# I. Georgia AI Manufacturing (GA-AIM) Technology Corridor

i. Coalition Vision and Partners: COVID-19 impacts, increasingly sophisticated cyber-attacks, and global warming have made evident that manufacturers must simultaneously increase their security and their pace of adopting new technologies and supply chain models. GA is an epicenter of these needs: Savannah port shipping crises[1] and ransomware attacks[2] have hurt the U.S. economy in 2021. Three interrelated gaps cause these issues: 1) high technology transition times and costs, 2) lack of technically qualified workforce[3], and 3) insufficient supply chain resilience.[1] Furthermore, COVID-19 has disproportionately impacted minority[4] and rural communities[5] within GA, and African Americans will experience 10% greater job loss due to automation and AI without immediate change.[6] Women make up only 18% of the advanced manufacturing workforce and African Americans less than 6%. GA has well-represented African American, Hispanic, and Asian populations – one of the three most diverse states within the U.S.[7] GA also reported the fifth largest number of state-wide COVID jobless claims from March 2020 to May 2021.[8]

Still, humans are increasingly limited in meeting the necessary pace of innovation, adaptation, and workforce retraining. We only learn to multi-task or improve multiple aspects of our work performance by practicing one task until it becomes habit, and then adding a new task to the habits. Today's computers networked across modern digital infrastructure can continuously learn across millions - to – billions of tasks at the same time and rapidly transmit their knowledge to us and each other. We need cooperative, secure, reliable, socially responsible, equitable, and trustworthy artificial intelligence (AI) innovation to ensure U.S. global leadership.

Georgia AI Manufacturing BBBRC Coalition and Partners
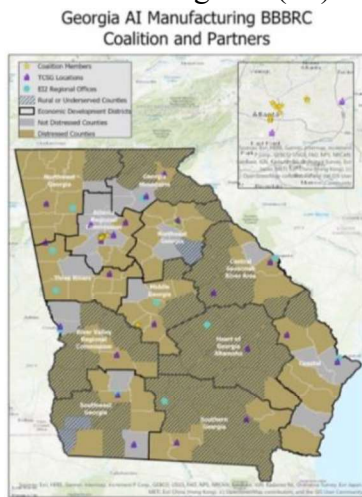
A proactive economic cluster that fills today's technology gaps, redirects today's technological opportunity equity trajectory, and creates and ecosystem that can outpace and advert tomorrow's potential crises will be established as the Georgia AI Manufacturing Technology Corridor (GA-AIM). GA-AIM will be led by a coalition of the Georgia Department of Economic Development (GDEcD), Technical College System of Georgia (TCSG), Russell Innovation Center for Entrepreneurs (RICE), Spelman College, and the Georgia Institute of Technology (GT) including Georgia Manufacturing Extension Partnership (GaMEP), Georgia Tech Manufacturing Institute (GTMI), Enterprise Innovation Institute (EI²), Georgia Minority Business Development Agency (MBDA) Business Center, Advanced Technology Development Center (ATDC), VentureLabs, I-Corps South, Georgia Tech Ethics, Technology, and Human Interaction Center (ETHICˣ), National AI Institute for Adult Learning and Online Education (AI-ALOE), Georgia Tech Supply Chain & Logistics Institute (SCL), and the Center for Education Integrating Science, Mathematics and Computing (CEISMC), (See **Attachment III** for leadership details). The map above indicates that 60% of the GA-AIM coalition member offices and campuses are located within distressed and underserved counties. GT ranks #1 - #3 nationally for each

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[1] 14 October 2021, NYT, P.S. Goodman, "'It's Not Sustainable': What America's Port Crisis Looks Like Up Close"

[2] https://www.wsbtv.com/news/local/north-fulton-county/fbi-confirms-criminal-gang-responsible-ransomware-attack-gas-pipeline/ANOOVVF73FDEZE4MKBTDFLUMRE/

[3] https://www.cnn.com/2021/05/12/tech/colonial-pipeline-cyber-security-manager-job-search/index.html

[4] https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/race-ethnicity.html

[5] http://www.georgiahealthnews.com/2021/08/rural-georgia-counties-reeling-virus-onslaught/

[6] https://www.businessinsider.com/mckinsey-finds-black-men-will-lose-more-jobs-automation-2019-10

[7] https://www.brookings.edu/research/americas-racial-diversity-in-six-maps/

[8] https://www.nbcnews.com/business/economy/unemployment-claims-state-see-how-covid-19-has-destroyed-job-n1183686

category of minority engineering degrees awarded,[9] Spelman College educates African American women, TCSG's 22 colleges (shown) and 88 campuses together with EI^2 regional offices ensure demographic and geographic inclusion across all 12 GA economic development regions (bold black borders on the map), and RICE focuses on growing Black-owned businesses.

