Industrial Automation Technology

Inland Empire/Desert Region (Riverside and San Bernardino counties)

Summary

Electro-Mechanical Technology
Community College Program
(TOP 0935.00)

Provides training for
2 Community College-level Industrial Automation Technology
Occupations

Over the next five years (2021-2026), employment for community college-level industrial automation occupations is projected to

Increase Employment by
4%

71
Annual Job Openings

10th Percentile Hourly Earnings Between
$22.84 to $25.11
Above the $21.82 Hourly Living Wage Standard

57 Total Annual Awards
In Industrial Automation Technology Programs

57
Program Awards from Community College Programs

0
Program Awards from Other Postsecondary Education Providers

The Inland Empire/Desert Centers of Excellence
Recommends
Industrial Automation Program Expansion to meet the need for more workers in the region

Introduction

This report provides labor market occupational demand and wage research and postsecondary program outcomes related to industrial automation technology. The California Community College program most likely to prepare students for industrial automation technology employment is the electro-mechanical technology (TOP0935.00) program. Electro-mechanical technology programs prepare students for employment through instruction related to the design, development, testing, and maintenance of electro-mechanical and servo-mechanical devices and systems (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by electro-mechanical technology programs lead to employment in the following occupations, further referred to as the industrial automation occupational group.

- Electro-Mechanical and Mechatronics Technologists and Technicians (SOC 17-3024)
- Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)

Job Counts and Projections

In 2021, there were 776 jobs in the industrial automation occupational group in the region. Regional employment for the industrial automation occupational group is projected to increase by 4% through 2026; 71 job openings are projected annually. Exhibit 1 displays the job counts, five-year projected job growth, job openings, and the share of incumbent workers aged 55 years and greater in the region.

Exhibit 1. Five-year projections for the industrial automation occupational group, Inland Empire/Desert Region, 2021-2026

Occupation	2021 Jobs	2026 Jobs	5-Yr % Change	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Electrical and Electronics Repairers, Commercial and Industrial Equipment	648	683	5%	294	59	17%
Electro-Mechanical and Mechatronics Technologists and Technicians	127	126	(1%)	59	12	29%
Total	**776**	**810**	**4%**	**354**	**71**	**19%**

Source: Lightcast 2022.4

An online job ad search for jobs in the industrial automation occupational group was conducted to reveal the employers seeking these workers, including the median job advertisement duration, earnings information, and in-demand skills. Over the last twelve months, from February 2022 through January 2023, only 34 job ads were posted for the industrial automation occupational group in the region. The job ad search was expanded to include all industrial automation jobs posted throughout California to ensure that the advertisement information included in this report is reliable and generalizable. Exhibit 2 shows the number of job ads posted over the last twelve months in California and the median posting duration.

On average, employers kept online job ads for electro-mechanical and mechatronics technologists and technicians open for 29 days. The average statewide online job is open for 27 days, indicating that it is slightly more challenging for employers to fill industrial automation positions than other jobs.

Exhibit 2. Job ads and time to fill, California, February 2022 through January 2023

Occupation	Job Ads	Median Posting Duration (Days)
Electro-Mechanical and Mechatronics Technologists and Technicians	265	29
Electrical and Electronics Repairers, Commercial and Industrial Equipment	1	N/A
Total	**266**	**29**

