# LDRA Academic Alliance Program

## Providing Expertise for a Safer Tomorrow

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# LDRA Customers



Aerospace



Defence



Automotive



Industrial



Medical



Railways

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# Introduction

The LDRA Academic Alliance Program has been created through a partnership between universities and colleges in India, with the aim to educate thousands of engineering scholars to generate a competitive, experienced workforce and enhance global software safety and security expertise in India. Professional certifications are important in today's employment as companies prefer to appoint candidates who require limited training. Through collaboration with academic institutions the program aims to empower the student community and prepare them for employment by facilitating a broad range of resources and support to faculties and students. The LDRA Academic Alliance Program is vital for this fast-changing and specific-skilled industry scenario.

# About LDRA

Liverpool Data Research Associates (LDRA) was founded in 1975 by Professor Michael Hennell to commercialise a software testbed created to perform quality assessments on the mathematical libraries on which his nuclear physics research at the University of Liverpool was conducted.

LDRA is a pioneer provider of software analysis, test and requirements traceability tools for the public and private sectors and a forerunner in static and dynamic software analysis. Blue chip companies in the Aerospace, Defence, Nuclear, Industrial, Medical and Automotive sectors use the LDRA tool suite to test their applications to safety-critical standards.

Boasting a worldwide presence, LDRA is headquartered in the UK with subsidiaries in the United States and India coupled with an extensive distributor network.

# Worldwide Industrial Presence

For more than 40 years, LDRA has developed and driven the market for software that automates code analysis and software testing for safety-, mission-, security- and business-critical markets.

The LDRA tool suite is a premier choice for building quality into safety critical civil and military avionics software. The LDRA client profile in the aerospace domain comprises major international players such as: Airbus, Honeywell and General Electric (GE) to name a few.

To enable safe and secure systems in the Indian aerospace and defence sectors, LDRA works with Hindustan Aeronautics Limited (HAL), National Aerospace Laboratories (NAL), ISRO Inertial Systems Unit (IISU), Defence Research & Development Organisation (DRDO) and many other major players like L&T, Wipro, HCL, Quest Global and Infotech.



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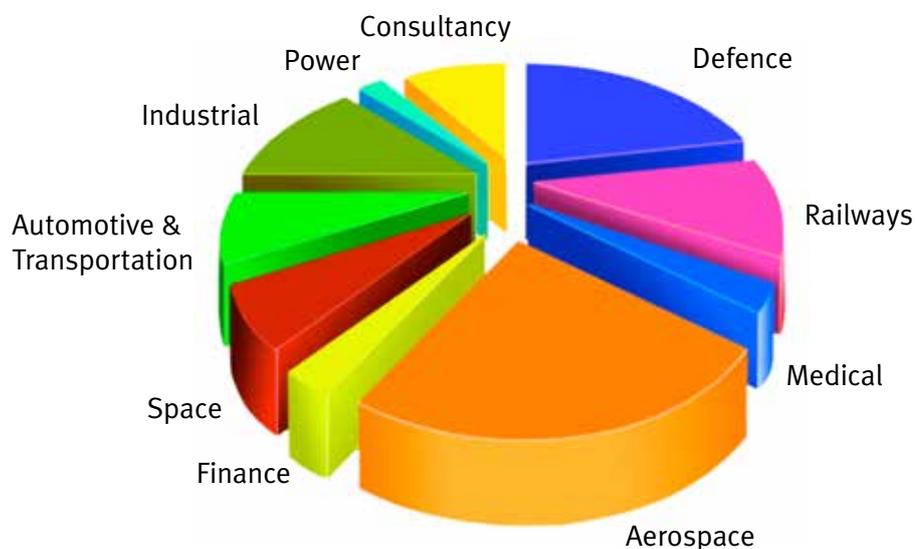
*Since its inception LDRA has been regularly audited for tool qualification purposes. Honeywell, Pratt and Whitney, BAE, Rockwell Collins, GE Aviation and Federal Aviation Authority among others, have recently undertaken audits of LDRA in connection with: ISO 9000/9001:2000; Def-Stan 00-56; and DO-178B/C standards.*

In addition to LDRA's presence in the aerospace and defence sectors, major automotive manufacturers such as Siemens, Daimler, Toyota, Hyundai and Caterpillar also use the LDRA tool suite. Within this sector the LDRA tool suite is used to help manufacturers to meet the software quality and management compliance objectives of the MISRA C and C++ guidelines and the ISO 26262 standard.

