

## Internal Assessment Resource

**Achievement Standard Digital Technologies 91639:** Implement complex interfacing procedures in a specified electronic environment

**Resource reference:** Digital Technologies 3.48

**Resource title:** Develop robotic device

**Credits:** 4

Achievement	Achievement with Merit	Achievement with Excellence
Implement complex interfacing procedures in a specified electronic environment.	Skilfully implement complex interfacing procedures in a specified electronic environment.	Efficiently implement complex interfacing procedures in a specified electronic environment.

### Student instructions

#### Introduction

This assessment activity requires you to implement complex interfacing procedures in constructing a control system for a robotic device.

A robot is a machine, programmable by a computer— capable of carrying out a complex series of actions automatically. Your robot must be guided by a programmable microprocessor.

This is an individual task.

You will have seven weeks to complete the work.

Complete all your practical work in class time.

You will be assessed on how well you implement complex interfacing procedures to construct your robotic device.

#### Task

Construct a control system that integrates the subsystems for a robotic device that uses complex interfacing procedures, as specified.

Follow relevant health and safety practices in the making of your product.

#### Specifications

The specifications for the subsystems allow:

- a microcontroller to manage independently and reliably, variable speed, direction and power of at least one small DC geared electric motor
- a microcontroller to interact with at least two sensors.

Plus additional features such as:

- display using seven segment displays and/or LCDs
- sound at completion of an operation
- automatic maintenance alerts (for example, to cellphone/internet)
- operator over-ride controls

### ***Construct your interfaces***

Construct functional models for three subsystems (see Appendix A for examples):

- one to manage the motors
- one to manage the sensors
- one to manage user requests and information.

Construct electronic circuits and other hardware set-ups required.

Write, test, and debug software to control the subsystems and their interaction. Make sure that you:

- select the best type and value of component
- select the best arrangement of components
- modify hardware input and/or output parameters
- modify software parameters
- account for electronic noise and its filtering.

Analyse and modify your initial interfaces until they are substantially improved and you are satisfied that they perform the functions required and meet specifications.

### ***Report***

As you develop, construct and interact the subsystems, record the work you are doing using photos and notes. Use these records to write a report, which you will submit as evidence for the assessment of this standard.

Show in your report that you:

- use the electronic components provided to produce a sensor(s) that can interact with the environment
- use the electric motors provided so that the software can reliably vary the speed and position of the device
- write, test, and debug well-structured, clearly annotated, readily understandable software to effectively manage the interface between the microcontroller and the sensors and actuators it controls
- analyse, test, debug and modify the functional models' sensor subsystems and actuator subsystems. This is to substantially improve the way the subsystems work/interact and the quality of the data delivered by the interface.

### ***Final submission***

Hand in your subsystems, or a video of the subsystems interacting, and your report