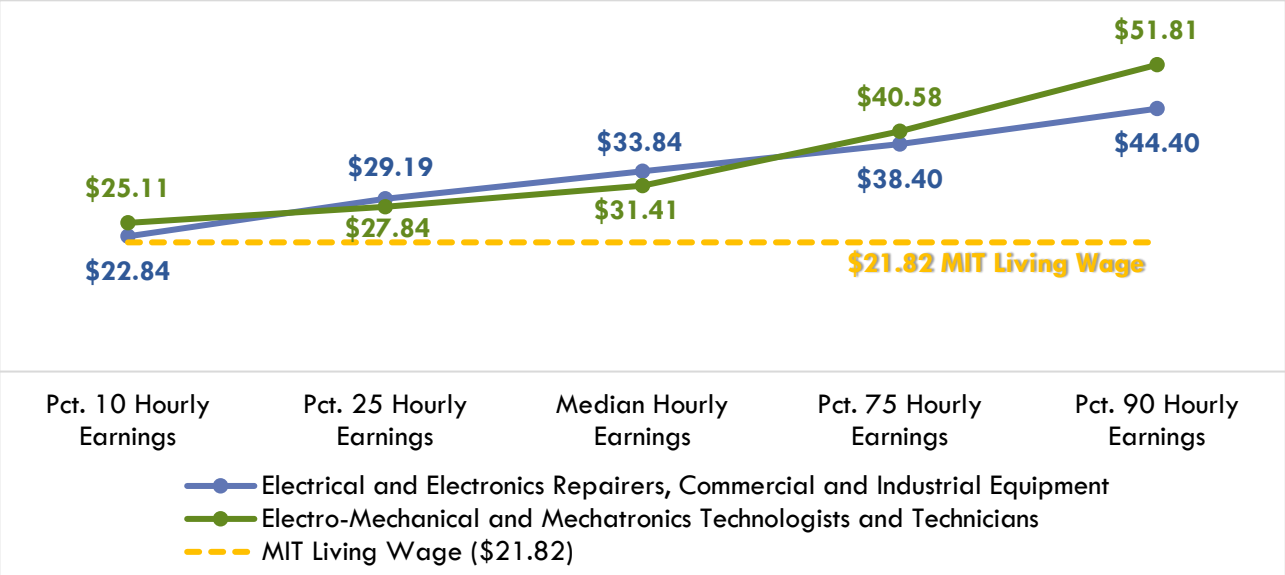
Source: Lightcast 2022.4

Earnings and Benefits

Community colleges should ensure their training programs lead to employment opportunities that provide a living wage. The MIT living wage calculator estimates that an individual must earn $21.82 per hour or $45,386 annually to be self-sufficient in California (Glasmeier, 2022).

Exhibit 3 displays the hourly earnings for the industrial automation occupational group. The 10th percentile hourly earnings for the industrial automation occupational group are above the living wage standard, indicating that at least 90% of workers earn a living wage.

Exhibit 3. Hourly earnings by percentile for the industrial automation occupational group, Inland Empire/Desert Region, 2021

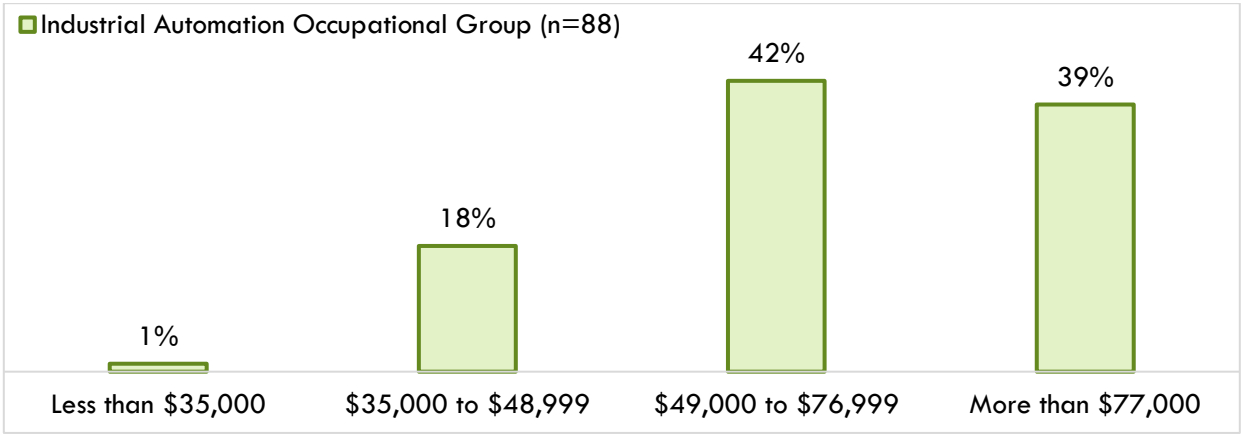


Source: Lightcast 2022.4

Advertised Salary from Online Job Ads

Exhibit 4 displays the statewide online advertised salaries for industrial automation workers over the last 12 months. Online job ad salary information reveals that employers are willing to pay this occupational group a median rate of $68,480 annually or $32.92 per hour, above the $21.82 hourly living wage standard. Consider the salary information with caution since only 33% (88 out of 266) of online job ads for this occupational group provided salary information.

