



Minority Programmers Association

Code. Culture. Community.

Background

The Minority Programmers Association was originally founded in 2019 by a group of culturally diverse Computer Science, Media Arts, Intelligence Analysis, and Business students as a international organization aimed to diversify the Science, Technology, Engineering, and Mathematics (STEM) field by allowing a space for minorities to develop humanitarian software solutions for communities in need.

With its first chapter at JMU, the Minority Programmers Association (MPA) uses a project-based learning approach to train its members on programming principles and frontier software development practices. MPA brings members from a wide variety of disciplines that utilize technology in their studies and a diverse set of cultural backgrounds. The diversity of the organization aids effective problem solving as our networks develop projects aimed to aid underprivileged communities. Ultimately, the Minority Programmers hopes to become a force where we can unite unique individuals from all across the planet to innovate against the pains of society.

Vision

The Minority Programmers Association overall vision is to both diversify the STEM field to reflect a diverse world and channel this technological empowerment to fuel humanitarian change. A facet of achieving diversity in STEM is both establishing a professional network of programmers from across the world, but also educating members of this network with both soft and technical skills, further investing in this world's future. Moreover, as part of this principle of community outreach, MPA intends to implement local outreach with introductory programming courses through our university and national chapter model.

Mission Statement

Minority Programmers Association strives to create a diverse, multidisciplinary community using technical knowledge to develop globally minded projects. We strive to motivate our members through community outreach and professional development events. Our solutions are intended to be humanitarian in nature and socially impactful.



We hope to uplift underprivileged communities, diversity the Science Technology Engineering and Mathematics discipline, and approach problems from a software engineering perspective.

Objectives

Our main objectives are as follows:

- Diversifying STEM related fields
- Training and placing ally programmers in job opportunities
- Developing meaningful humanitarian-based projects
- Provide support to nonprofits working to help their communities either locally or globally
- Coding projects that benefit or support underprivileged communities
- Unifying minorities to code solutions for underrepresented communities

Context of Problem

Return on Investment for STEM Education

Students have expressed that their top motivation for attaining a degree in higher education is to secure a future career¹. While other fields don't have enough jobs, the STEM field needs more qualified professionals with an estimated 3.5 million jobs that will be needed to be filled by 2025². Moreover these jobs tend to be more profitable, as non-STEM workers earn 26% less than their STEM counterparts with a similar education³. Those in the STEM field also experience lower rates of unemployment and 20 percent higher pay⁴. Moreover, the fastest growing modern universities can attribute much of their growth to their rapid research and investment into science and technology⁵. It is clear that investing in STEM education not only grows a university, but provides job security for a university's students.

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https://www.realcleareducation.com/articles/2018/02/13/student_perspectives_on_the_purpose_of_higher_education_110253.html

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<https://www.shrm.org/hr-today/news/hr-magazine/summer2019/pages/the-u.s.-needs-to-prepare-workers-for-stem-jobs.aspx>

³ <https://www.pewresearch.org/fact-tank/2018/01/09/7-facts-about-the-stem-workforce/>

⁴ purdue.edu/hhs/hdfs/fii/wp-content/uploads/2015/07/s_iafis04c01.pdf

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<https://www.timeshighereducation.com/news/the-7-fastest-rising-young-universities-in-the-world/2019337.article>



Recession Proof

Even before the Coronavirus epidemic 21% of those who partake in online education chose so because it was their only way to pursue their field of interest⁶. With the abrupt arrival of the coronavirus outbreak, over 99% of all students were home for school⁷. With universities using a dynamic approach to the fall semester, discussion on blended learning and the possibility of complete remote learning has been a main concern. Considering many online programs in software engineering and courses on programming already existed online, with a myriad of self taught programmers, the e-Learning infrastructure for software engineering not only is already online, but was developed through the global online community. This is why out of the top 50 most popular Massive Open Online Courses (MOOCs) the highest portion is programming courses⁸.

Interdisciplinary Learning

In addition to reinforcing STEM principles, MPA is unique in that it facilitates the application of concepts from the humanities. The National Council for Teachers of English describes interdisciplinary learning the best; "educational experiences are more authentic and of greater value to students when the curricula reflects real life, which is multi-faceted rather than being compartmentalized into neat subject-matter packages"⁹. Major technology schools like Stanford are understanding the importance of this and the growing need for computing in all disciplines, to the point to where they are now offering new blended programs like the CS+X program¹⁰. Considering that 50% of technology jobs aren't even in technology companies, it is clear that all sectors are in need of those with advanced computer literacy¹¹. Moreover, those in higher education are increasingly finding that the computation of large sets of data to predict outcomes is heavily influencing social science theory and changing the nature of research across all areas of study¹².

