



Artificial intelligence (AI) specialist

- There are opportunities for AI specialists within many IT roles such as software development, systems design and programming (see the profiles for applications developer, software engineer, systems developer, web designer, computer games engineer). According to itjobswatch.co.uk., in December 2010, most jobs using AI had job titles like 'software engineer', 'software developer' and 'programmer'.
- AI specialist is a useful term to describe these similar roles, but there is no generally agreed upon job title for such positions.
- When AI is used outside of academia it is usually as part of larger projects solving practical problems faced by businesses and other organisations. Therefore, anyone interested in a career using AI must be able to offer skills and experience beyond AI.
- The games industry is an exception where there is a specific AI niche for games development and jobs are advertised as AI jobs, but game development skills are still necessary. For more information about this see the Computer Games section in this folder.
- Jobs mentioning AI specifically remain a very small part of the IT sector; less than 1% of IT jobs advertised in the UK according to itjobswatch.co.uk. (December 2010).

Prospects

- According to the U.S. Bureau of Labor Statistics, employment in all computer-related fields is expected to grow faster than the average for all occupations until at least 2016, and that includes AI specialists. Between 2006 and 2016 the number of AI specialists is expected to grow by around 20 percent. There remains high demand for skilled IT workers.
- In October 2010 the Guardian identified jobs in 'Robots and artificial intelligence' as 'jobs of the future'; jobs that may not exist in a fully fledged form yet but are predicted to exist in a few years.
- Computerworld.com identified AI and skills using AI (e.g. datamining) as 'hot skills' to have in business intelligence and the internet. They say that to be successful, businesses will need to create web sites that are user-friendly, with artificial intelligence, data mining and data warehousing capabilities as part of their highly competitive marketing approach
- Salary prospects remain good for the IT sector as a whole. This is also true in AI specialisms; according to itjobswatch.co.uk., in December 2010, the average salary for a job using AI was £42 500, with most AI jobs offering salaries of more than £26 000.
- There remains a shortage of software personnel worldwide so anyone with these skills will be in demand.

Education and requirements

- Many AI specialists' jobs require a master's degree or a PhD. Others may only require a degree, but look for much more practical experience in a relevant IT role (see sample job advertisements).
- To succeed, as well as knowledge about AI, you will need a good grounding in programming and systems analysis, as well as a knowledge of several computer languages; practical skills and experience to implement your ideas. According to itjobswatch.co.uk, in December 2010, the majority of jobs using AI required programming skills in C ++, C and Java.

Finding a job

- Some AI specialist jobs are advertised, but not many. Other jobs advertised use AI technologies such as speech recognition, but are not directly linked to AI – persistence and thoroughness will be required to find relevant jobs. Since there is no generally accepted term for AI specialist jobs it is important to read job descriptions thoroughly to find out if they are relevant.
- Watch these sites for vacancies:
 - www.ed.ac.uk/careers/sage - SAGE (Student and Graduate Employer) job database at Edinburgh University.
 - www.computingcareers.co.uk
 - www.cwjobs.co.uk
 - www.itjobspost.com
 - www.insidecareers.co.uk/it - Inside Careers: Information Technology – online magazine with information about careers in IT. Also advertises graduate IT jobs.
 - <http://targetjobs.co.uk/it-and-telecoms-graduate-jobs>
 - www.hays.co.uk/enhance-your-career/it-jobs/index.htm - Hays IT - recruitment agency with specialist IT site
 - www.computerweekly.com- online IT magazine, with jobs search section.
 - jobs.guardian.co.uk/jobs/it-and-telecoms/ - Guardian jobs in IT & telecoms
- You could make speculative applications to companies already using AI. For advice on finding unadvertised vacancies see our website www.ed.ac.uk/schools-departments/careers/looking-for-work/unadvertised-vacancies/overview.
 - To identify companies working in AI keep up with the news in IT:
 - www.guardian.co.uk/technology - Guardian technology news.
 - www.computerweekly.com- online IT magazine, with jobs search section.
 - www.computing.co.uk - UK computing magazine available online.
 - The *Computing MI IT Software directory* (available to the left of the green IT folders) lists software developers by software category, including 'AI' under 'systems development'.