Exhibit 4. Online Advertised Salaries for the industrial automation occupational group, California, February 2022 through January 2023



Source: Lightcast 2022.4

Job Titles, Employers, Skills, Education, and Work Experience

Exhibit 5 displays the job titles most frequently used in job ads for the industrial automation occupational group over the last 12 months. Displaying advertised job titles may provide insight into the types of positions sought by employers posting ads. The most frequently requested job title in the state was calibration technician.

Exhibit 5. Job titles most frequently used in industrial automation job ads, California, February 2022 through January 2023

Job Titles	Unique Job Ads
Calibration Technician	71
Robotics Technician	26
Instrument Technician	22
Electromechanical Technician	19
Electronics Technician	17
Instrumentation Technician	16
Mechatronics Technician	8
Maintenance Technician	6
Electronic Repair Technician	4
Automation Technician	4

Source: Lightcast 2022.4

Exhibit 6 displays the employers posting the most job ads for the industrial automation occupational group during the last 12 months. Showing employer names provides insight into where students may find employment after completing a program. Takeda Pharmaceutical Company posted the most job ads for the industrial

automation occupational group, seeking workers to maintain, repair, and calibrate automated control systems used in manufacturing pharmaceutical products.

Exhibit 6. Employers posting the most job ads for the industrial automation occupational, California, February 2022 through January 2023

Top Employer	Unique Job Ads
Takeda Pharmaceutical Company	12
Applied Industrial Technologies	11
Jervis B. Webb Company	9
Keurig Dr Pepper	9
GXO Logistics	8
Johnson & Johnson	6
Northrop Grumman Corporation	5
Thermo Fisher Scientific	5

Source: Lightcast 2022.4

Exhibit 7 lists a sample of specialized and employability skills employers seek when seeking workers to fill industrial automation positions. Specialized skills are occupation-specific skills that employers request for industry or job competency. Common skills are foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job ads may be utilized to guide curriculum development.

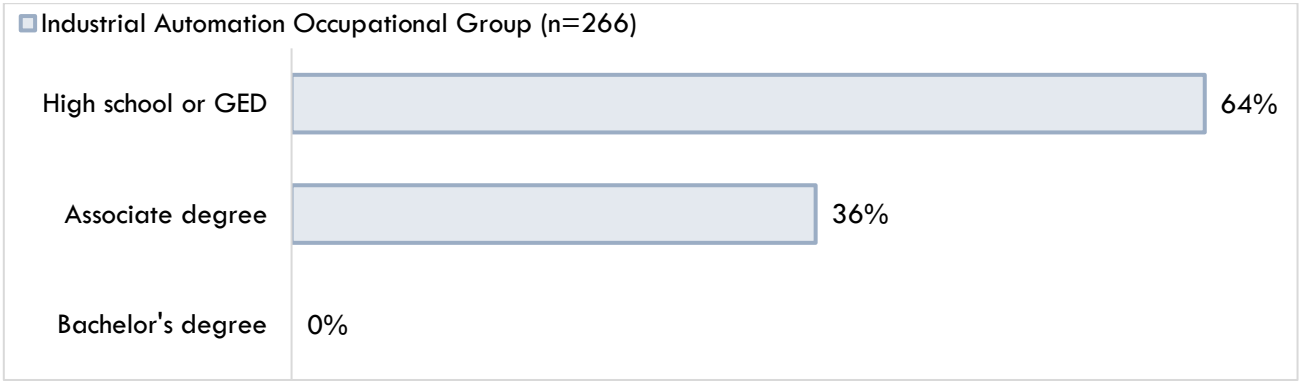
Exhibit 7. Sample of in-demand skills from employer job ads, California, February 2022 through January 2023

Specialized skills *(n=266)*	Common skills
• Automation	• Troubleshooting (Problem-Solving)
• Electronics	• Communications
• Calibration	• Operations
• Instrumentation	• Management
• Programmable Logic Controllers	• Lifting Ability
• Preventive Maintenance	• Customer Service
• Test Equipment	• Detail Oriented
• Electromechanics	• Writing
• Control Systems	• Organization Skills
• Robotics	• Planning

Source: Lightcast 2022.4

Exhibit 8 displays the minimum advertised education requirements for the industrial automation occupational group. According to the Bureau of Labor Statistics, between 48% and 51% of incumbent workers in this field hold a community college-level of educational attainment, "some college, no degree," and an "associate degree." Most employers listing a minimum education level requested a high school diploma or GED followed by an associate degree.