ii. Coalition Projects and Timeline: In Phase I (12/2021 – 12/2022), the Regional Economic Competitiveness Officer (see **Section III**) will convene and respond to a multi-sector industry alliance (**Appendix ii**) to transform the nascent manufacturing sector into a regional economic engine by designing and piloting the projects identified in the table below. In Phase II (09/2022 – 09/2027), these 8 projects will be fully implemented, addressing

Project Title	Coalition Partner	Leader
GA-AIM Technology Corridor	Georgia Tech	Prof. Kurfess
GA-AIM State ED Programs	GA GDEcD	
1. AI Manufacturing Pilot Facility	GTMI	Prof. Stebner
2. AI Mfg Technical Workforce Dev.	TCSG	Mr. Ferguson
3. LaunchPad AI Innovation Studio	RICE	Mr. Bailey
4. VR for AI Workforce Training Innov.	Spelman	Prof. Volcy
5. Center for AI Commercialization	VentureLab/I-Corps	Prof. Sivakumar
6. GA AI Mfg Community Engagement	EI^2/GaMEP	Mr. Bridges
7. Georgia AI Mfg Rural Supply Chain	SCL	Dr. Brown
8. AI InVenture K-12 Experiences	InVenture	Prof. Moore

these six EDA investment priorities: equity, recovery and resilience, workforce, manufacturing, technology based economic development, and exports/ FDI.

1. AI Manufacturing Pilot Facility: The GT Advanced Manufacturing Pilot Facility (AMPF) will be renovated into the AI Manufacturing Pilot Facility (AI-MPF). Manufacturers cannot accept 100% of the risk and cost of maturing AI manufacturing technologies beyond proof-of-concept demonstrations without detriment to existing operations and supply chains. AI-MPF will provide GA-AIM with a world-leading environment for cooperative industry-academia-government pilot trials, cybersecurity games, and workforce training to innovate, transition, and create workforce for AI manufacturing technologies without exposing the region's supply chains to risk. AI-MPF will operate reconfigurable, digitally integrated, fully automated test tracks for manufacturing with structural materials spanning synthesis, semi-finished goods, finished goods, manufacturing quality systems, reducing energy footprints and CO2 emissions, resource management, recycling capabilities, data management, networking and communications, and cyber-physical security.

2. AI Manufacturing Technical Workforce Development: TCSG, a state technical college coordinating organization, will lead GA-AIM to design, develop, and implement curricula at community colleges that include apprenticeships at AI-MPF and virtual reality (VR) modules from Spelman (see **Section I.ii.4**). They will provide regional entry points for dual enrollment and traditional students to AI manufacturing technical education at certificate and degree levels. Graduates will have exit points that lead directly to careers in the industry or provide for the continuation of education and higher degree attainment through articulation agreements among GA-AIM members. TCSG will create regional AI manufacturing training and innovation studios to promote entrepreneurship and create equity in access to resources, with a Phase I assessment performed in coordination with EI^2 to match studio themes with regional needs (see **Section I.vi**). These studios will also provide technical resources and mentoring for AI Inventure teams (see **Section I.ii.8**) from GA-AIM rural schools to increase their opportunities.

3. LaunchPad AI Innovation Studio: the Russell Innovation Center for Entrepreneurs (RICE) will transform 5,000 ft^2 into the LaunchPad AI Innovation Studio to provide prototyping and proof of concept development of physical products, exposure to and training in manufacturing processes

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[9] https://ceed.gatech.edu/coe-diversity-rankings

relevant to their products, low volume manufacturing to support qualification and transition to full scale production, and an access to AI-MPF and the GA-AIM network of service providers for matching entrepreneurs with commercial/scale-up production partners. It will empower black entrepreneurs with knowledge, equipment, training, experience, and mentoring they often cannot otherwise afford to provide world-class equity in opportunities to start, lead, and grow AI technology businesses into $25M+ per companies. LaunchPad AI will also be open to AI InVenture teams (see **Section I.ii.8**) from Atlanta's urban K-12 schools, with special programs designed for startup mentoring and seed funding for K-12 entrepreneurs. AI-MPF and Spelman will support the continued operations and improvements of this facility through cooperative programs that will be designed in Phase I to include equipment transition and upgrade plans, networking, on-site mentoring and technical support from staff, students, and faculty, and more.

4. Virtual Reality for AI Workforce Training Innovation: Virtual Reality (VR) - based training reduces training time, increases focus and attention and, in the long term, is more cost-effective than either e-learning or classroom learning.[10] While the cost of delivering VR training is low, the development costs are high because of the required technical skills. The Spelman Innovation Lab will innovate VR technology for (re)training of the GA-AIM workforce to get workers comfortable with new technologies before the technology is deployed without risk of damaging expensive equipment or injury to inexperienced workers. In Phase I, Spelman will lead a pilot study using a mock training simulation and Spelman College students. In Phase II, the Gaming Lab will expand its capabilities via an innovation program to incorporate supplemental technologies to enable continuous AI innovation and improvement of the simulated work environments including vision tracking and haptic feedback. The lab will be directly networked with the AI-MPF such that manufacturing data can be immediately utilized in innovating workforce training.