The LDRA tool suite is also extensively used in other industries including nuclear, medical, space, energy, communication, railway, security and financial where the current political and economic environment has dictated that security related issues are at the forefront of decision making for systems development.

## Industry Observations

The TechNavio analysis forecast on the Global Embedded Software Market 2012-2016 states that there will be a growth of 10.7% CAGR (Compounded Annual Growth Rate) over the period of 2012-2016[1]. One of the key factors contributing to this market growth is the increasing demand for embedded software in the automotive segment. However, safety and security issues associated with embedded software development could pose a challenge to the growth of this market.

The Static Application Security Testing (SAST) market in the APAC is to grow at a CAGR of 36.1% for 2010-2014[2]. The SAST market in the Europe Regions is to grow at a CAGR of 36.7% for 2010-2014[3]. One of the key factors contributing to this market growth is the increase in demand from enterprises for SAST-certified applications, according to TechNavio's analysis forecast.

The above mentioned market research reports indicates that the embedded software safety and security market is going to see a sharp rise in the near future, but there is a shortfall in terms of skilled manpower in this domain.

The automotive industry will require the most efficient engineers in the near future. The introduction of new initiatives and the development of new software standards, most notably the MISRA (Motor Industry Software Reliability Association) standard for the C and C++ programming languages demonstrate that this industry has started recognising the need to ensure best practices in secure software development. The introduction of the ISO 26262 guidelines further emphasise the advancement of technology and increased use of complex electrical and mechanical systems in all modern vehicles. Engineers with knowledge and experience of these industry standards and guidelines will be in high demand in the coming decade.

## Mismatched Student Aspirations and Job Market

There is a contrast between the Indian job market and the aspirations Indian students have when they enrol in an institution. The majority of Indian students aspire to achieve a job in: medicine, teaching, business management, software and IT engineering. But these are not the sectors were India needs skills in the near future and our young students are not aware about this changing trend in the job market.

By 2022, India is projected to be short of more than 103 million skilled workers in the infrastructure sector, about 35 million in the automobile industry and 33 million in construction.  The other booming areas are Aerospace, Defence, Energy and Nuclear. By contrast, a shortage of only 5 million is expected in the technology sector, states the National Skill Development Corporation in their report "Skill Development in India: A Transformation in the Making."

According to a survey of more than 2,800 students undertaken by the Centre for the Advanced Study of India (CASI) at the University of Pennsylvania for their report: "The Skills they Want: Aspirations of Students in Emerging India," the automotive and construction sectors are expected to need the most skilled workers over the next decade but only a very small proportion of students want careers in those fields[4]."

Megha Aggarwal, the lead author of the CASI survey says "The local industry is not doing enough to train and communicate with the students or make their jobs attractive[4]." Dilip Chenoy, Head of the National Skill Development Corporation says "we have a whole lot of people with degrees in hand but with no relevant skills and if we don't get our act together in time and employ them gainfully, there will be a huge social and political problem in our hands[5]."

LDRA was an integral member of the committee who developed and launched the MISRA C and MISRA C:2012 standards. Both this new standard together with the original MISRA C standards are fully supported by the LDRA tool suite.

**Industry Requirements vs. Student Aspirations**

Respondent interest vs labour market gaps

- Fewer jobs/high student interest
- More jobs/strong student interest
- Fewer jobs/low student interest
- More jobs/poor student interest

