Medical Technology

SESSION 4

Surgical Robots

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Researchers leading this session:

Joanna Brunker

James Joseph

This hand-out belongs to:

Robotic surgery

Robotic surgery, computer-assisted surgery, and robotically-assisted surgery are terms for technological developments that use robotic systems to aid in surgical procedures.

What is da Vinci Surgery?

The da Vinci Surgical System allows surgeons to perform minimally invasive surgery with the help of robotic arms. The machine consists of four, thin robotic arms inserted into strategically placed incisions just one to two centimeters long. The surgeon operates while seated at a console unit, using hand and foot controls, and with a 3D, high-definition view of the surgical field. It can simulate an open surgical environment without the physical trauma of large incisions.

Building your own robot

Your Arduino-controlled robot will not perform surgery!
But you can design a device to measure one or more physiological parameters, such as heart rate.

Answer the following questions to help you design your medical device.

(1) Which physiological parameter(s) will you measure?

(2) Why do you want to measure these parameters?

For example, you could think of a medical or sporting application.

(3) Which sensor kit would be suitable for making the measurements you require?

Choose from:

- Pulse sensor:
  https://www.coolcomponents.co.uk/en/pulse-sensor.html
- Particle sensor:
  https://learn.sparkfun.com/tutorials/max30105-particle-and-pulse-ox-sensor-hookup-guide?_ga=1.97228895.1597862514.1479216075
- Heart rate monitor:
  https://learn.sparkfun.com/tutorials/ad8232-heart-rate-monitor-hookup-guide
- EMG (Electromyography) sensor:
  https://www.coolcomponents.co.uk/en/emg-detector.html
- Myoware muscle sensor development kit:
  https://learn.sparkfun.com/tutorials/myoware-muscle-sensor-kit?_ga=2.39886562.1973069348.1503480036-1575493297.1484668914
  https://cdn.sparkfun.com/datasheets/Sensors/Biometric/MyowareUserManualAT-04-001.pdf

(4) How does your chosen kit work?

(5) How will you test your device?

For example, you could think of an experiment involving measurements on your friends.

Notes

Now think carefully about the code you will need to make your Arduino-controlled device work.
Do some research on the Internet and write notes here.