

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills: Show you have researched and used reliable sources to support your ideas. Include key theories and up-to-date information about mechanical dynamics, control systems, and software like MATLAB Simulink with proper referencing (Harvard style).		
Feedback: You include core control texts (e.g., Åström & Murray; Ogata; Dorf & Bishop) and you reference MATLAB documentation, which is relevant to the modelling/simulation focus. You show some attempt to connect literature to design decisions (e.g., PID selection; habituation point). Feedforward: The literature base is too narrow for a 2000-word Level 4 design report (only ~6 sources, and limited peer-reviewed material about wildlife deterrence/sensors/field reliability). Add more journal articles, standards, and application notes (e.g., PIR performance outdoors, actuator/motor selection, solar/battery sizing, animal deterrence evidence). Harvard referencing requires refinement for consistency. Each reference must include complete details: author, year, title, edition (if applicable), publisher or journal, volume(issue), pages, DOI or URL, and access date for online sources. The MathWorks reference is incomplete and should specify the exact page title and full URL with the access date. The entry for Brandon Anthony (2021) needs proper author formatting, title presentation, and clear publication details. Increase critical engagement: not just “PID is common”, but why PID is sufficient here, what limitations it has for noisy PIR signals, and how your design mitigates those limitations using evidence.	15	8
2. Knowledge and Understanding Skills: Demonstrate that you understand the main concepts and principles behind your project, explaining how they relate to designing the monkey deterrent system and its challenges.		
Feedback: You demonstrate clear understanding of closed-loop control, why feedback matters, and what the P/I/D terms do in practical terms. You identify key system constraints from the scenario (no grid power, low cost, monkey adaptability) and you propose a sensible architecture (PIR + controller + actuator + multi-modal deterrents). Feedforward: Strengthen the engineering interpretation of the “monkey deterrent system” as a dynamic system: what exactly is the controlled variable (arm angle? displacement? motor speed?), what is the reference and what does “step input representing monkey detection” physically mean? Expand the link between theory and context: e.g., show how dynamics/control choices reduce habituation, reduce false triggers, and conserve energy (with clearer justification and evidence). Include a clearer explanation/justification of chosen parameters m, b, k in relation to a plausible actuator/arm mechanism (even if estimated).	20	15
3. Cognitive and Intellectual Skills: Use your analytical skills to develop and explain models, interpret results, and justify your design choices with clear reasoning and evidence.		
Feedback: You present a clear analytical structure, including modelling and controller selection, along with appropriate performance metrics (rise time, settling time, overshoot, and steady-state error). You also discuss limitations and potential improvements, demonstrating reflective judgement. Feedforward: The modelling section contains a key issue: the mass–spring–damper equation is written as $m\ddot{x}(t) + b\dot{x}(t) + kx(t)$, but it omits the forcing/input term (typically $= F(t)$). This weakens the mathematical clarity and the link between system input and output; it should be included to complete the model.	20	14

Provide deeper evaluation of design choices using quantitative evidence. For example, report numerical performance values (rise time, settling time, overshoot) explicitly in the main body, rather than describing them only qualitatively. Strengthen the analysis by comparing at least two control approaches (e.g. PID vs on/off control with hysteresis, PID vs PD, or PID vs a simple lead compensator) and justify your final choice in the context of cost and power constraints. The description of the “night/day logic” is internally inconsistent in places (e.g. ambiguity between daytime and night-time enablement). This should be clarified so that the system logic can be followed and validated unambiguously.		
4. Practical Application Skills: Apply what you know by modelling and simulating the system, considering real-world factors like cost and power supply, and show how your design works in practice.		
Feedback: You demonstrate good evidence of implementation, including Simulink architecture, MATLAB code, and plots showing closed-loop response, error, and control effort. Practical constraints are also considered, such as the use of solar power, a component cost breakdown, and a low-maintenance design approach. Feedforward: The power system design requires greater engineering detail. Convert current draws into an energy budget (e.g. Wh/day) and justify whether a 20 W panel with a 12 V, 7 Ah battery is sufficient under a realistic duty cycle, including allowance for worst-case low-sunlight conditions. Clarify the role of the USB power bank in the presence of a 12 V battery system, as this introduces a potential design inconsistency unless the voltage regulation strategy (e.g. provision of a stable 5 V rail) is clearly explained. Ensure the simulation aligns with real hardware constraints. For example, the term “control effort (motor/speaker power)” is not clearly defined in terms of units. Specify what $u(t)$ represents (e.g. voltage, PWM duty cycle, or force). Additionally, include actuator saturation limits (e.g. maximum motor torque, supply voltage), as omission of these constraints may result in overly optimistic simulation outcomes.	20	16
5. Transferable Skills for Life and Professional Practice: You will be assessed on how clearly and professionally you write your report and organise it (15 marks). Your ability to present your work confidently and effectively in the presentation and answer questions will be evaluated. This includes communication, organisation, and attention to detail (10 marks).		
Feedback: The report is clearly laid out with a logical table of contents and appropriate sectioning. Tone is mostly professional and readable; diagrams/screenshots support understanding. Presentation slides are clear, aligned to objectives, and communicate the design succinctly. Feedforward: Improve technical writing accuracy and consistency: Ensure consistent terminology (e.g., “daytime/daylight” vs “night-time enabled”). Proofread for spacing/formatting issues (several instances of inconsistent spacing, capitalisation, and minor typos). Strengthen diagram conventions: label signals/units and ensure block diagrams match the written explanation precisely. For professional practice, include a brief “deployment considerations” section: weatherproofing (IP rating ideas), tamper resistance, maintenance schedule, and ethical/safety considerations (non-harmful deterrence). 11/15 Report 6/10 PP presentation	25	17

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)		70%
	Up to 1 week late (40% Max)		
	Over 1 week late (0%)		