High interest shown by students

High anticipated labour market shortage

Banking
Mobile/computing
Healthcare
Transportation
Food processing
Hotel/tourism
Retail
Automobiles
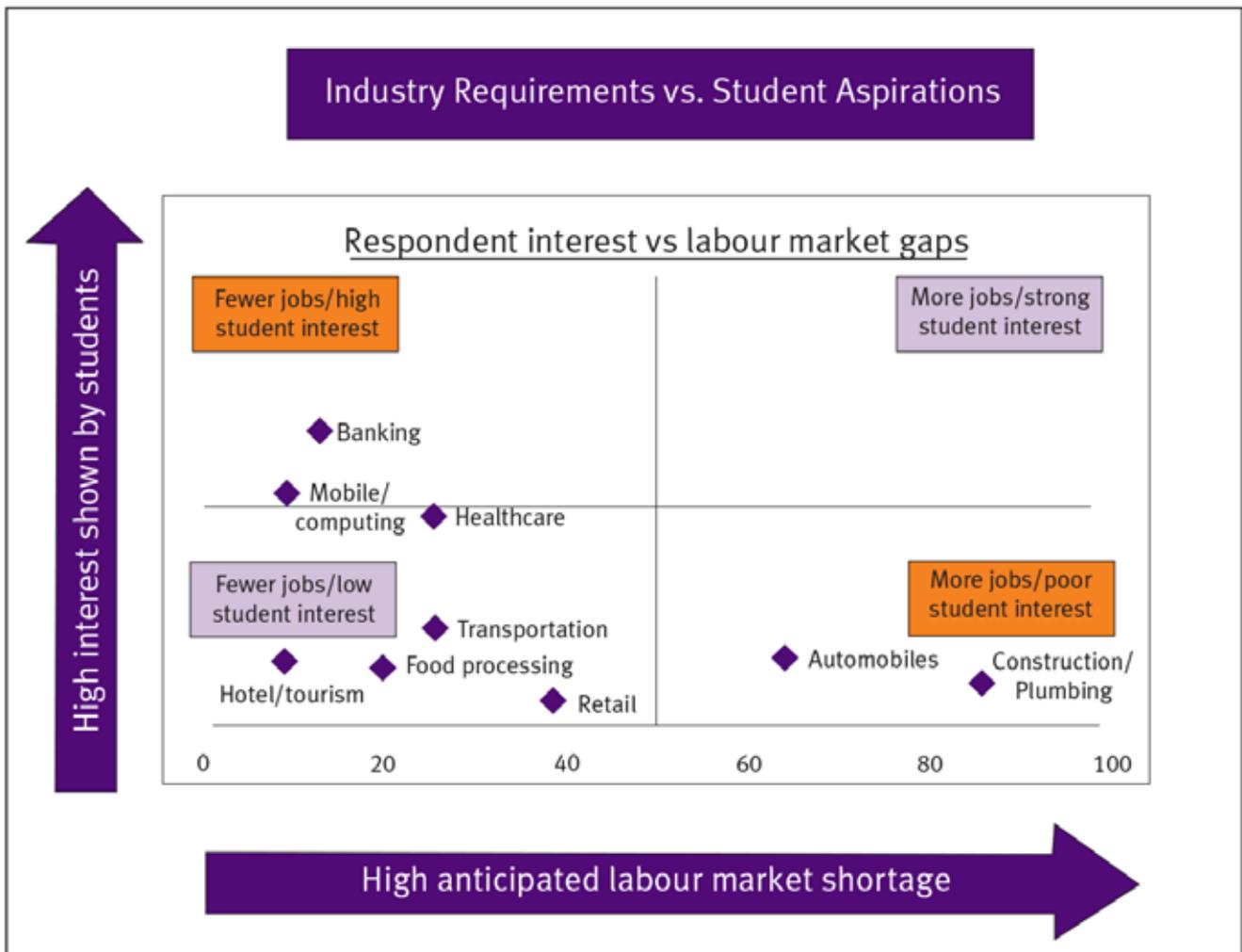Construction/Plumbing

0   20   40   60   80   100

**Image Credit: Megha Aggarwal, Devesh Kapur, Namrata Tognatta, and CASI Working Paper Series - The Skills they Want: Aspirations of Students in Emerging India[4]**

Considering the urgency of this situation the Government has stepped into this arena and has begun upgrading hundreds of languishing vocational training institutes with new industry-specific skills courses and setting up skills development centres in partnership with businesses.

This forthcoming industry scenario forms a responsibility for both industry pioneers and academics in our country to groom our learners with specialised market required skills. Training our young students with industry specific skills and communicating future industry trends is the key to this dynamic market. A mutual venture which comes into existence with the collaborative effort of academic institutions and special-skilled companies, such as LDRA, promises a better future for young talent, various industries and the nation as a whole. This innovative program will remove the glut which the Indian IT industry is facing at present in terms of job availability and required skills.

# Required Market Skillset

To understand the required market skill set in a qualified software safety and security professional LDRA conducted a survey where in-depth analysis and inputs were taken from around 150 industry practitioners.

The survey covered areas such as process and standards, coding guidelines, programming languages and other soft skills which are considered essential in many industries: Avionics, Automobile, Defence, Industrial, Communication, Nuclear and Medical.

Based on the survey, LDRA's report titled, "Expectation from a Qualified Software Safety and Security Professional", showcased that the knowledge of programming languages C and C++ is very important with a weight of 81% and 73% respectively.

