# Desktop Fan

Design and develop a desktop fan for use in an office environment

| Achieved | Merit | Excellence |
|---|---|---|
| Use advanced techniques to develop an electronics outcome. | Use advanced techniques to develop an informed electronics outcome. | Use advanced techniques to develop a refined electronics outcome. |

## Introduction

This assessment requires students to design and develop an electronic system suitable for controlling a desktop fan. Students must demonstrate the use of advanced iterative processes to design, develop and test their electronic system, ensuring they construct an outcome that meets specifications and addresses relevant implications. This assessment starts on … and finishes ...

## Task

Indoor office spaces can be hot, stuffy places to work. A desktop fan is a popular method to increase airflow and reduce the temperature of an office space. Your task is to design and develop a desktop fan. You have been provided with a list of specifications, use these to inform the development of your electronic sensor.

## Specifications

**Specifications**

- A fan can be switched between continuous rotation or fixed position.
- Fan speed can be controlled
- Visible indicators used to show the state of the system, both fan speed and continuous rotation or fixed position

You will be expected to improve and refine the desktop fans operation and control system beyond the specifications given

Hint (Use a Potentiometer for variable speed control of Motor)

**Relevant Implications**

The following relevant implications need to be considered

A. Usability
B. Software Standards and Maintainability
C. Functionality
    a. Reliability of control systems
    b. Robustness of electronic system from unexpected voltage/current
D. End-user considerations
    a. Operation and control meets user needs
    b. Understandable/labelled/visible warning indicators.

# Completing the task

As you perform the task, make notes and gather evidence for inclusion in your portfolio:

1. **Project Brief**
   It's good to start by clarifying what you intend to do
   a. Identify the inputs and outputs used in this task.
   b. Identify the relevant implications and how these will be addressed.

1. **Circuit schematics of the electronic system**
   a. Sketch a circuit schematic for your proposed electronic system, include correct circuit symbols and labels for components you select.

2. **Construct your electronics system**
   Evidence constructing, testing, and debugging your electronics system on all input/output interfaces. Include
   a. Testing/calibration of your potentiometer on a range of operating conditions
   b. Testing actuators and output warning indicators on a range of inputs conditions
   c. Evidence of modifying and debugging software code
   d. Show how you addressed the relevant implications within development

3. **Trailing and iterative improvement of the Electronics Sensor**
   Iterative improvement within your work will show evidence of using documented cycles to refine functionality, reliability, end-user considerations and fitness for purpose. Evidence needs to show
   a. Usability: how you improved usability
   b. Software Standards and Maintainability; how you improved the microprocessor code to be logical and understandable
   c. Functionality: how you improved Reliability of control systems and how you improved Robustness of electronic system from unexpected voltage/current
   d. End-user considerations: how you improved operation and control to meets user needs and how you improved made controls Understandable/labelled/ visible.

4. **Purpose and function of components and interfaces**
   Include evidence that shows you are able to describe/explain/justify the interfaces and functions of the components of the systems used
   a. A photograph of your electronics system. Annotate your photographs with descriptions of:
      i. each component (what it does, how it functions)
      ii. each interface (what it does, how it functions)
   b. Explain the behaviour and function of the electronics outcome
      i. Resistance and voltage characteristics of the voltage divider
      ii. Analog to digital conversion
      iii. Transistor switch interface for controlling a DC Motor
      iv. Pulse Width Modulation and controlling DC Motor speed
      v. Voltage and current characteristics of the LED + current limiting resistor interface
   c. Justify your choice of the components and systems used
      i. Justify sensors and how these enable monitoring of plant health
      ii. Justify resistors in a voltage divider and how this affects sensitivity (calculations not required)
      iii. Justify your selection of LED + current limiting resistor. Use calculations to determine the current limiting resistor value for LED.

# AS2.5 Portfolio Scaffold

The Portfolio Scaffold is used as a guide to help kids understand the stages and expectations of the assessment. The Assessment Task for the Electronics outcome and specifications will be given to you by your teacher.
*IMPORTANT if you follow this template you will need to have supporting evidence from a notebook or journal to evidence "iterative development"*

Glue in the Assessment Task here ...

# Project Brief

Identify the specifications for your electronics outcome

Describe the relevant implications and how these will be addressed

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# Circuit schematics of the electronic system

Sketch a circuit schematic for your proposed electronic system, include correct circuit symbols and labels for components you select.

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# Construct and test your electronics outcome

Evidence constructing, testing, and debugging your electronics system on all input/output interfaces. Include:

Testing/calibration of your analogue sensor / potentiometer

Testing/calibration of analog sensor / potentiometer

| sensor / potentiometer | Analog Reading |
|---|---|
| | |
| | |
| | |
| | |

Testing inputs and outputs Table

Testing of Servo and Motor (outputs) on all expected input conditions

| *Input* | *What I expected the outputs to do?* | *What the outputs actually did?* |
|---|---|---|
| | | |
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Evidence of modifying and debugging software code

Show how you addressed the relevant implications within development

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# Iterative improvement of the Electronics outcome

**This section is required for Merit and Excellence only. The box is way too small**

Iterative improvement within your work will show evidence of using documented cycles to refine functionality, reliability, end-user considerations and fitness for purpose. Evidence needs to show:

- Input sensors; how you made improvements to reliability.
- Software; how you improved the microprocessor code to be logical and understandable
- Robustness; how you improved the electronic circuit & enclosure to be secure, robust
- End-user considerations; How you improved understandability/visibility of outputs

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# Purpose and function of components and interfaces

Include evidence that shows you are able to describe/explain/justify the interfaces and functions of the components of the systems used.

A photograph of your electronics system. Annotate your photographs with descriptions of:

- each component (what it does, how it functions)
- each interface (what it does, how it functions)

**Explain the behaviour and function of the electronics outcome**

Resistance and voltage characteristics of the voltage divider

Voltage and current characteristics of the LED + current limiting resistor interface

Analog to digital conversion

Transistor switch interface for controlling a DC Motor

Pulse Width Modulation and controlling DC Motor speed and/or Servo

**This section is required for Excellence only. The box is way too small**

Justify your choice of inputs

XXX

Justify your selection of LED + current limiting resistor. Use calculations to determine current limiting resistor value for LED.

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