5. Center for AI Commercialization: The GT commercialization enterprise including VentureLab and I-Corps South will establish a center for the commercialization of AI manufacturing technologies into local and regional startups via: (1) A quarterly cohort-based entrepreneurial training program built upon the NSF's I-Corps curriculum. (2) A training program for local and regional instructors, to provide regional connections and a sustainable workforce of instructors who will have additional entrepreneurial impact within their communities. (3) Ongoing mentoring of emerging startups from inception through funding, staffed by mentors familiar with the region's strengths and demographics. (4) The systematic creation of companies locating in the region, with an intent to shore up arising infrastructure needs and to provide an array of good local jobs, boosting the local and regional economies. (5) The connection of the region's existing and new companies to sources of capital through direct introductions and coordination with national funding agencies and the venture capital community. These programs will include and recruit from AI-MPF, LaunchPad AI, Spelman College, and other GA-AIM partners.

6. Georgia AI Manufacturing Community Engagement: EI[2], through GaMEP and the MBDA Business Center[11] will connect GA-AIM manufacturers for the diffusion of innovation and workforce training programs. GaMEP will enable small and mid-sized manufacturers to harness the power of AI to drive results through outreach to raise awareness, provide onsite technical assessments, readiness reviews, specification writing, vendor selection advise, and more. AI-MPF will facilitate access to sandbox new technologies for these programs, driving collaboration between OEMs, academia, and industry. In addition, the GT Economic Development Lab (EDL) will convene community members in the distressed and underserved parts of GA to develop GA-

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AIM workforce development program implementation strategies. EDL will also support the underserved regions in strategies to attract and retain AIM companies and jobs in their community by leveraging existing resources and programs funded by the federal and local governments.

7. Georgia AI Manufacturing Rural Supply Chain: SCL, a supply chain and logistics institute at GT, will bolster GA-AIM rural supply chains by 1) studying the impact of automation technologies; 2) defining automation solutions tailored for rural manufacturers; and 3) developing programs to lower the barrier for access to use AI-MPF to facilitate evaluation of equipment options and serve as a base for hands-on workforce training for rural manufacturers, such as customization of the VR training innovations that are developed by Spelman. Rural companies are either not willing or able to undertake such a challenge alone, hence the need for a public-private partnership involving industry, government, and academia. The benefits of this activity will: make low skilled jobs easier and less physically demanding, reducing turnover; provide opportunity for higher skilled and higher paying jobs (e.g., mechanics, technicians, planners, engineers); introduce more technical skills into rural areas, which enhances opportunities for other industries; helps to ensure high-paying job retention and growth in GA.

8. AI InVenture K-12 Experiences: To ensure a technically capable workforce in future years, we must overcome the perception that AI and automation kills equity in economic opportunity and instead excite rural and minority students with the unbounded potential for high earning careers in AI manufacturing sectors before generational dogma is engrained. To that end, Georgia Tech's InVenture Prize program and the CEISMC[12] GoSTEM program will expand their emphasis to rural and underserved areas of the state by piloting a rural regional event with a region-specific prize. A second focus will be the creation of supplemental lessons around AI and Data Science to be disseminated through the K-12 InVenture Prize curriculum website that includes a one-week primer and hands-on activities that prepares students to think about data, where it comes from, and its potential for misuse and bias in the context of artificial intelligence. In Phase II, these pilot findings will inform expansion to all GA economic development regions. AI-MPF will cooperatively host field trips and trainings for K-12 teachers and students.

iii. Economic Opportunity: GA-AIM addresses a key industry sector of the GA-GDEcD and the GA Office of the Governor.[13] The strategic plan for GA will serve as the Comprehensive Economic Development Strategy (CEDS) equivalent. Specifically, programs to put hard working Georgians first, strengthen rural GA, grow jobs, incomes, and investment, educate Georgians, develop a skilled workforce to meet current and future needs across the industry spectrum, and apply research in the communities of GA[14] align with the proposed scope and projects of GA-AIM. GA-AIM will also contribute toward fulfilling 12 of the 17 key recommendations from the U.S. National Academies for U.S. materials and manufacturing global competitiveness in the coming decade, including that the U.S. should maintain robust programs to support and expand manufacturing for alloys and ceramics; improve the sustainable manufacturing of materials and parts; ensure that U.S. academia, industry, and government can access to state-of-the-art facilities; and expand investments in automated materials manufacturing, especially automated materials synthesis and parts manufacturing, to ensure the U.S. is the leader in the field by 2030; all using, when appropriate, data analytics, machine learning, and autonomous 3D characterization.[15]

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[12] GoSTEM is a collaborative partnership at Georgia Tech between the Center for Education Integrating Science, Mathematics and Computing (CEISMC) and Institute Diversity, Equity and Inclusion (IDEI). Its mission is to promote STEM academic achievement and college attendance among Latino and other cultural and linguistic minority K-12 students.

