

TEAM ALT F4'S

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SMART HEALTH MONITORING CHAIR FOR NON INTRUSIVE MEASUREMENT OF BIOLOGICAL SIGNALS



Problem statement

- ❖ Hypertension is a fatal disease that can result in death or disabilities due to cardiovascular diseases or stroke, thus needs to be continuously managed by using a simple system for measuring blood pressure. A system that can continuously measure blood pressure to alert patients to the dangers of hypertension is required.
- ❖ However, the existing method to measure blood pressure uses a cuff wrapped around the arm, making it cumbersome, and hence, most patients do not measure their blood pressure regularly.
- ❖ Intrusive method of fetching biological medical data may cause people to suffer. These problems made us to design a diagnostic chair for unconstrained heart rate and blood pressure monitoring purposes.





How important is it to solve this problem? What are the pains to be relieved and gains to be created?

The principal goal of unconstrained measurement is to sustainably monitor health-related information through biological signals without interrupting the subject's ordinary daily activities and without requiring additional operations or cooperation in order to make signal measurements.

Pains to be relieved	Gains to be created
<ul style="list-style-type: none">➤ Irregular blood pressure checkups of the patients can be avoided.➤ Patients can monitor the health status of their own without the help of the medical assistant.	<ul style="list-style-type: none">➤ The patient can know his /her daily health status through the device.➤ Apart from hospital environment, it is can be used anywhere(like industries, automobiles) for health monitoring.



Proposed Solution:

An ECG is a recorded electrical signal that can be measured through clothing. The insulating effect of clothing creates relatively high impedance between sensor and skin. Therefore, a high-input impedance amplifier that converts displacement current into voltage through clothing was used in each sensor as an active electrode.

A BCG is the recording ballistic force imparted by the motion of blood and heart during each cardiac cycle. PVDF film was used for BCG measurements. A PVDF film is placed under the thighs in the seat of the chair to detect the vibrations. In our device, the PVDF film was wrapped in a silicon pad for protection and enhancement of the sensitivity of output signal detection.

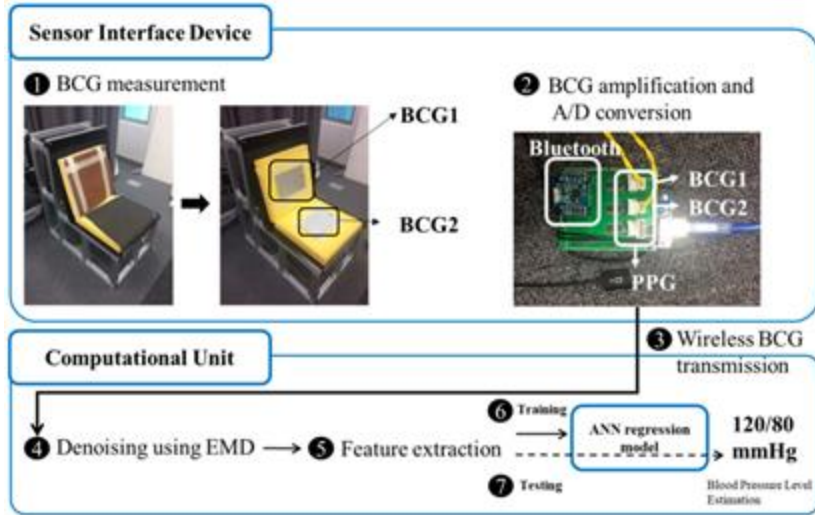
However, measuring blood pressure using PPG cannot be considered as a fully nonintrusive/unrestricted system because the users must be conscious while measuring their blood pressure, which is inconvenient. This is because users or patients must attach their finger to PPG sensors in order to enable the measurement of PPG signals. Therefore, they would be consciously rigid while having their blood pressure measured via PPG.