- The website dmoz has a directory of companies involved in AI, both in the UK and abroad. It indicates how each company is using AI and provides links to their websites.
www.dmoz.org/Computers/Artificial_Intelligence/Companies/
- You can also use contacts developed through university or work to identify companies using AI
- AI is being used in many different sectors (see 'AI in use') therefore you could target in-house IT groups which use AI.
- Many large graduate employers utilize AI and have graduate programmes in IT. If you are interested in this you could research these employers and their programmes, speak to them (at recruitment events or careers fairs - **[www.ed.ac.uk/ careers](http://www.ed.ac.uk/careers) > [quicklinks](#) > [Talks and events](#)**) and enquire if there might be opportunities in their organisation to specialize in their systems which use AI.
- Graduate jobs using AI are sometimes advertised, but since many jobs using AI require experience or postgraduate qualifications (see sample job advertisements) it may be necessary to work in IT for a period before specializing in AI.
- Some jobs may follow from masters or PhD research if the project is relevant to a company or creates interest in the individual's skills, however this is not a guaranteed route to a job.

AI in use

This is not intended to be a complete list of applications of AI, but to show the breadth of uses AI has been put to use in, and therefore the range of industries which require AI specialists. AI has many areas of specialization, including pharmaceuticals, communications, transportation, entertainment, defence, and computer technology. In these specific industries in-house AI specialist jobs may be advertised through industry specific media, not IT specific media.

AI tools are now used in many places as part of a larger system; for the most part, AI does not produce stand-alone systems, but instead adds knowledge and reasoning to existing applications, databases, and environments, to make them friendlier, smarter, and more sensitive to user behaviour and changes in their environments.

The Microsoft research website

(**<http://research.microsoft.com/apps/dp/areas.aspx>**) illustrates the range of research large companies are involved in. The dmoz website has a list of companies using AI and indicates how each uses AI

(**www.dmoz.org/Computers/Artificial_Intelligence/Companies/**).

- **Medicine:** including interpretation of medical images, diagnosis, expert systems to aid GPs, monitoring and control in intensive care units, design of prosthetics, design of drugs. The Intellipath™ pathology diagnosis system has been deployed in hundreds of hospitals worldwide. AI is being increasingly used to provide solutions regarding vector-borne diseases like malaria.
- **robotics:** including vision, motor control, learning, planning, linguistic communication, cooperative behaviour . Robots are usually trusted with jobs that are deemed dangerous and sometimes impossible for a human being. Today, many industries use them for jobs that are to be performed with utmost efficiency and without the slightest possible chance of lapse in concentration.

- **engineering:** fault diagnosis, intelligent control systems, intelligent manufacturing systems, intelligent design aids, integrated systems for sales, design, production, maintenance, expert configuration tools (e.g. ensuring sales staff don't sell system that won't work). Diagnostic systems based on AI technology are being built into photocopiers, computer operating systems, and office automation tools to reduce service calls. Stand-alone units are being used to monitor and control operations in factories and office buildings.
- **software engineering:** work on programme synthesis, verification, debugging, testing and monitoring of software. AI systems configure custom computer, communications, and manufacturing systems, guaranteeing the purchaser maximum efficiency and minimum setup time, while providing the seller with superhuman expertise in tracking the rapid technological evolution of system components and specifications.
- **interfaces and "help" systems:** as computers are used for more and more applications that involve interaction with human beings, there are ever growing pressures to make the machines easier for non-experts to use.
- **information management:** this includes the use of AI in data mining, web crawling, email filtering, etc. For example, a company in California, uses AI to help retailers mine for consumer data by sifting through the ages, postcodes and buying habits of people who buy goods over the internet. Google is a set of applied artificial intelligence platforms, which are able to 'learn'.
- **entertainment:** increasingly AI is being used in computer games and in systems for generating and controlling synthetic characters either for textual interaction or generating films with cartoon characters or interactive avatars in virtual worlds.
- **architecture, urban design, traffic management:** tools to help solve design problems involving multiple constraints, helping to predict the behaviours of people in new environments, tools to analyse patterns in observed phenomena.
- **crime prevention and detection:** e.g. detection of forgeries, learning to detect evidence of crooked police officers, software to monitor internet transactions, helping to plan police operations, searching police databases for evidence that crimes are committed by the same person, etc. Intelligence agencies and police departments across the world are highly dependent on artificial intelligence, which is used to detect bombs and explosives and defuse them. Forensic analysis of CCTV images using AI vision technology is being developed to recognise criminals. Computer programmes that can recognize fingerprints or voices for use in security systems are being developed.
- **commerce:** using software agents of various sorts to provide, search for, analyse or interpret information, take decisions, negotiate with other agents, etc. PEGASUS is a spoken language interface connected to the American Airlines EAASY SABRE reservation system, which allows subscribers to obtain flight information and make flight reservations via a large, on-line, dynamic database, accessed through their personal computer over the telephone. The use of automatic scheduling for manufacturing operations is exploding as manufacturers realize that remaining competitive demands an ever more efficient use of resources - companies such as Toyota and Bausch & Lomb use the technology to streamline their production supply chains. Evolutionary computing is used in scheduling to find the most efficient way to roster staff or allocate resources.