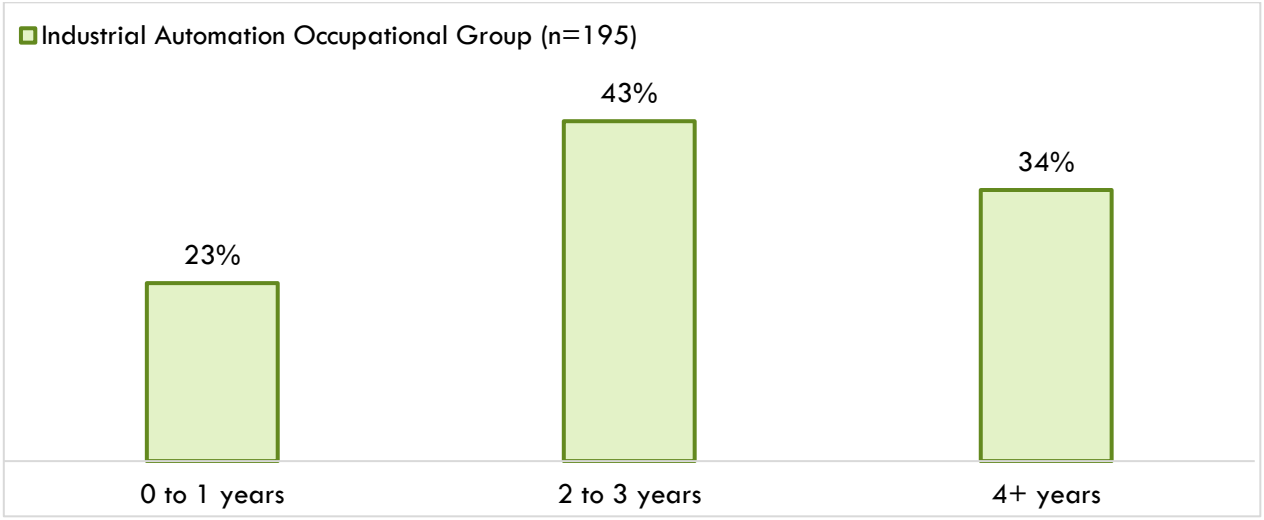
Exhibit 8. Minimum advertised education requirements, California, February 2022 through January 2023



Source: Lightcast 2022.4

Exhibit 9 displays the work experience typically required for the industrial automation occupational group. The occupations in the industrial automation occupational group do not typically require workers to have previous work experience. More than three-quarters of employers sought candidates with two years or more of prior work experience.

Exhibit 9. Real-time work experience requirements, California, February 2022 through January 2023



Source: Lightcast 2022.4

Student Completions and Programs Outcomes

Three regional community colleges currently use four program codes in their programs related to industrial automation technology. Combined, regional community college industrial automation technology programs have issued 57 awards annually over the last three academic years, 2019-2022. Exhibit 10 displays each regional industrial automation technology programs and award types students earn upon program completion.

Exhibit 10: Industrial automation-related programs, Inland Empire/Desert Region, 2022-23 academic year

College	TOP Program (TOP Code)	Local Program Title	Award
Chaffey	Electrical Systems and Power Transmission (0934.40)	Industrial Electrical Technology	Associate Degree
		Industrial Electrical Technology Level I	Certificate
		Industrial Electrical Technology Level II	Certificate
		Industrial Electrical Technology Level III	Certificate
	Electro-Mechanical Technology (0935.00)	Mechatronics	A.S. Degree
		Mechatronics Level I	Certificate
		Mechatronics Level II	Certificate
		Electromechanical Technology	Certificate
Norco	Manufacturing and Industrial Technology (0956.00)	Industrial Automation	Associate Degree/Certificate
		Supply Chain Automation	Associate Degree/Certificate
San Bernardino Valley	Industrial System Technology and Maintenance (0945.00)	Industrial Automation	Certificate

Source: COCI, 2022-23 Community College Catalogs

Electrical Systems and Power Transmission (0934.40): Installation, operation, maintenance, and repair of electrical systems and the power lines that transmit electricity. Includes assembly, installation, maintenance, and repair of motors, generators, transformers, and related equipment (Taxonomy of Programs, 2012).

