

Eye-Controlled Device

ABC Assistive Technologies specializes in making the world more accessible to people with disabilities. In the past, ABC focused on hearing aids and personal emergency response systems. ABC would like to start providing new products that can be controlled via actions of the face and head. As ABC's newest electrical engineer, you have been asked to explore using eye blinks to turn on and off devices.

Your primary tool for detecting a blink will be the Vernier EKG Sensor. An EKG sensor is normally used to record the electrical activity of the heart, but it can also record other electrical changes in your body, such as an eye blink. When the nerves fire to activate the muscles that produce a blink, they produce an electrical signal that can be detected with the EKG's electrodes. Closing the eyelids produces a positive voltage pulse and reopening the eyes produces a negative pulse.

You may choose from a variety of output devices to activate with eye blinks. At this point in product development, ABC simply wants a "proof of concept," a device that can demonstrate that the proposed technology is feasible.

Your job is to create a prototype of a blink-activated device using a Vernier EKG Sensor, a LabQuest interface, and Logger *Pro* software (or a stand-alone LabQuest 2), and a variety of output devices shown in the Materials list.

MATERIALS

Vernier LabQuest 2 or
LabQuest interface with computer running
Logger *Pro* software
LabQuest power supply

Digital Control Unit (DCU)
EKG Sensor

Output Devices
DC buzzer
DC/120 mA lamp
green LED (with resistor)
red LED (with resistor)

Construction Materials
duct tape
cardboard
felt sheets
colored markers

DESIGN AND CONSTRUCTION TIPS

- Following the Engineering Process will save you time and energy! First, consider the design requirements and constraints, and then start brainstorming ideas. Using an Engineering Design Sheet can guide you through the process.
- Reading the electrical impulses generated by an eye blink is most easily accomplished by attaching the electrode tabs as shown in Figure 1.

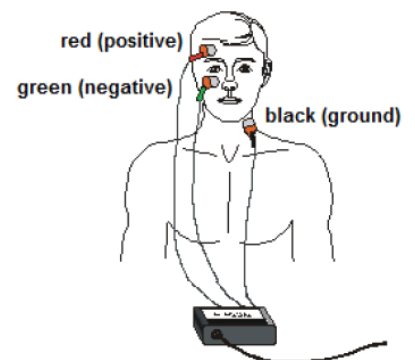


Figure 1