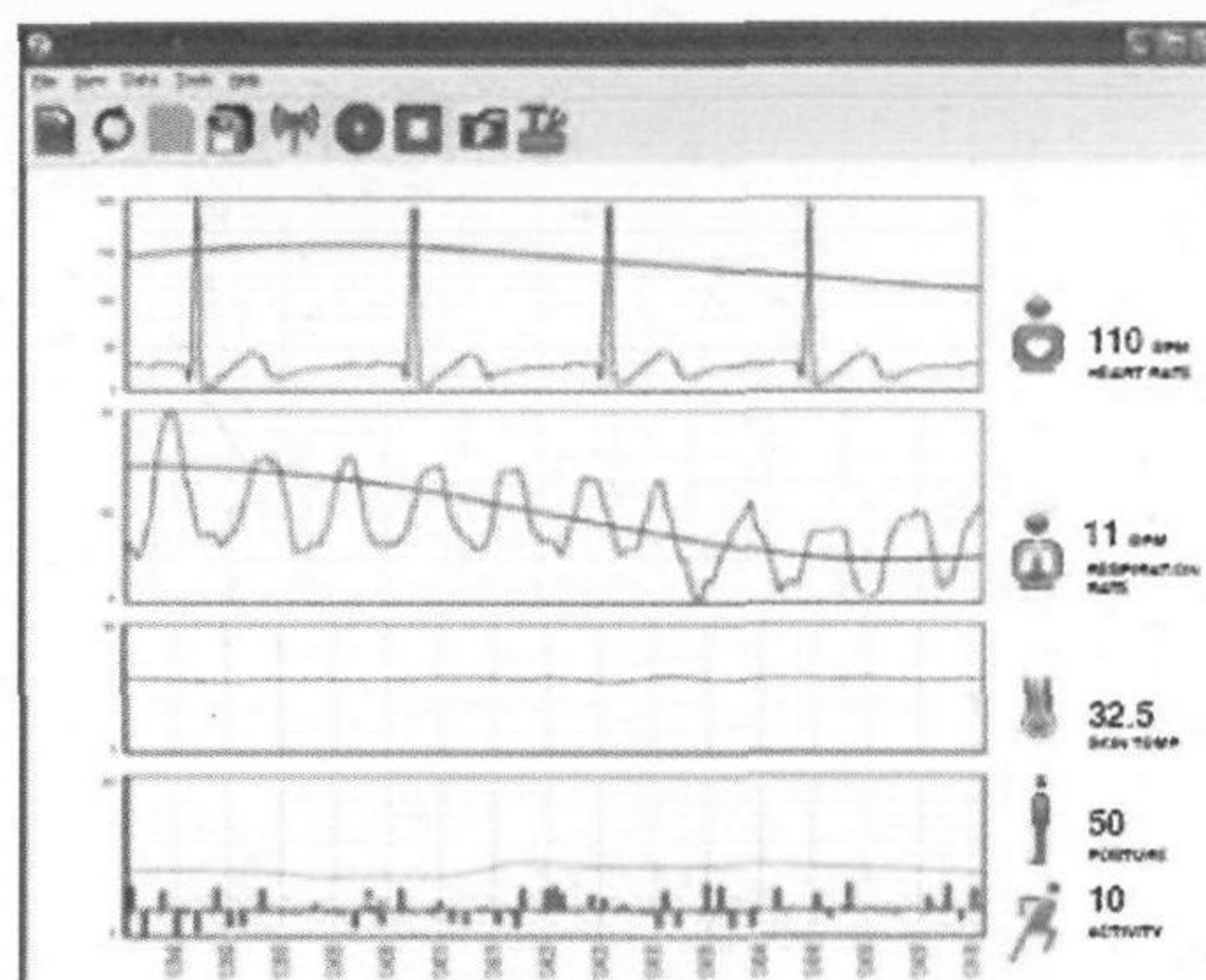


Heart rate, breathing rate, skin surface temperature and movement data can all be monitored



WHEN IT comes to monitoring, Zephyr in New Zealand has combined smart fabric sensor technology with novel algorithms and system design to measure displacement, distance, force and pressure, strain, impact events and bio data. The technology has military, medical and athletic applications.

Wireless connectivity and graphical diagnostic tools deliver status updates in real time or record information to allow evidence-based determination of trends, for any application. Brian Russell, CEO of Zephyr Technology says: "We use off-the-shelf technology from a supply point of view. We use standard materials and we use standard electronics and have integrated them."

MILITARY APPLICATIONS

With regards to the military, Impact SF consists of one or more Zephyr Smart Fabric sensors coupled to a Zephyr electronic impact detection device, which through Zephyr software displays impact data. The sensors are thin and flexible, and are positioned immediately behind protective body armour or material in the region of impact. Deformation of the protective surface by impact causes physical compression over time (strain rate) of the sensing fabric. This changes the

electrical characteristics of the sensor. The impact detection device samples the signal generated by the sensor, and analyses the data for impact signatures based on the strain rate of the sensor. Impact data is transmitted by the device via a USB link to a computer running the analysis software.

Russell explains: "It is currently available as a laboratory tool. It goes behind body armour and can measure the force and strain rate behind the body armour. So, you measure the energy removed from the bullet and hence, the effectiveness of the armour itself. We are in development and are putting into vests and various applications, which is about as much as we can say."

The technology can be used in the field to monitor combatants. "That is the end game," says Russell. "That is what we are still developing with various organisations around the world, so we can tell when somebody has been hurt and protect them from the blunt force trauma after that. The internal injuries are similar to what happens in a vehicle accident, so the internal organs get damaged even though the bullet is stopped by the armour."

Monitoring the combatants would allow them to know what medical aid is required before the casualty is even reached.

"And, because we also monitor the vital signs, we can tell exactly what has happened and can provide that expert knowledge either to the people dealing with the injured person, or we can assist the person in the field, says Russell. The technology is also being looked at by police forces around the world. "You can imagine that if a policeman gets attacked or shot, they are quite often by themselves and so it becomes very much more important to be able to get information on their whereabouts and their vital signs and so forth so you can get there very quickly."

The company currently has a working prototype but does not have any equipment available commercially yet. "We are currently talking to companies and getting it designed and it is being evaluated in various applications," confides Russell.

Another technology being developed is the Bio Harness, which is a lightweight elasticised strap incorporating Zephyr Smart Fabric ECG, heart rate, breathing rate, skin temperature, activity and posture sensors.

Heart rate, breathing rate, skin surface temperature and movement data is monitored and transmitted by radio link to a PC. Data can also be logged to internal memory for ►

taking the smart option

Before GPS just knowing where you were was a challenge, whereas now the latest technology will not only provide positional information but a whole lot more for military, medical and athletic purposes alike