Electro-Mechanical Technology (0935.00): Design, development, testing, and maintenance of electro-mechanical and servo-mechanical devices and systems (Taxonomy of Programs, 2012).

Industrial System Technology and Maintenance (0945.00): Design, construction, maintenance, and operation of mechanical, hydraulic, pneumatic, and electrical equipment and related systems, such as production machinery. Includes building and plant maintenance (Taxonomy of Programs, 2012).

Manufacturing and Industrial Technology (0956.00): Engineering principles and technical skills for the manufacture of products and related industrial processes. Includes shaping and forming operations, materials

handling, instrumentation and controls, and quality control. Includes Computer Aided Manufacturing and robotics. Also has optimization theory, industrial and manufacturing planning, and related management skills (Taxonomy of Programs, 2012).

Exhibits 11 – 14 display student completions for electrical systems and power transmission (TOP 0934.40), electro-mechanical technology (0935.00), industrial systems technology and maintenance (0945.00), and manufacturing and industrial technology (0956.00) programs related to industrial automation technology over the last three academic years, 2019-2022. In the previous three academic years, Chaffey College issued three awards annually in electro-mechanical technology programs and 44 awards in electrical systems and power transmission programs. San Bernardino Valley College issued one award annually in its industrial systems technology and maintenance program. Norco College issued an annual average of nine awards over the last three academic years in manufacturing and industrial technology programs related to industrial automation. Program completion and student outcome methodologies can be found in the appendix.

Exhibit 11: Annual average community college awards for electrical systems and power transmission programs related to industrial automation technology, Inland Empire/Desert Region, Academic Years 2019-2022

TOP 0934.40 – Electrical Systems and Power Transmission (Local Program Title)	**Academic Year 2019-20**	**Academic Year 2020-21**	**Academic Year 2021-22**	**Total CC Annual Average Awards, Academic Years 2019-22**
Chaffey (Industrial Electrical Technology/Industrial Electrical Technology Level I/II/III)				**44**
Associate Degree	8	6	16	10
Certificate 16 < 30-semester units	35	12	14	20
Certificate 30 < 60-semester units	10	10	19	13
Certificate 6 < 18-semester units	2	1	0	1
Total	**55**	**29**	**49**	**44**

Source: MIS Data Mart, COCI

Exhibit 12: Annual average community college awards for electro-mechanical technology programs related to industrial automation technology, Inland Empire/Desert Region, Academic Years 2019-2022

TOP 0935.00 – Electro-Mechanical Technology (Local Program Title)	**Academic Year 2019-20**	**Academic Year 2020-21**	**Academic Year 2021-22**	**Total CC Annual Average Awards, Academic Years 2019-22**
Chaffey (Electromechanical Technology/Mechatronics/ Mechatronics Level I & II)				**3**
Associate Degree	0	0	3	1
Certificate 16 < 30-semester units	0	2	1	1
Certificate 8 < 16-semester units	0	2	2	1
Total	**0**	**4**	**6**	**3**

Source: MIS Data Mart, COCI

Exhibit 13: Annual average community college awards for industrial systems technology and maintenance programs related to industrial automation technology, Inland Empire/Desert Region, Academic Years 2019-2022

TOP 0945.00 – Industrial Systems Technology and Maintenance (Local Program Title)	**Academic Year 2019-20**	**Academic Year 2020-21**	**Academic Year 2021-22**	**Total CC Annual Average Awards, Academic Years 2019-22**
San Bernardino Valley (Industrial Automation)				**1**
Certificate 30 < 60-semester units	0	1	1	1
Total	**0**	**1**	**1**	**1**

Source: MIS Data Mart, COCI

Exhibit 14: Annual average community college awards for manufacturing and industrial technology programs related to industrial automation technology, Inland Empire/Desert Region, Academic Years 2019-2022