⁶ <https://educationdata.org/online-education-statistics/>

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<https://www.achieve3000.com/community-resources/literacy-resources/remote-learning-time-crisis-challenges-and-opportunities/>

⁸ <https://www.onlinecoursereport.com/the-50-most-popular-moocs-of-all-time/>

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<https://serc.carleton.edu/econ/interdisciplinary/why.html#:~:text=The%20Gain%20%2D%20Interdisciplinary%20instruction%20opens,is%20enhanced%20by%20interdisciplinary%20learning.>

¹⁰ <https://www.chronicle.com/article/Computer-Science-Meet/235075>

¹¹ https://www.youtube.com/watch?time_continue=28&v=ql9ol8OBUL4&feature=emb_logo

¹²

https://medium.com/@urban_institute/3-exciting-possibilities-for-combining-data-science-and-social-science-927351c88c5



This push for the intersectionality of data science and social science is coming heavily from industry, further incentivizing institutions to promote such programs to lead to job security for its graduates¹³. With the rise of data science, an interdisciplinary approach to computer science is also being emphasized as concerns of privacy and other ethical concerns shine a light on the dangers of a simply computational approach to problem solving¹⁴.

Humanitarian Focus

One of the goals of MPA is to inspire our student population to intertwine their passion to solve humanitarian and social justice issues with the relevant STEM skills we teach them. We are looking to break the norm of STEM and the humanities as two distinct areas, and rather the foundation for learners' toolset to fixing broader problems in society. Considering our members come from all types of backgrounds, there are many topics that we would love to address with the computing principles we are learning. Some of the issues we care about are economic inequality, mass incarceration, racial discrimination, environmental protection, mental health, war, hunger, and sexual violence to name a few. Promoting the intersection of these fields will encourage people of different disciplines to enhance their knowledge and skills relating to STEM. We intend on lighting a fire for students to learn software engineering principles through passion projects that students are proud of. This is foundational in why students believe in MPA. Rather than just being a community for diverse individuals, we find out how our members want to leave their mark on the world and motivate and provide the tools for them to achieve that. Additionally, we hope to encourage students majoring in non-STEM fields to consider learning baseline coding skills or feel supported when furthering their background in technology.

Software Engineering Focus

Another objective of MPA is to increase opportunities for students to learn software engineering, an emerging field that is still encompassed by Computer Science in many higher education institutions. While Computer Science applies broader scientific theory to computer software, software engineering focuses on the specific development of these software applications¹⁵. For some students the abstract and mathematical elements push them to favor Computer Science, on the other hand some students favor experiencing the hands on approach to the software

¹³ <https://blog.dominodatalab.com/data-science-past-future/>

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<https://www.edsurge.com/news/2019-01-11-university-data-science-programs-turn-to-ethics-and-the-humanities>

¹⁵ <https://career karma.com/blog/computer-science-vs-software-engineering/>



development cycle that a software engineering track provides. Moreover, modern software engineering, especially with the Agile SCRUM methodology MPA instills in its members, emphasizes the creation of tangible products that provide more gratification than theorizing about computation. Other majors, such as the Integrated Science and Technology, Biology, Media Arts and Design, Computer Information Systems, and Intelligence Analysis, learn basic coding skills in different languages but also lack coursework from a software engineering perspective. This comes in a timely fashion as 60% all the STEM jobs in the U.S. are in computing, with the largest portion of that in software development¹⁶. Moreover, both these portions are most prevalent when looking at new STEM jobs in 2022. Just like many of our Computer Science professor don't have a degree in CS, as it was offered in there time, many of us instructors in Software Engineering have a degree in CS, showing that although this discipline's curriculum is not fully developed, in time it will be. At the same time, in industry, a lack of software engineering knowledge leads to further ineffices for employers. 43% of software projects were either completed late, lacked requirements, or cost too much money, with 18% of software projects completely failing¹⁷. Supplementing current technology-based courses offered at universities will make students more employable and pursue more diverse job opportunities.

Training Students for Workforce

Although higher education institutions have become the pipeline to higher paying jobs across all industries, companies spend around \$1000 on average to train each employee¹⁸. This makes corporate training an over \$87 billion industry annually¹⁹. When looking at the breakdown of expenses, we can clearly see how MPA, being run by passionate volunteers inside universities for free can easily undercut the cost of current industry training workshops. Including opportunity costs, a daylong workshop for 30 people can cost around \$40,000 with a majority of those expenses consisting of instructor, venue, and travel expenses.. Where MPA gets its compensation is through educating members to produce tangible products that and serves as recruitment tools for expansions.