- **space:** control of space vehicles and autonomous robots too far from earth to be directly manipulated by humans on earth, because of transmission delays. Nasa uses AI to help plan and schedule space shuttle maintenance.
- **military activities:** this may be the area in which most funds have been spent. It is also not easy to learn about the details.
- **Finance:** Credit card providers, telephone companies, mortgage lenders, banks, and governments employ AI systems to detect fraud and expedite financial transactions. The US Internal Revenue Service apply artificial intelligence techniques and other advanced computing skills to solve IRS business problems using neural networks, data mining, encryption, agent-based modeling, expert systems, text generation and natural language, and sophisticated Web applications. Artificial Intelligence is heavily used in investing in stocks, organizing operations and managing properties. Fraud detection systems use neural networks to detect stolen credit cards. Financiers use neural networks to predict stock market trends and genetic algorithms to optimise their portfolios.
- **Telecommunication:** language and speech technology systems, automatic speech recognition, speech translation systems, Call Centres and Help Desks often use case-based reasoning to provide instructions on how to deal with common problems
- **Marketing:** AI is being used to develop more targeted, relevant, and timely marketing programmes to increase customer attrition rates, respond (in most cases proactively) to customer events, and create customer communication strategies that are personalized, relevant and delivered at precisely the right time for maximum impact.

Links

www.ed.ac.uk/careers/ - Edinburgh University Careers Service website with information about looking for jobs, CV's and applications, careers in IT, SAGE, and much more...

Computing MI - directory of IT employers and service providers. Available to the left of the green M folders.

<http://targetjobs.co.uk/career-sectors/it-and-telecoms> - Target jobs: IT – online magazine with information about graduate careers in IT. Also advertises graduate IT jobs. - <http://targetjobs.co.uk/it-and-telecoms-graduate-jobs>

www.aaai.org - The AAAI (Association for the Advancement of Artificial Intelligence) – the website includes back copies of their magazine and a vast source of information about AI on the internet in the 'AI topics' section, including information about studying AI, researching AI, working in AI and links to news about AI.

www.aisb.org.uk - Society for Artificial Intelligence and Simulation of Behaviour (SSAISB)

www.bara.org.uk/ - BARA (British Automation & Robot Association)

www.bcs.org.uk - British Computer Society (BCS) - www.bcs-sgai.org - BCS Specialist Group on Artificial Intelligence (BCSSGAI)

www.computerweekly.com - online IT magazine, with jobs search section..

www.computing.co.uk - UK computing magazine available online. - www.computingcareers.co.uk - Computing's job search site.

www.cwjobs.co.uk - IT job site.

www.dmoz.org/Computers/Artificial_Intelligence/Companies/. – Directory of companies using AI

www.e-skills.com - e-skills UK - The Sector Skills Council for Business and Information Technology

www.guardian.co.uk/technology - Guardian technology news -
jobs.guardian.co.uk/jobs/it-and-telecoms/ - Guardian jobs in IT & telecoms

www.hays.co.uk/enhance-your-career/it-jobs/index.htm - Hays IT - recruitment agency with specialist IT site

www.insidecareers.co.uk/it - Inside Careers: Information Technology – online magazine with information about graduate careers in IT. Also advertises graduate IT jobs.

www.itjobspost.com/ - IT job site

www.itjobswatch.co.uk – provides information about recruitment, the skills connected to jobs e.g. demand for C++ with AI, and an idea of salaries for IT jobs.