Other areas which are considered to be significant are – software engineering concepts (79.75%), MISRA C (73.42%), Verification & Validation methodologies (72.78%), MISRA C++ (50.6%) and DO-178 B/C (46.84%). 51.27% of the industry experts consider knowledge of the LDRA tool suite as an essential qualification for a software safety and security professional.

The importance of these skills shows that genuine engineering skills are required to make safe products in a wide range of industries. In addition, academic institutions can create an USP (Unique Selling Proposition) by imparting these skills into their engineering scholars. This will increase the credibility of academies in front of companies looking for a skilled pool of graduates.



# LDRA Academic Alliance Program Goals

The LDRA Academic Alliance Program is designed to benefit engineering students, developers and software safety experts who wish to become familiar with the source code analysis techniques and methodologies that it supports. The specialised knowledge in this domain offers career opportunities in the safety and security industry.

The LDRA Academic Alliance Program aims to provide a platform with a thorough understanding of advanced testing methodologies and compliance with industry specific standards such as DO-178B/C (Avionics), ISO 26262 (Automotive), IEC 61508 (Industrial Safety) and IEC 62304 Medical Devices).

## Objectives:

- **Updating the Syllabus**

  LDRA will implement the knowledge about the software safety and security industry into the course curriculum, with the objective of creating skilled and market ready safety professionals. This will ensure a self-sustaining model, generating a continuous pool of industry-skilled and competent engineers into the software quality and security market.

- **Faculty Development Programs (FDPs)**

  We will provide an in-depth training program, focusing on software engineering, safety standards, testing methodologies using the LDRA tools, which will be the foundation of our Academic Alliance Program. LDRA will provide initial onsite training and follow up WebEx Sessions on industry specific topics at regular intervals to appraise the knowledge base of faculties and to keep them informed about industry standards and evolving technologies.

- **Networking Opportunities**

  By joining the LDRA Academic Alliance Program, educational institutions are provided with an opportunity to link with LDRA business partners and clients, several other industry groups and luminaries. LDRA will share the list of academic partners to our clients which will help the institutions to have better placements and give their students a promising career path.

  The academic institutions will be a part of all relevent LDRA events, seminars and subsidised training carried out on the latest safety tools and standards. These events will be a huge arena for faculties and students to learn more about upcoming industry practices and new LDRA tools from industry experts.

- **LDRA – Software Testing and Source Code Analysis Tool**

  LDRA will help the institution with an LDRA lab for the purpose of training the students and faculty. Licenses will be provided with a deep discounted pricing option, with an assurance under the software license agreement, that it will be used for in-house training and learning purposes only. LDRA has developed its tool suite to enable the application of lifecycle best practices which produce software that meets the highest quality standards. The LDRA tool suite is unique in its static and dynamic analysis, together with unit and system-level testing on virtually any host or target platform.

- **LAAP Service Partner**

  In association with our partner, LAAP can be included as an independent course in the curriculum.

## Supported Standards

| | |
|---|---|
| DO-178B/C | IEC 61508 |
| DO-278 | IEC 60880 |
| MISRA C:2012, MISRA C++:2008, MISRA C:2004 and MISRA C:1998 | EN 50128 |
| | High Integrity C++ |
| JSF++ AV | IPA/SEC C |
| Def Stan 00-56 | Netrino C |
| ISO 26262 | HIS |
| IEC 62304 | |

LDRAunit, LDRA's class leading standalone unit/ integration test tool, provides a complete verification environment for the automated generation and management of test harnesses and unit/integration tests. This solution maximises developer productivity by giving them the ability to focus on implementing correct software functionality versus burdensome and time consuming, low-level manual testing activities.

LDRArules - Increases Visibility for Software Standards Compliance and Security Vulnerabilities. The tool provides transparency into source code, enabling managers, teams and developers to better monitor standards compliance, memory management errors and security vulnerabilities. LDRArules provides cost-effective, standalone MISRA checker. Developers can easily configure LDRArules for a specific programming standard such as MISRA, or choose to enforce in-house programming templates and improve their overall software development methodology

LDRAcover - Structural coverage analysis for optimal test effectiveness. LDRAcover is the LDRA code coverage reporting tool. It provides users with the ability to quickly and easily view code coverage results such as callgraphs, flowgraphs, and code coverage reports in an interactive easy-to-use interface with powerful filtering capabilities. LDRAcover provides test planning documents and colour-coded graphs to help you achieve the desired level of coverage, ranging from procedure/function calls to safety-critical modified condition/decision coverage.

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