

Embedded Electronic Systems Design and Development Engineer

Level 6 Degree Apprenticeship Standard

Occupation: Embedded Electronic Systems Design and Development Engineer

Electronics pervades all areas of modern life and this is reflected in the job of an Embedded Electronic Systems Design and Development Engineer. The role of the Embedded Electronic Systems Design and Development Engineer is to apply their knowledge of electronics and of embedded software to the design of circuits or devices that provide a useful function, that are capable of being manufactured at a competitive cost, and that are reliable and safe in use. This involves the use of the engineer's knowledge of electronics and electronic principles, married to an expertise in the end use of the final product. In electronics this end use can cover a wide spectrum. Examples of industrial sectors that rely heavily on Embedded Systems Design and Development Engineers include Aerospace, Automotive, Automation and Instrumentation, Robotics, Telecommunications, Information and Computer Technology, Defence, Energy (including renewables), Transport and Consumer Electronics. The role provides the basis of learning with potential to specialise as a Hardware Engineer, Software engineer or Systems Engineer in these sectors and can extend from design of integrated circuits through to complete systems.

Embedded Electronic Systems Design and Development Engineers will spend their careers in these industries developing the next generations of products such as smartphones, electric vehicles, communications satellites, smart grids and bringing concepts such as smart cities into reality. For others, an initial grounding in design and development will prove an excellent launch pad for a career in applications engineering, product management, marketing or general management. Many leading figures in industry are from an engineering background such as Jonathan Ive, Apple's Lead Designer for the iPhone and James Dyson, Chief Executive of Dyson.

The Embedded Electronic Systems Design and Development Engineer must be proficient in a wide range of skills, underpinned by academic understanding, to enable them to work across these sub-sectors and specialisms.

Apprentices will complete a Degree that will support the fundamental scientific and mathematical principles that equip them with the understanding required to operate effectively and efficiently at a high level within any of these sectors. This will be supported by vocational training to develop the required competencies specific to particular roles within the chosen sectors.

Requirements:

A competent Embedded Electronic Systems Design and Development Engineer will meet the following requirements:

Knowledge	What is required
Electrical circuit theory	Understanding of basic electrical theory
Electronic components	Knowledge of the method of operation of basic semiconductors and passive components including their most common uses. Also the basic formulas used in their application
Analogue and digital design techniques	Understanding of design of both analogue and digital circuits and the basic design rules for mixed analogue and digital circuit boards
Structured software	Comprehension of the fundamentals of structured software design
Company Specifics	Understanding key aspects of the employer's business and product applications – against a template to be generated by the employer

Skills	What is required
Circuit design	Design functional electronic systems and circuits from component level
Circuit layout	Utilise modern CAD technology to implement circuit design with understanding of considerations for heat dissipation, electrical interference and other industry specific considerations affecting layout
Structured programming for embedded software	Write and document structured code to comply with industry norms and to allow others to understand and subsequently maintain/modify the code
Mathematical modelling	Utilise modelling techniques for circuit design, embedded software development and thermal management
Design for purpose	Ability to demonstrate an understanding of the principles and practice of design for market, design for manufacturability, design for testability and design for maintainability

Testing methodology	Ability to develop a test plan for a product that they have developed
Product transition into production	Ability to explain the process by which a product is introduced into production, including what aspects are discussed at what stage and with whom and how development gateways work
Project Management	Ability to develop a basic project plan including resource planning, time planning, use of contingencies etc. Also techniques for predicting pinch points and strategies for timescale recovery
Compliance	Awareness of international standards and compliance requirements for the products designed by the employer. Ability to discuss the differences between legislative and non-legislative requirements
Commercial awareness	Ability to demonstrate knowledge of basic business fundamentals including costs, overheads, gross margin, net margin, profit, and cash
Health and Safety	Ability to demonstrate awareness and understanding of basic health and safety principles both in the general workplace and specific to electronic circuit design

Behaviours	What is required
Motivation	Self-starter, organised thinker. Works safely and effectively without close supervision
Communication	Confident in oral, written and electronic methods. Ability to communicate effectively with all levels of stakeholder
Team ethos and leadership	Exhibits leadership behaviour and qualities. Demonstrable ability to work as a member of a team.
Continuous development	Committed to personal learning and development
Problem solving/practicality	Enjoys problem solving. Able to demonstrate practical capabilities in their professional role.
Responsibility	Accepts responsibility for own work and that of others
Ethics and professional standards	Exercises responsibilities in an ethical manner and respects and complies with company rules and guidelines. Able to commit to beliefs, goals, and standards of their employer and the wider industry and its professional standards

Duration:

Typically the duration of this apprenticeship is 36 months.

Entry Requirements:

Individual employers will set their own entry requirements in terms of prior academic qualifications and experience. Typically candidates will have attained A-Level standard or equivalent, in Maths and at least one further STEM based subject such as Physics, ICT, Computing or Electronics and will have English Language at GCSE (grade C or above).

Level:

The Apprenticeship Standard is at Level 6.

Qualifications:

Successful Apprentices will achieve an Institute of Engineering and Technology (IET) accredited Honours Degree in Electronics or Electrical & Electronic Engineering, meaning that the degree course has been audited by the IET as being to a suitable standard to qualify the individual for additional professional qualifications later in their career, such as Incorporated Engineer (IEng) or Chartered Engineer (CEng). Completion of the required academic standards shall be a pre-requisite to a synoptic end-point test.

Professional Registration:

Completion of the Apprenticeship is designed to be recognised by the IET or other relevant Professional Engineering Institutions.

Review:

The standard will be initially reviewed after three years to ensure it reflects employer demand for changes in the syllabus.