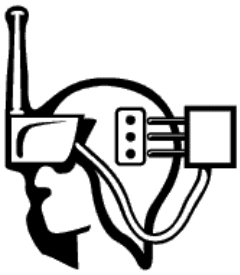
Controlling Technology— Cyborgs and Cybernetics

Context

In the 1940s and 1950s, scientists began to study machines and compare their behaviours to the behaviours of humans. In a human-machine system, the behaviours of each were thought to be the same. Mathematician Norton Wiener called the science of control of these human-machine behaviours "**cybernetics**." The control and the modeling of these human-machine systems through input, process, output and feedback mechanisms was the goal of **cybernetics**. Soon, "**cyborg**," short for **cyb**ernetic **org**anism, began to refer to humans who are part machine. Today, says Professor Donna Haraway says, **we are all cyborgs: everyone of us is part technology**, **part human**. ***What do you think?*** She says that instead of resisting this notion that we are part technology, we should try to understand the circuitry that wires us all together, the gadgets that extend what we can do, and the bits and particles that control much of our action. Then we can begin to short-circuit the controls that threaten to limit what we can think, feel or do.

Problem

Design and construct an enclosure that is externally controlled to guide a cyborg who wears the enclosure.



Design Constraints

- The enclosure must be designed so that the person who wears it cannot see.
- The enclosure must creatively change the appearance of the materials used (e.g., from box to robot).
- The cyborg must be externally controlled (8-10 ft of wire leads).
- Enclosure circuitry, or display panel, must be limited to LEDs or buzzers to signal direction.
- Two display panel circuits must be designed: 1) for directional walking (mobile); 2) for stationary grasping (manipulative).
- There is a $5.00 limit on the cost of <u>new</u> materials, but, you must account for all money spent.

Design Considerations

- Pay close attention to form of materials, economy, ecology, simplicity, and unity.
- Comfort and mobility are important considerations for enclosure materials.
- Consider the placement of the display panel in relation to eyes (and ears if using buzzers).
- Consider a range of appearances for the enclosures: this does not have to look like a robot.
- Consider guidance codes for cyborg control of mobility and manipulation

Construction Sequence

Enclosure

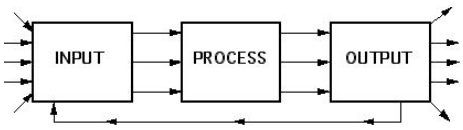
- Brainstorm ideas for the cyborg appearance.
- Sketch two or three designs and choose appropriate forms, materials and patterns.
- May use 2D computer aided design

Circuit

- Read the schematic given
- Customize for guidance and control
- Layout electronic parts on panels provided (display and control)
- Solder parts
- Test with meters for continuity

(CAD) techniques to lay out patterns.
- Locate recycled materials or new materials.
- Cut materials to form enclosure.
- Assemble and finish with paint or other accessories.
- Final assembly.
- Test with power supply
- Place in enclosure
- Test cyborg guidance system.

Management Issues
- End of Day 1: Approval of enclosure design and circuits.
- End of Day 2: Enclosure and circuits completed.
- End of Day 3: Test cyborg guidance system.
- End of Day 4: Trials through maze.



Related Studies
- Cybernetics
- Sciences
- Mathematics
- Social Studies
- Sociology
- Psychology
- Engineering

Honest Self (Group) Evaluation

1. We stayed within the design constraints and deadlines _____ out of 5 marks

2. Our enclosure is unique in its design _____ out of 5 marks

3. Our circuits have design features that are improvements over the design provided _____ out of 5 marks

4. The materials used are recycled _____ out of 5 marks

5. Our use of materials was creative, economic and efficient _____ out of 5 marks

6. Our cyborg can be successfully guided from an external control panel _____ out of 5 marks

7. Our skit for doing the maze was creative and entertaining _____ out of 5 marks

Total _____ out of 35

Assessment

Group's Self Assessment _____ Total/ 35

Design Principles

Features and Form _____ out of 10

Originality _____ out of 10

Economics and Ecology _____ out of 10

Craft and Quality _____ out of 10

Working parts _____ out of 15

Deadlines, Safety and Participation _____ out of 10

Total _____ out of 100