TOP 0956.00 – Manufacturing and Industrial Technology (Local Program Title)	**Academic Year 2019-20**	**Academic Year 2020-21**	**Academic Year 2021-22**	**Total CC Annual Average Awards, Academic Years 2019-22**
Norco (Industrial Automation/Supply Chain Automation)				**9**
Associate Degree	2	3	0	2
Certificate 16 < 30-semester units	10	4	2	5
Certificate 6 < 18-semester units	3	1	2	2
Total	**15**	**8**	**4**	**9**

Source: MIS Data Mart, COCI

California program outcome data may provide useful insight into the likelihood of success for the proposed program. Community college student outcome information based on the selected TOP code and region is provided in Exhibits 15 – 18.

Exhibit 15: 0934.40 – Electrical systems and power transmission strong workforce program outcomes, Inland Empire/Desert Region, Academic Year 2019-2020 (Unless Noted)

Strong Workforce Program Metrics: 0934.40 – Electrical Systems and Power Transmission	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2020-21)	258	1,427
Completed 9+ career education units in one year (2020-21)	40%	31%
Students who completed a noncredit CTE or workforce preparation course (2020-21)	-	39%
Students who earned a degree, certificate, or attained apprenticeship (2020-21)	29	114
Job closely related to the field of study (2018-19)	73%	84%
Median annual earnings (all exiters)	$51,904	$61,152
Median change in earnings (all exiters)	23%	54%
Attained a living wage (completers and skills-builders)	73%	71%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Exhibit 16: 0935.00 – Electro-mechanical technology strong workforce program outcomes, Inland Empire/Desert Region, Academic Year 2019-2020 (Unless Noted)

Strong Workforce Program Metrics: 0935.00 – Electro-Mechanical Technology	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2020-21)	110	379
Completed 9+ career education units in one year (2020-21)	59%	47%
Students who earned a degree, certificate, or attained apprenticeship (2020-21)	-	44
Transferred to a four-year institution (transfers)	-	33
Job closely related to the field of study (2018-19)	89%	94%
Median annual earnings (all exiters)	$55,288	$50,070
Median change in earnings (all exiters)	62%	28%
Attained a living wage (completers and skills-builders)	80%	62%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Exhibit 17: 0945.00 – Industrial systems technology maintenance strong workforce program outcomes, Inland Empire/Desert Region, Academic Year 2019-2020 (Unless Noted)

Strong Workforce Program Metrics: 0945.00 – Industrial Systems Technology Maintenance	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2020-21)	34	854
Completed 9+ career education units in one year (2020-21)	35%	45%
Students who completed a noncredit CTE or workforce preparation course (2020-21)	-	93%
Students who earned a degree, certificate, or attained apprenticeship (2020-21)	10	132
Job closely related to the field of study (2018-19)	100%	80%
Median annual earnings (all exiters)	$49,958	$47,238
Median change in earnings (all exiters)	41%	30%
Attained a living wage (completers and skills-builders)	85%	64%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Exhibit 18: 0956.00 – Manufacturing and industrial technology strong workforce program outcomes, Inland Empire/Desert Region, Academic Year 2019-2020 (Unless Noted)

Strong Workforce Program Metrics: 0956.00 – Manufacturing Industrial Technology	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2020-21)	59	2,934
Completed 9+ career education units in one year (2020-21)	39%	34%
Students who completed a noncredit CTE or workforce preparation course (2020-21)	-	24%
Students who earned a degree, certificate, or attained apprenticeship (2020-21)	-	316
Transferred to a four-year institution (transfers)	-	87
Job closely related to the field of study (2018-19)	78%	75%
Median annual earnings (all exiters)	$47,752	$50,216
Median change in earnings (all exiters)	68%	48%
Attained a living wage (completers and skills-builders)	83%	66%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Other postsecondary institutions may utilize a variety of program codes for programs that prepare students for industrial automation technology employment. Industrial automation technology CIP codes include electromechanical/ electromechanical engineering technology/technician (15.0403), robotics technology/technician (15.0405), and industrial electronics technology/technician (47.0105). Other regional postsecondary institutions did not issue awards in programs related to industrial automation technology over the last three academic years.