A fingerprint module is placed in the armrest of the chair which displays the personal details of the users and a weight sensor is placed under the chair for measuring the weight

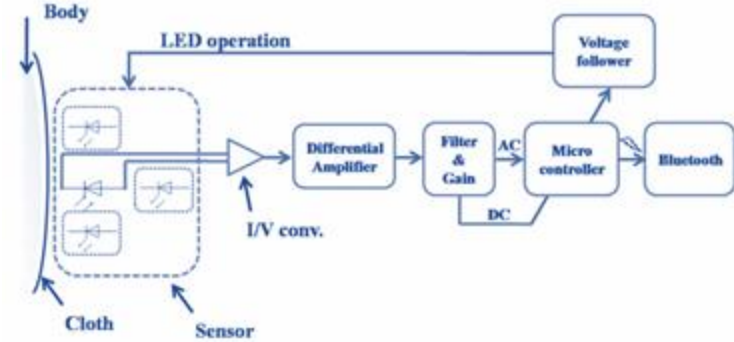
Working:



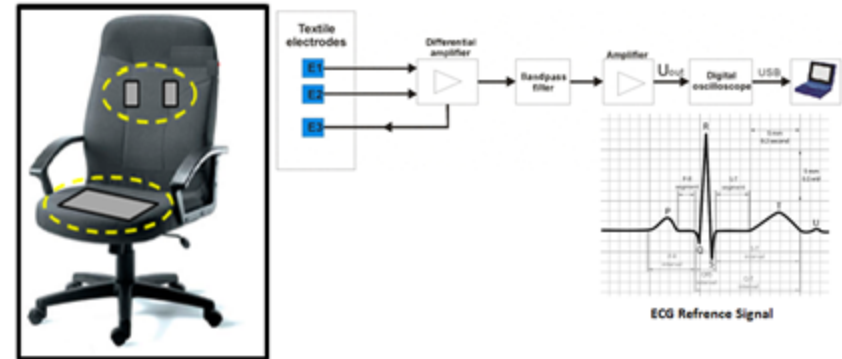
BCG



PPG



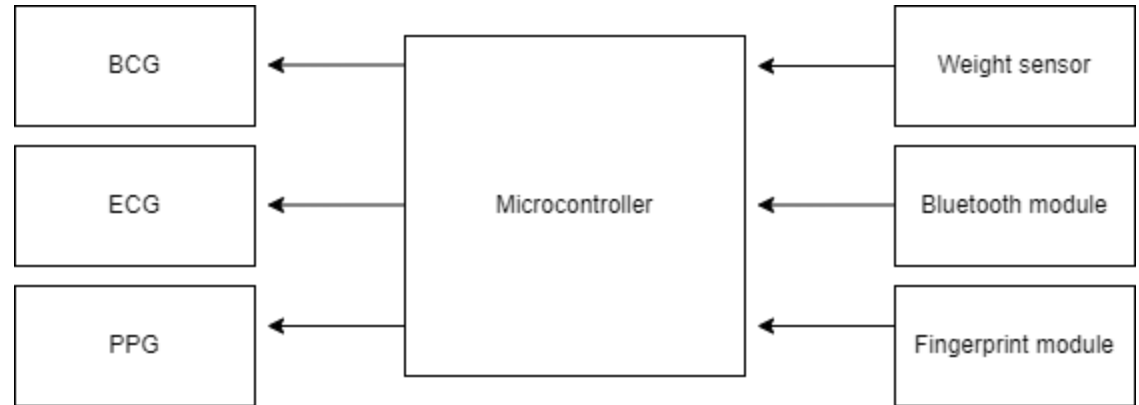
ECG





Technological stack of your solution:

- Electrodes
- Ballistocardiogram
- Photoplethysmogram
- Electrocardiogram
- Polyvinylidene fluoride film
- Artificial Neural Network
- Weight sensor
- Fingerprint module
- Bluetooth module



Novelty:



EXISTING



Measuring blood pressure uses a wrapping cuff, which makes measuring difficult for patients



