A Career in Control and Automation

Involved in creating a safe, intelligent, power efficient and more productive environment, control and automation engineers engage with customers from multiple industry verticals. They also get immense exposure to a wide range of usage scenarios in the field of control and automation systems, which is a very good beginning to any career. Let’s take a look at the scenario in India—the opportunities, scope and entry level jobs in control and automation

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Machines are increasingly getting intelligent and this intelligence is provided by software. Currently, more functionalities are being defined by software rather than hardware. Sharing his point of view, Prasad Bhatt, vice president, Product Engineering Solutions, Wipro, says that, “We observe that IT has a very important role to play on the shop floor, and to drive this trend, the industry needs automation engineers who understand the interplay of software and machines.”

Starting from waste and water management to any production assembly line, there is a need for control and automation systems, believes Partamita Kapat, head-HR, eInfochips. She adds, “Synchronised signals and correct signal indications can create an efficient system to make life easier. Intelligence can be added to such systems by ‘monitoring’ the traffic and flow.”

It’s a multi-disciplinary field

The control and automation domain is a multi-disciplinary field. It requires a convergence of various engineering fields—CS/IT, electrical, mechanical, chemical and electronics to develop a solution. “Control and automation requires a blend of process knowledge, logic theory, software/platform knowledge, instrumentation and IT,” says Amit Kumar Kushawaha, product manager (EMS-Energy Management Systems), Rishabh Instruments Pvt Ltd, Nashik.

The basic premise of automation is to pass on the intelligence to a system with the objective of making it efficient and economical. “Systems such as energy management are an investment and lead to savings in aspects of consumption, man hours and enhanced system availability,” Kushawaha adds.

The control and automation domain is currently in a situation in which demand far outstrips supply. “In fact, this is one of the few technical areas in the electrical/electronic-engineering field where the knowledge or skills available in India are seriously inadequate, and students, engineers and experts in these areas will be required by the industry in the immediate future,” says Nilesh Sawant, head, SITRAIN India, Siemens Ltd.

Prasad Bhatt believes that in India, the adoption of automation has lagged behind countries in Europe and North America. He adds, “However, some companies, especially those in process industries such as steel, cement and oil & gas, have been leading adopters of automation technologies.”

The Indian market for automation is evolving, believes Kushawaha. With the rising cost of resources, stringent regulations, and the increasing concern for the environment and safety, companies are making systems efficient. But within the current economic scenario, the decision to switch to automation is also based on concerns about cash flow and capex. There is also the need to raise awareness among end customers. Kushawaha says, “Automation has percolated to several new areas including security, lighting, fire detection, entertainment and energy...
management. The market comprises large players like Rockwell, Schneider, Siemens and several fragmented players who have developed capabilities in specific fields. Rishabh Instruments, over three decades, has developed expertise in electrical equipment and systems like energy management.”

Rajeev Sharma, general manager-Strategic Planning and Business Development, Mitsubishi Electric India Pvt Ltd, says, “Automation Industry is increasing at the rate of 12 to 13 per cent every year, but in the Indian automation market technology used in machinery is not at par with developed countries. Indian market is good for F&B and Pharma industry which is a very attractive market for automation.”

The job scenario

There is considerable demand for control and automation engineers in India, say industry experts. “The scenario for jobs in control and automation clearly shows a serious demand for students and engineers from the branches of electrical, electronics and instrumentation engineering,” says Nilesh Sawant. He adds, “All types of industries, including automobiles, food and beverages, pulp and paper, cement, mining, chemical, pharma, construction, infrastructure or even power generation and transmission, use automation engineering and technology in small, medium or high levels, depending on the machinery or process. Hence, individuals gaining knowledge in basic or advanced levels of automation will have access to a variety of job opportunities.”

Considering India’s industrial growth, many multinational companies that provide automation solutions have entered or are entering into the Indian market, informs Partamita Ka-
pat. She says, “These companies have to rely on local resources. The manpower can be for office staff (designing and manufacturing) or for onsite deployment. If a skilled workforce is not available locally, these MNCs have to ‘import’ talent, which increases the cost of the solution.” She adds, “There is a large requirement for products used in control and automation. Most of the raw material used for automation solutions is imported. The industry needs substitutes for the imports.”

Kushawaha thinks that those aspiring to enter this field should take up internship opportunities during college, at companies involved in such operations. Plant start-ups are a great place to experience systems integration and functioning. Another avenue for learning are the various competitions held at educational institutes across the country. He says, “Aspirants should get out of their comfort zones and take up such challenges. Rishabh Instruments offers internship opportunities to students in the field of energy management and systems integration. Students get to dirty their hands on actual systems, which leaves them with an intense learning experience.”

Scope and entry level roles in the control and automation sector

Automation is a rapidly expanding field and in a developing country like India, there are immense growth opportunities for an individual. Kushawaha says, “An aspect of crucial importance here is that an exposure to operations gives you an edge over others, as it helps you to acquire a holistic picture of the systems involved.”

Talking about entry level jobs, he says, “The entry level roles do involve getting into installation, commissioning, etc, and these experiences help one come up with efficient and safe designs in automation projects.”