¹⁶ <https://cs.calvin.edu/images/department/jobs/2022/>

¹⁷ <https://www.amazon.com/Introduction-Software-Engineering-Design-Principles/dp/0321410130>

¹⁸ <https://www.bizlibrary.com/blog/training-programs/cost-of-training-employees/>

¹⁹

<https://www.forbes.com/sites/danpontefract/2019/09/15/the-wasted-dollars-of-corporate-training-programs/#35c8c9d171f9>



Project Based Learning

The Computer Science department at JMU encourages project based learning. Project based learning will help everyone in the organization be involved with our humanitarian projects. It will also allow executive members to teach skills over time and through engaged learning. The diversity of disciplines in our club will help us more strategically approach problems. Our projects will also encourage teamwork and group communication which is a crucial skill to have in STEM careers.

Oftentime students can lack motivation due to the confusion over how they are going to implement what they are learning into their future careers. By having contextual based learning, students will be able to utilize skills they are learning in the classroom to produce practical projects based on real-world problems. Problem solving through project development can result in higher rates of entrepreneurship. The organization also hopes to teach agile scrum development skills while developing our products and utilize GITHUB to collaborate effectively.

Current Lack of Diversity

While discussions of systemic racism fire up the nation, the Minority Programmers looks at developing pipelines to STEM programs as the easiest way for minorities to attain upward mobility. One of the principles of economics growth is that tech innovations not only leads to increase in personal wealth, but encourages investments back into the community²⁰. Although the STEM field has the potential to elevate minority populations to financial security, as of 2015, almost half of scientists & engineers in the STEM field are white males²¹. It is estimated that the people of color will constitute a majority of the American population in 2050²². Not educating people of color in technical fields, would in turn disproportionately offset innovation for American in the future, thus leading to a halt in economic growth.

The Minority Programmers combat this perception and increase diversity within the STEM workforce. We encourage females and other minorities to pursue furthering their STEM education by having a supportive and accepting community with a vast network of alumni and partnerships with Equal Opportunity Employers. Increasing representation of minorities in STEM can combat groupthink and lack of cultural awareness while helping teams work more creatively tackle problems. While industry is spending millions to increase hiring in diverse talent, they are seeing a

²⁰<https://www.sciencedirect.com/science/article/pii/S1877042815036538>

²¹ <https://nsf.gov/statistics/2017/nsf17310/digest/occupation/overall.cfm>

²² <https://files.eric.ed.gov/fulltext/ED508104.pdf>



pipeline problem where many of this STEM talent just isn't currently diverse²³. A major part of feeding this pipeline, is establishing a sense of community through mentorship by senior that understand the student's experiences ²⁴.

Sense of Community

As programmers, we understand the frustration a lack of support creates. This is only emphasized by increased social isolation. Many people who code often know the feeling of stopping in their tracks because of pure frustration and lack of immediate resources for what could very well be a minor bug. Additionally, many programmers describe themselves as introverts, where Computer Scientist often appears on lists of good jobs for introverts²⁵. As Teaching Assistants, many founders of MPA, have seen this isolation emphasized with international students who often have to navigate around both linguistic and programming language difficulties. While international students provide a unique perspective to problem solving, American students often perceive them as a threat to the American economy, culture, and education,²⁶ Additionally teachers often don't properly empathize with these linguistic barriers, often questioning competency and at times criticizing their accents further alienating students. This alienation directly translates to weaker performance. While diversity has increased amongst student populations, university faculty and staff remain predominantly caucasian, often adding an additional barrier²⁷. We are not saying that people should only learn from people who look like them. All the evidence we've provided goes against this. Rather we are saying that the sense of community we provide through peer education and support is more conducive to welcoming all types of people. During the school year, in addition to our weekly skills workshops that we choose based on the needs of our students, we have an additional study hall day where students can ask for help with any computing problem. This model of community is how MPA started through the CS lab hours, however it was expanded to accompany programmers from all majors and backgrounds. At the same time, we saw how important establishing this network was in the face of the coronavirus pandemic, when normally isolated students would refer to us for help instead of giving up.

²³

<https://www.forbes.com/sites/paologaudiano/2020/03/23/6-ways-diversity-and-inclusion-impact-the-cost-and-effectiveness-of-recruiting/#22c66f1d7a5c>

²⁴

<https://www.americanscientist.org/article/how-to-recruit-and-retain-underrepresented-minorities>

²⁵ <https://thebestschools.org/resources/best-degrees-jobs-introverts/>

²⁶ <https://www.hindawi.com/journals/edri/2015/202753/>

²⁷ <https://www.aacu.org/aacu-news/newsletter/2019/march/facts-figures>



Opportunity to Reach Developing Nations

Although MPA has a chapter model approach to organization utilizing current higher education infrastructures, the Minority Programmers aim to have chapters and networks in developing nations. Even though we are prioritizing STEM education, our STEM outreach methodology understands that around $\frac{1}{3}$ of those in the STEM workforce do not have a college degree²⁸. This poses as a huge opportunity, as much of the developing world in need of STEM education does not have the infrastructure of brick and mortar generational institutions. This is where MPA is needed most and can most effectively fast track poverty-stricken communities into STEM careers. This is important as part of the cost associated with education is beyond the physical expense of tuition, room, and board, but the opportunity cost of supporting a family who will potentially lose their immediate income earner as well.