University of Edinburgh Careers Service

January 2011



expanding horizons

www.careers.ed.ac.uk

Sample job adverts for AI Specialists

Please note: The following are sample job adverts for AI specialists collected during December 2010. Most are not graduate entry positions, but show the kind of positions available and the experience and knowledge required.

Graduate AI Specialist

Our company is creating a fully functioning world that runs constantly on a server populated by artificially intelligent computer generated characters and real players. The project is a highly detailed simulation with full AI for the NPCs with each having their own motivation, goals attributes and even jobs to fulfill. The worlds span a range of genres from fantasy to science fiction to cyberpunk! This is a superb opportunity for an enthusiastic newly qualified computer science graduate with a strong interest in real-time AI to join the team.

The role will also very probably involve the successful candidate assisting in the evaluation of new technologies as the company has exciting relationships across the world from Europe to Australasia, the Far East and the USA. The company comprises of very talented people and were originally formed by a merger of teams from Bullfrog and Sony. A joint venture agreement has just been signed with the company who produced the special effects for the movie "Gladiator". This is a very exciting new vacancy and is exclusive to Aardvark Swift.

Skills Required:

C++, Computer games, AI

ASP.NET Developer Maths / Artificial Intelligence

Salary: £ 75000

Job Type: Permanent

The company is a leading edge software developer involved in the creation of an intelligent adaptive web based system, using artificial intelligence techniques to provide solutions in a variety of different areas. If you have a Mathematical Mindset - this is your dream environment.

A senior ASP.NET / C# developer is required. In this role, you will work as a lead developer in order to deliver high-quality software. Responsibilities will include the design and coding of web applications based on .NET technology. You will ensure that these applications are developed to full usability, in terms of robustness, scalability and security. The role provides an opportunity for the developer to contribute in a meaningful way to the design and production of a powerful and complex system.

Competencies required

Very good knowledge of .Net framework

In-depth knowledge of, and experience in, C#
Strong object oriented modelling and design skills
Good working knowledge of SQL Server / relational databases
Experience of Web, Windows & Distributed Application development
Experience of HTML, CSS, XML, XSLT, SOAP, AJAX etc.

Successful applicants must have:

First or 2.1 Degree / MSc in Computer Science or related discipline.
Strong background in C# / ASP.NET
5 years relevant experience in developer role.

Industry placement in AI

Lockheed Martin Advanced Technology Laboratories (ATL) is the advanced computing asset of Lockheed Martin Corporation – a global enterprise with core businesses in systems integration, space, aeronautics, and technology services. The mission at the Advanced Technology Laboratories is to enhance the Corporation's competitive edge. We are a group of professionals who develop and apply "cutting edge" software technologies. ATL performs applied research in artificial intelligence, distributed systems and embedded processing.

Job Description:

Short-term engineering employees are typically assigned to, at most, two Artificial Intelligence Laboratory contracts or research and development projects, and report to the project's Leader. Their tasks generally comprise software design, development, and test of a portion of a concept development prototype as a part of a development team. Projects are currently concentrating on technology areas such as intelligent mobile agents, autonomous robot control, automation for reduced manning initiatives, and web-based data collection and processing tools

Job Requirements:

- Candidate should be currently enrolled in computer science, electrical or computer engineering or related technical major that emphasizes software development as the means to problem solving
- GPA 3.2+ required; 3.5+ preferred
- Previous technical work experience preferred.

Course work or experience in the following:

1. Artificial Intelligence, specifically in symbolic and numeric data structures, knowledge representation schemes, knowledge-based control strategies, and developmental approaches used in constructing these systems combined with C++ and/or Java programming experience
2. Human-Computer Interaction, Interface Design or Cognitive Science combined with User-Interface Design experience

DSP Systems Engineer - Image Processing

Sector :Manufacturing and Engineering

Job Type :Permanent

Hours : Full-Time

Salary : £30000 - £40000 per annum

New DSP software and systems engineering vacancy with a Midlands based company developing exciting technology in the image processing / recognition arena.