Regarding the scope for career development in this field, Prasad Bhatt informs, “Broadly, an engineer can work in three different kinds of companies. The first are pure-play automation companies that are suppliers of automation equipment and software to various industries. Then there are industrial users of automation products and services, such as companies in automotive, power and the oil & gas sectors. Finally, there are services companies, which provide consultancy and services to integrate products from pure-play automation companies with the manufacturing processes of the industrial users.” These services add high value by adapting standalone machines and middleware, and customise them to the specific needs of optimisation and control, remote management and machine-to-machine (M2M) applications. Talking about entry level jobs, he adds, “Typically, entry level roles involve validation of automation and control systems’ designs. Gradually, the engineer moves into designing and modelling of the systems.”

According to Nilesh Sawant, there are two broad categories of firms that absorb freshers or engineers with one
or two years of experience. The first are hard core electrical or electronic engineering companies like Siemens, which hire for projects, design, engineering, commissioning, sales and servicing of the automation products and systems. The automation product and systems could be PLC, HMI, SCADA, networking systems, DCS, sensors, etc. The second type are the hard core manufacturing or consumer industries (involving the use of automation), where these engineers would be required in large numbers. Companies in the consumer industry include Cadburys, Times of India, Ford, Tata Iron & Steel, Ranbaxy, CEAT Tyres, etc. The jobs could be in areas like plant and projects, plant maintenance, plant purchase, plant engineering/commissioning, plant production, etc.

Do you have the right qualifications?

“For starters, one must have the basic diploma or degree in electrical, electronics or instrumentation engineering. There have been a few exceptional cases of mechanical, production or chemical engineers also taking the initiative to master automation and controls,” informs Sawant. Bhatt says, “Candidates with an M.Tech in automation and control or in instrumentation also have significant opportunities to play a specialised role. Increasingly, business analysts with a clear understanding of the industry domain and factory floor/field operations will play a crucial role in defining user requirements.”

Talking about qualifications, Sharma says, “B.Tech is a compulsory course for all the engineers, but depending on which field you would like to opt for, you can go for a diploma in the same. Also, those with an MBA in sales and marketing can opt for sales or marketing to enter the automation industry.”

Fine tune your skills

Students interested in a career in control and automation must have a strong understanding of the fundamentals of control theory as well as advanced topics like Distributed Control Systems (DCS) and Programmable Logic Controllers (PLC), informs Bhatt. He says, “They should be comfortable with concepts in pneumatics, hydraulics and electro-mechanics. Programming skills in C, Fortran or VB are also essential.” He adds, “Knowledge of MATLAB and LabVIEW will help a student in modelling and simulation of control and automation systems. These packages are also widely used in the industry and will therefore help students in day to day tasks as well.”

According to Partamita Kapat, typically, an automation engineer must have knowledge of electronics and mechanical systems, programmable logic controllers (PLC), interfacing technologies such as protocols, signal types and levels, and application programming or product solutions on PCs.

The remuneration

A fresh B.Tech/BE engineer can expect a compensation of approximately ₹ 300,000 per annum while an M.Tech engineer will get around ₹ 400,000 per annum.

Excerpts from a discussion on ‘The lack of young engineers in control and automation engineering’

“The problem is we have too many of what I call automation engineers who lack the background to understand what they are automating. Young engineers should get operations’ experience and field experience before launching into this side of the business because they fancy writing programs.”

“I would suggest to anyone who wants to enter this field to get some operational experience. I believe it’s actually good for any young engineer to get some operational experience before they start any kind of design type of work. Getting involved in plant start-ups is probably the best of all, provided you have some experience around you. I once worked in a ‘plant start-up’. The process was unique, but almost all the engineers involved were a bunch who had less than five years’ experience. It never made it to production and the key reason was the lack of experience, coupled with a lack of leadership. Start-ups can be gruelling and the more experienced folk tend to not like it, especially when all the overtime is unpaid, but the experience rewards can be substantial.”

—Will Wagoner P.E., consultant at Infilco Degremont Inc, USA

“The industrial companies would prefer outsourcing the automation package rather than do it by themselves. Due to this popular business model, young engineers rarely have the chance to know both. Probably only our company insists on developing automation packages by itself, and by previous production engineers.”

—Zhangjun (Jack) H., senior process automation engineer, Dow Chemical, USA

“I have been often working on both sides of the ‘barricades’ as a pure IT architect for large blue chip companies and am a ‘hands-on’ innovative automation solutions practitioner. I’ve realised that automation (is) becoming more and more amalgamated with traditional IT conception. But the problem here is that for many of the traditional, great automation practitioners and providers, this reality requires a paradigm change and they find themselves in the unfamiliar territory of software development …. at least to some degree....”

—Ilya K., domain architect / technical project manager at IKS Automation, Australia

“Of course as a passionate controls enthusiast I would like to see everyone become a controls engineer. It is one of the most dynamic and challenging fields that exist, in my opinion.

The main thing is for engineering students to be interested in control. Getting that done requires programs and teachers who can show how critical control systems are to industry and pass on the passion. This field has always been multi-disciplinary, and it will continue to be the same in the future. As the needs increase we will have to move away from the ‘know-it-all, do-it-all’ engineer, to a team that can accomplish the work together. For example, CS/IT people to program the front-end HMI tools; engineers (electrical, mechanical, chemical, etc) to develop control strategies and algorithms that take the process into consideration; and instrumentation/electrical specialists to solve the difficult sensing problems. Of course, someone can know a little about all of these things but for a truly great product, you need to put a team together.”

—Brett I., process control engineer at Corning Incorporated, USA