The Minority Programmers has the opportunity to combat child labor which affects over 150 million children globally²⁹. MPA can both train adults so they can remotely earn income to support their children, and train children by taking them from low paying hazardous labour, to technical training courses that will lead to a lifelong career furthering upward mobility. These programs are sometimes referred to as Technical Vocational Education and Training (TVET) education aimed to place people directly in employment. Pursuing such programs is necessary for fulfilling the future STEM workforce in both Asia and Africa and to prepare students for tech entrepreneurship. This is key as technological advancement is a substantial indicator of economic growth³⁰. Moreover, UNESCO has even declared a girls access to STEM education as human right, further emphasizing the impact STEM education has in addressing systemic inequalities in developing countries³¹. While it seems more difficult to achieve in developing nations, in actuality in the past 15 years technological advancement has been growing at a higher rate for developing nations than their developed counterparts³². Many members of MPA come from immigrant families that used STEM to give us the opportunity to pursue STEM in higher education to do the same for our people. We feel a personal duty to go back

²⁸ https://www.purdue.edu/hhs/hdfs/fii/wp-content/uploads/2015/07/s_iafis04c01.pdf (pg. 5)

²⁹ <https://www.compassion.com/poverty/child-labor-quick-facts.htm>

³⁰

<https://www.economicdiscussion.net/economic-growth/5-factors-that-affect-the-economic-growth-of-a-country/4199>

³¹ <https://gsdrc.org/publications/benefits-of-stem-education/>

³²

<https://cs.stanford.edu/people/eroberts/cs181/projects/2007-08/developing-economies/economics.html>



and pay tribute to our motherland. Especially as Americans we want to change the perception from America spreading injustice throughout the world to America's lead export being STEM education that facilitates upward mobility.

Scope

The Minority Programmers Association originates from Virginia which is increasingly investing in technology and tech start up companies. Moreover, with the DMV (D.C, Maryland, Virginia area) having about $\frac{1}{4}$ of all the new STEM jobs in the U.S, MPA's location is prime for serving as a STEM pipeline³³. MPA is an internationally recognized organization that is utilizing JMU to start its first chapter. James Madison University is the first collegiate chapter and will serve as a model for other chapters that choose to help us expand the organization. The Computer Science department at JMU is one of the best in Virginia and is well recognized by employers on the East Coast. The program attracts international students and many minority students that have foreign backgrounds or represent minority cultures. Because of this, MPA has a globally minded community and we hope to serve not just our local community of Harrisonburg but also work toward creating practical solutions for real-world problems.

Expansion Plan

Many of our founding members come from diverse backgrounds with families and peers deep in the field of technology. As a result, we have not only gauged interest for starting chapters in other colleges (such as UVA, Mason, VCU), but we have also gotten interest from developers in Bangladesh, India, Ethiopia, and Palestine and we are now building both a chapter and national model expansion plan. The overall goal is to make software solutions for the government that affect crisis situations in developing nations. Our first project, Readphones, aims to solve many e-learning challenges that have risen as a result of the COVID-19, like utilizing a mobile low-bandwidth infrastructure, to bring curriculum to streets of developing nations. We are currently in the works of developing this application in conjunction with our JMU and Bangladesh team. Our President is currently in the works of building an office in Bangladesh for the national chapter. This will be involving a center for STEM education and software development in the epicenter of massive inequality, Dhaka, Bangladesh.

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How to Support

We appreciate all of our sponsors and supporters. Monetary funds significantly help us fund projects and organize events our partnerships are crucial to our success. Please contact minorityprogrammers (at) gmail (dot) com if you are interested in offering any form of financial support. Some events that have high student interest are Hackathons, professional development workshops, and skills training seminars.

We want investors to be able to choose how they're investment is used. Whether it goes to compensating MPA programmers who help non-profits implement software solutions, putting funds for a computer giveaway for underprivileged and future programmers in the local high school populations, or funding a day long hackathon, MPA will make sure that you know how your contribution is impacting the world.

Ways to Support

- Close collaboration with STEM hiring partners to tailor training that is
- applicable to students going into workforce
- Join network of programmers (make something on website for this)
- Fund community programs in your area
- Investing in Software Projects
- Investing in Hackathons
- Participating in Webinar
- Certified Training For Company
- Provide mentorship to MPA students
- Support Community STEM outreach efforts