Due to the challenging nature of the job candidates will need to be degree educated with a minimum 2i classification, ideally in an engineering or DSP focussed discipline.

Your skills should include:

- excellent C++ and C
- sound understanding and experience in developing with low level / circuit level code
- you may have worked as a designer of high speed digital embedded electronics earlier in your career before majoring in embedded firmware for DSP systems
- assembly language experience and familiarity with compiler translations to assembly language and their optimisation
- DSP experience ideally gained in volume products having resource constraints and complex algorithms.

The following are highlighted as beneficial:

- experience with Blackfin processors would be a benefit
- this role would suit a candidate with an interest in some, or all, of AI systems, machine vision, pattern recognition and neural networks
- exposure to Visual Studio and MFC, and programming under Windows
- experience in design for embedded products manufactured in volume.

Data Mining Analyst

Waterfront International is a Toronto-based financial consulting firm, specializing in developing computer based statistical trading strategies. Waterfront's selective hiring process considers only highly talented individuals with a history of exceptional professional and academic achievement, and solid real-world experience.

Primary Responsibilities:

- Perform financial market data research and analysis to identify and resolve data issues using advanced data mining techniques.
- Develop proprietary data mining tools and applications.
- Develop predictive models.

Requirements of the Candidate include:

- PhD or Masters in mathematics, statistics or computer science specializing in data mining.
- Experience with machine learning and knowledge discovery techniques.
- Solid quantitative background with excellent analytical skills.
- Strong working knowledge of data mining and statistics.

- Must possess expert level C/C++ programming skills.
- Some financial experience desired but not required.
- Must be a strong self-starter and able to work well independently.

Java Software Engineer

Salary: £40000 - £50000 per annum + Benefits

Job Type: Permanent

Do you have core programming skills in Java? Do you have additional skills in Object Orientated Design? This leading Digital Start up is looking to recruit talented Java Software Engineers due to expansion. This is a great opportunity to join a young start-up that is already experiencing a steady period of growth. The company is founded by people from Leading companies and have installed that culture into their own venture.

The role of a Java Software Engineer would be responsible for:

- Writing server-side code for web-based analysis applications, creating robust applications, and developing prototypes quickly.
- Developing various classification models to help our customers understand the performance of their web presence.
- Analysing diverse product architectures for scalability, reliability, robustness, and adaptability.

You will need to have a good track record in Java, along with any of the following desirable skills:

- C++
- Experience with artificial intelligence, data mining, machine learning, and natural language processing
- Python or Javascript / AJAX
- Database design and SQL,
- TCP/IP and network programming

Systems Engineer

Salary: £38000 - £40000 per annum

Job Type: Permanent

Leading Systems Integrator and supplier of High Technology Systems and Services seeks a client facing Senior Systems Engineer to join a flagship programme entering into a major technical transformation. Offer includes good salary, benefits, pension and free parking.

As the Senior Systems Engineer you will be working for the Engineering Manager. The role is for the Lead System Engineer responsible for the Artificial Intelligence (AI) System and will become the Lead Engineer for the new operational system when this is fully deployed

.The Senior Systems Engineer duties will include:

- Engineering customer point of contact for all changes to the operational systems.
- Lead teams of systems, software & infrastructure engineers to design high level architectures for enhancements to operational systems.
- Provide technical support to the implementation teams through the development, testing, and system acceptance phases of enhancements to the operational system.
- Provide technical integration support for integration teams during software deployment phases.
- Provide focus for technical solutions in support of the Programme Management team during customer reviews and internal programme reviews.
- Ensure comprehensive technical hand-over to on-going maintenance / support teams.
- Lead investigations into Trouble Tickets raised against the operational systems
- Lead discussions with customers during requirements analysis - transforming operational needs into technical requirements specifications.
- Support Business Development and Programme Management with technical expertise during the capture & proposal phases.