Medical assistant required to guide illiterate people to get medical information



OUR INNOVATION



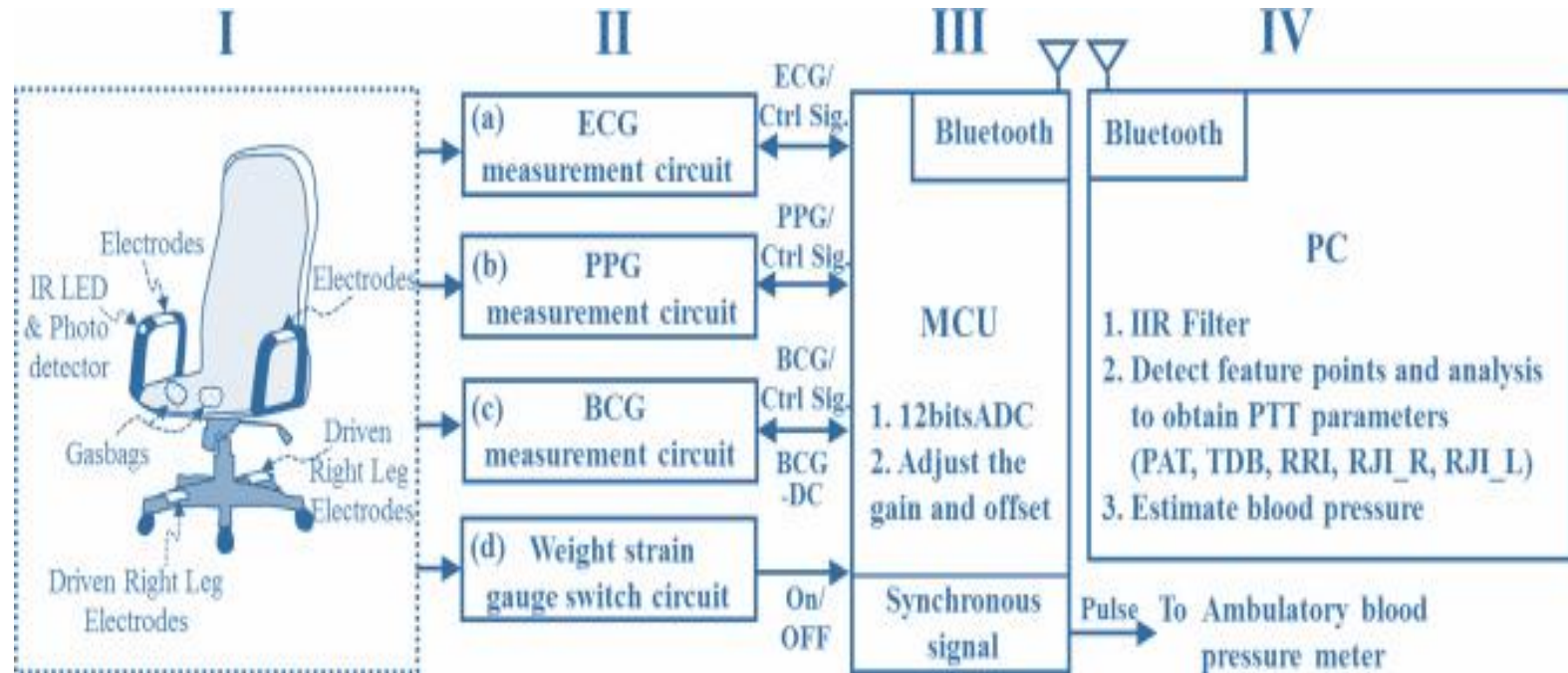
Biological signals fetched by non-intrusive method



No need of medical assistant as people just sit on the smart chair to get the medical information



Application:

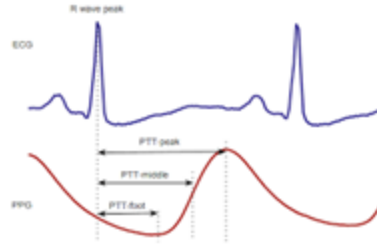




Challenges:



User must be able to recognize and establish contact with the sensor.



Peak of the PPG or ECG cannot be detected if the signal quality drops, leading to a decrease in accuracy.



the surface of the human torso is curved, air gaps were created between the capacitive electrode face and the subject's back, resulting in poor contact



How to sustain in the market with the proposed solution:

- People can check their medical info from their places, no need to visit hospitals.
- People don't need to spend money on every checkup, instead they can buy our smart health monitoring chair.
- Maintenance free