Summary of Findings

The knowledge, skills, and abilities trained by electro-mechanical technology programs (TOP 0935.00) prepare students for employment in two community college-level occupations. These occupations are projected to have 71 annual job openings and increase employment by 4% over the next five years in the Inland Empire/Desert Region. The 10th percentile earnings for these occupations are between $22.84 and $25.11 per hour, above the living wage standard, indicating that at least 90% of workers in this field earn a living wage. Online job ad salary information confirms that employers are willing to pay this occupational group a median annual rate of $68,480 annually or $32.92 per hour.

Regional community college industrial automation programs currently utilize four program codes, electrical systems and power transmission (TOP 0934.40), electro-mechanical technology (0935.00), industrial systems technology and maintenance (0945.00), and manufacturing and industrial technology (0956.00). Combined, regional community colleges have issued 57 awards annually in programs related to industrial automation technology over the last three academic years, 2019-2022. Other postsecondary education institutions in the region have not issued awards related to industrial automation technology over the previous three academic years.

The Centers of Excellence recommends expanding programs related to industrial automation to meet the regional demand for more workers. Colleges considering this program should partner with relevant employers and confirm their demand for industrial automation workers and the skills needed for students to secure work in this field shortly after exiting the program.

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Appendix: Occupation definitions, sample job titles, five-year projections, and earnings for industrial automation occupations

Occupation Definitions* (SOC code), *Education and Training Requirements, Community College Education Attainment

Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)

Operate, test, maintain, or adjust unmanned, automated, servomechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment to observe or record visual information at sites such as oil rigs, crop fields, buildings, or for similar infrastructure, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.

Sample job titles: Automation Technician (Automation Tech), Electro-Mechanic, Electromechanical Assembler (EM Assembler), Electromechanical Technician (EM Technician), Electronics Technician (Electronics Tech), Mechanical Technician (Mechanical Tech), Process Control Tech, Product Test Specialist, Test Engineering Technician (Test Engineering Tech), Test Technician (Test Tech)

Entry-Level Educational Requirement: Associate's degree
Training Requirement: None
Work Experience: None
Percentage of incumbent workers with a Community College Award or Some Postsecondary Coursework: 51%

Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)

Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.

Sample job titles: Control Technician, E and I Mechanic (Electrical and Instrument Mechanic), E and I Mechanic (Electrical and Instrumentation Mechanic), Electrical and Instrument Technician (E and I Tech), Electrical Maintenance Technician, Electronic Technician, I and C Tech (Instrument and Control Technician), Instrument and Electrical Technician (I and E Tech), Repair Technician, Scale Technician

Entry-Level Educational Requirement: Postsecondary nondegree award
Training Requirement: More than twelve months of on-the-job training
Work Experience: None
Percentage of incumbent workers with a Community College Award or Some Postsecondary Coursework: 48%

Appendix: Methodology

Exhibits 11 - 14 display the average annual California Community College (CCC) awards conferred during the three academic years between 2019 and 2022 from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. Awards are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case to calculate an annual average. This is done to minimize the effect of atypical variations that might be present in a single year.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from California's Employment Development Department's Unemployment Insurance database. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2023a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS) administered by Santa Rosa Junior College (LaunchBoard, 2023a).

Job ad data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014). Online job ads often do not reveal employers' hiring intentions; it is unknown if employers plan to hire one or multiple workers from a single online job ad or collect resumes for future hiring needs. A closed job ad may not be the result of a hired worker.

Table 1. 2021 to 2026 job growth, wages, entry-level education, training, and work experience required for the industrial automation technology occupational group in the Inland Empire/Desert Region (Riverside and San Bernardino Counties combined)

Occupation	2021 Jobs	5-Year Change	5-Year % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage (10th to 90th percentile)	Median Hourly Wage (50th percentile)	Average Annual Earnings	Entry-Level Education & On-The-Job-Training	Work Experience Required
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	648	35	5%	59	$22.84 to $44.40	$33.84	$69,700	Postsecondary nondegree award & More than 12 months	None
Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)	127	(1)	(1%)	12	$25.11 to $51.81	$31.41	$73,600	Associate's degree & None	None
Total	**776**	**34**	**4%**	**71**	**-**	**-**	**-**	**-**	**-**

Source: Lightcast 2022.4