[13] Source: https://www.georgia.org/industries/advanced-manufacturing

[14] Source: file:///C:/Users/db99/Downloads/state_strategic_plan_%20(2).pdf

[15] National Academies of Science Engineering and Medicine, ed., Frontiers of Materials Research : A Decadal Survey, National Academies Press, Washington, DC, 2019.

GA is a national advanced manufacturing leader, outpacing the U.S in 10-year GDP growth in the manufacture of products including machinery, electrical equipment & components, and fabricated metals. This multi-sector strength results in a $61.1 billion output and an abundant workforce of approximately 270,000 production workers and more than 387,000 total employees that comprise 8.9% of GA's workforce.[16] In addition, manufacturing products are 90 percent of Georgia's total exports.[17] GA-AIM will leverage the existing network of 4,374 manufacturing firms[18] for the diffusion of AI manufacturing innovation and workforce development. These companies are spread across the state with larger concentrations in the metropolitan Atlanta area and in small cities such as Athens, Augusta, and Savannah. However, the small city concentrations and diffuse company locations around the state's distressed and underserved communities is significant at 72 percent of all firms and will be served and engaged by GA-AIM.

iv. Preliminary Success Metrics: GA had an average of 66 employees per manufacturing firm in 2018 (National Association of Manufacturing 2020), which equates to approximately 272,000 employees in the NAICS codes connected to the growth of GA-AIM. Manufacturing employees earn $47,654 on average. 2013 – 2018 Manufacturing revenues in GA grew at a rate of 5.5%. At this pace, 2022 – 2027 GA-AIM related jobs would grow by 15,000/yr. We aim for GA-AIM to extend that forecast by 10 percent, adding another 7,500 (1,500 jobs per year) GA jobs from 2023 – 2027. **Appendix ii** documents companies in GA who would likely hire these workers. As a proof point, in October 2021, there are currently 10,600 open manufacturing jobs in GA. Using the IMPLAN input-output economic model, an AI manufacturing multiplier of 2.13 can be applied to the 7,500 jobs created or saved, resulting in a total impact of 15,975 jobs or ~$4,700 per job ($75 million Phase II EDA grant divided by 15,975 jobs). As for equity opportunity, GA-AIM has already identified that 72 percent of the firms and jobs reside in distressed and underserved areas of the state. GA-AIM is proposing to reach a large majority of the counties in the underserved parts of the state which have between 30 and 70 percent Black/ Hispanic populations.

v. Matching Funds Availability: The Phase II matching funds will include cost shared GA State (GDEcD, TCSG, $2M) and Georgia Tech investments in this program ($5M) such as Career Grants, Technology Incubation Grants, providing leadership and staff salaries and benefits toward this program, facility investments, capital planning and management for the AMPF renovation, and more. Industry cost share of $8M will complete our obligation (see **Appendix ii**).

vi. Risk Mitigation Plan: Three risks and mitigation strategies follow: 1. The workforce training may not be connected to the industry need for work ready jobs. As mitigation, the industry engagement strategy (**Section ii**) will emphasize that training fills needs for employers at the point of need. For example, manufacturers that contribute to the economy around Columbus, GA currently need workers capable of implementing machine vision inspection solutions in their factories; a TCSG regional studio themed in AI signal processing will be placed in their region. These studios will be reconfigurable around GA; when sufficient workforce have been trained in one theme, the studio will be repurposed or relocated. 2. Underserved population engagement may be limited. As mitigation, GA-AIM includes Spelman, RICE, TCSG, GaMEP, and Georgia MBDA Business Center, which already have established networks and successful programs with these communities. 3. The AI-MPF may not work as an accelerator of innovation. This center will be modeled after successful accelerators, such as the Global Center for Medical Innovation.

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[16] https://www.georgia.org/industries/advanced-manufacturing
[17] https://www.nam.org/state-manufacturing-data/2019-georgia-manufacturing-facts/
[18] The data for life science firms was gathered from NAICS codes. The gold-colored distress county designations originated from the United States Census Bureau and the United States Bureau of Labor Statistics. The undeserved cross hatched county designations were obtained from the Consumer Financial Protection Bureau. The 12 Georgia Economic Development Districts are outlined in bold.