The Senior Systems Engineer will ideally have familiarity with:

- o Windows (NT/2003/7/2008)
- o UNIX OS
- o Oracle Databases
- o C++
- o Java/J2EE
- o UML
- o Proven ability working with Enterprise Architect (EA)
- o ITIL

Advanced Data Analysis Engineer

Salary/Rate: £30000 - £35000

Type: Permanent

A large aviation organisation require an experienced Data Analysis Engineer who will work as part of a small team in the areas of Data-mining, A.I (Artificial Intelligence) and advanced statistics.

You will support R&D and application of decision support technologies, including reasoning, anomaly modelling, prediction, optimisation and virtual sensing. You will work with a team of technologists using these techniques to combine them with expert domain knowledge to extract large volumes of data from various aircraft. You will also be involved with prototyping, exploration and comparison of data analysis techniques, as well as contributing to real-world systems (on-board aircraft maintenance, off-board engine diagnostics and prognostics and web-based alerting systems).

Experience:

Advanced data analysis for decision support.
Algorithm design, prototyping and validation.
System Architecting.
Research, design and development of in-house management tools.
MSc or PhD in Science, computing, engineering or equivalent.
Experience of Artificial Intelligence, Bayesian Models, Neural Networks, Graphical Models
Software experience with: OO (MATLAB, C, C++ or Java or .Net).
Interest in developing leadership skills.

Algorithm Specialist

Salary/Rate: £25000 - £35000

Type: Permanent

This is an exciting opportunity to work for one of the worlds leading Engineering companies working on real world challenges and stimulating projects. We are seeking an Algorithm Specialist for decision support and advanced data analysis.

Summary

Research and development of decision science technology

Responsibilities:

The role requires innovating the development and application of decision support technologies including reasoning, anomaly modelling, prediction, optimisation and virtual sensing. The successful candidate will join an embryonic team of specialists whose aim is to develop core algorithms that can then be integrated into business solutions by a larger applications group. The applications group will use these techniques, combining them with expert domain knowledge, to extract value from large and complex data sets from around the businesses, majoring on aircraft data.

Key Requirements:

- * Algorithm design, prototyping and validation
- * Research, design and development of in-house analysis tools

Desired Characteristics:

- * Knowledge of artificial intelligence such as Bayesian models, neural networks, graphical models, statistics.
- * Computational complexity theory
- * Matlab
- * .NET
- * Design patterns
- * Interdisciplinary communication to forge connections with diverse domain specialists

Benefits Include:

- * Good opportunities for career development
- * Final salary pension scheme.
- * Share option scheme
- * Good location and working environment.

Lead Test Engineer / Tester - Finance

Salary/Rate: £40000 - £45000

Type: Permanent

Lead Test Engineer / Tester (Selenium RC) sought by innovative SAAS award winning financial software house. You will lead the testing of their intelligent analytics software which uses artificial intelligence techniques to mine and analyse highly complex financial data. This will include test planning, promoting automated testing within the firm (Selenium RC), responsibility for the sign-off of releases and managing test environments. This is an excellent opportunity for a senior tester to make the next step up to technical / team leadership and progress your career whilst gaining valuable knowledge of financial systems.

Requirements:

- * Strong testing experience including test planning
- * Selenium RC automated testing experience (ideally with Java)
- * Ability to lead the testing activities
- * Excellent communicator with good inter-personal skills

Senior Analog / Mixed I.C. Designers - Bristol

Job Hours: Full-Time

Salary: Negotiable

My client is seeking a highly experienced HIGH SPEED analog and mixed signal CMOS / BiCMOS I.C. designer to join their growing team.

The client is seeking individuals with over 7 years experience of active design; understanding design fundamentals, good communication skills, able to operate within a team orientated environment and holds a good honours degree in any related discipline.

Responsibilities will include the design and layout of high performance analog/ mixed signal I.C's for fibre optic communications used within various markets such as consumer, defence, automotive and telecommunications.

You will undertake feasibility studies of new products, carry out schematic entries, computational simulations, full custom layouts, parasitic extraction and contribute to design reviews.

When the right candidate is found a very competitive, tailored, remuneration package will be put together.