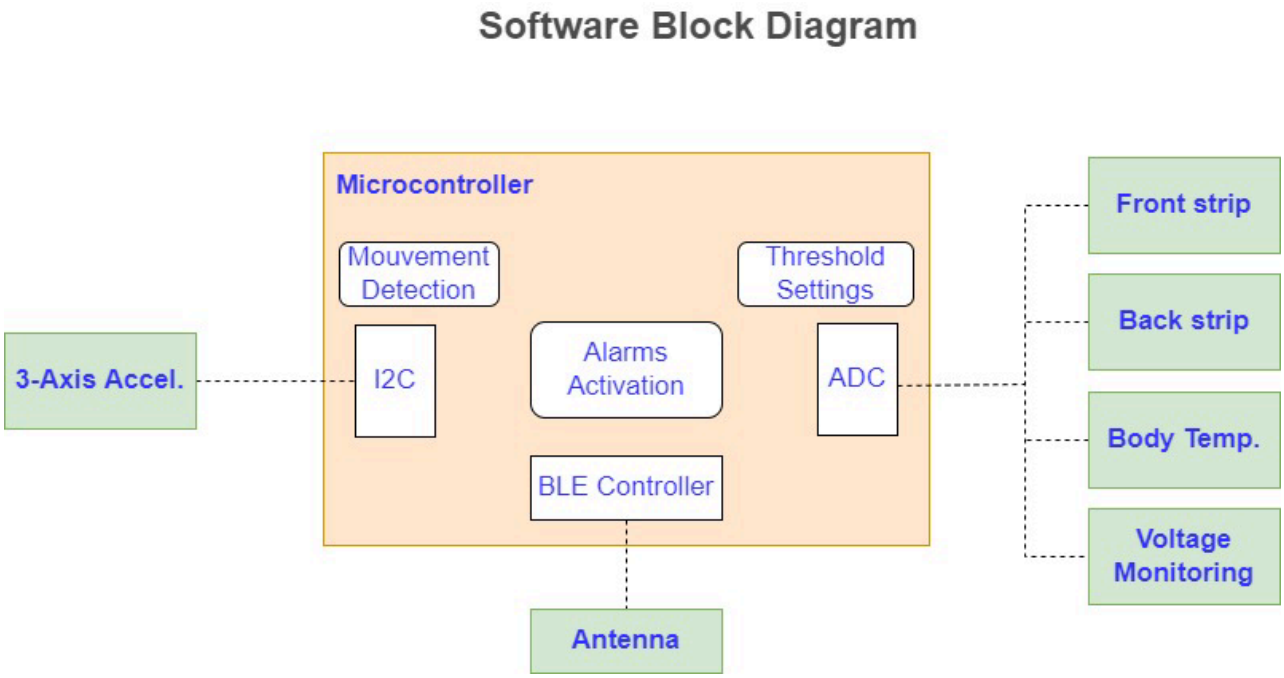


(Image source: freepik)

① Temperature sensor (NTC resin dipping)
② Sleep monitor strips (50µm piezo-film technology) with front end electronics (gain and low-pass filter for 50/60Hz rejection)
③ Power supply (2-layer super cap 4.2V) and microcontroller including BLE
④ 3-axis accelerometer

Diagrams


Hardware Block Diagram
Front strip
LPF + gain
LPF + gain
Back strip
ADC
ADC
RF Energy Harvesting
Supercap
Vcc
ADC
Microcontroller
ADC
Temperature
I2C
3-Axis Accel.
BLE


Software Block Diagram
Microcontroller
Mouvement Detection
Threshold Settings
3-Axis Accel.
I2C
Alarms Activation
ADC
BLE Controller
Antenna
Front strip
Back strip
Body Temp.
Voltage Monitoring

Hierarchy of Control Diagram