UNDERSTANDING THE MIDDLE-SKILL WORKFORCE IN THE CONNECTED & AUTOMATED VEHICLE SECTOR

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OVERVIEW

The movement of people and goods – the mobility industry – is rapidly expanding and evolving to include new forms of package delivery; mobility as a service (MaaS), the deployment of autonomous vehicles; and more. Within this industry, the connected and automated vehicle (CAV) sector is reimagining how an automobile moves and interacts with its environment. Innovations include new technologies in Advanced Driver Assistance Systems (ADAS), such as predictive control on multilane roads, as well as the research and development of driverless vehicles. The testing and design of CAVs are concentrated within Southeast Michigan. The region strongly supports this activity through its combination of public and private automotive research & development centers, test facilities, numerous well-known research universities and community colleges, as well as hundreds of employers in the automotive industry.

This research report explores the workforce supporting CAVs in Southeast Michigan, specifically looking at the development and evolution of middle-skill jobs. Middle-skill jobs are classified as jobs that require more skills and experience than a high school education provides, but less than a four-year degree. Within the CAV sector technicians comprise the majority of middle-skill jobs, and the bulk of these technicians are in the private sector. While most reports on the CAV sector workforce focus primarily on highly-skilled engineer and design jobs, there is a growing need to understand middle-skill jobs, such as technicians.

As a whole, the automotive industry is experiencing a critical shortage of qualified technicians as identified by industry trade groups. Fast-paced change in the CAV sector and its consequent demands exacerbate this problem further. This research addresses how these middle-skill jobs in the CAV sector are transitioning as it relates to testing and infrastructure.

The skillsets required to work on a vehicle have drastically changed over the last 30 years. Before the 21st century, cars were mostly mechanical and simple maintenance and troubleshooting could often be completed by hobby mechanics. As vehicle technology developed, however, the number of electronic, electrical and software components increased, as well as the associated skillsets required for those working on them (see Figure 1). For example, the electronic modules within a vehicle have exponentially increased from just one or two to now around 70 modules in most cars. Additionally, the software and connectivity of vehicles are...
quickly evolving and changing, especially with the continued push towards automation, driven by demands for both convenience and increased safety.

The demanded skillsets of technicians are evolving as quickly as the vehicle itself. Within this report, two interdependent categories are utilized to analyze middle skill positions: job duties and skillsets. Job duties are defined as the tasks employees are expected to successfully complete within their role. Skillsets are the technical and soft skills that equip employees to accomplish their duties (Figure 2).

Through this qualitative study, the team completed 63 interviews with managers in engineering and/or human resources (HR) departments.

The participants represented 30 organizations including Original Equipment Manufacturers (OEMs), suppliers, other businesses related to the CAV industry, ecosystem organizations and public organizations (such as city and state government).

While CAV technician job duties are broad, four thematic areas emerged from participant interviews with CAV-direct employers: prototyping, troubleshooting, testing, and maintenance. These areas all overlap and reinforce themselves, but the distinction here facilitates further analysis. Participants most often discussed job duties for CAV technicians related to prototyping and troubleshooting, followed by testing and maintenance.

Figure 2. The job duties of CAV technicians are accomplished through a combination of technical skills and soft skills. These areas are interwoven and dependent upon each other. More details on skillsets are provided in subsequent sections.

**SKILLSETS**

The base skillsets of mechanical, electrical and electronic knowledge— or combined mechatronics – form the critical foundation for the CAV technician workforce (Figure 3). Emerging skills in software and data-related systems are continuing to expand as more components on the vehicle are connected and linked together and to infrastructure. Advanced skills in systems and cybersecurity will also need to grow alongside the expanding complexity and connectivity of the vehicle. Woven through all these technical skills is also the binding nature of soft skills like problem solving and communication.

Successfully training and equipping middle-skill workers in the CAV sector is a critical part of its continued growth and development. Technicians offer unique perspectives and experiences in testing and can help streamline advancements when appropriately equipped and trained. The success of this sector in Southeast Michigan will depend not only on the engineering designers and innovators, but also the technicians who assist in bringing an idea from design into reality through prototyping, testing, troubleshooting and maintaining new products.

Figure 3. CAV technician skill demands and gaps