Embedded in Embedded
bridging the gap between academics and industry
EiE: Embedded in Embedded.

The EiE mission is to provide excellent technical and human resources to improve the connection with and understanding of Electrical and Computer Engineering (ECE) theory and practice both technically and socially.

Consistent, long-term face-to-face communication throughout their degree program and into industry helps EiE students engage in their education and equips them with a rich set of skills to bring to the workforce.

EiE builds confidence, communication and leadership skills, and cultivates passions to create innovative engineers and thought leaders.

Our vision is to equip every ECE school in North America with an EiE learning environment in which the school, local industry, and students always find immense value in participating.
A staggering 44% of recent graduates stated they did not think university had prepared them for the working world. [1]

Only 39% of employers believe that grads are well prepared for a job in their field of study. [1]

“The differentiator is that this is a long-term, people-based program with focus not only on technical skills, but also on communication and leadership growth.”

Jason Long, MPG / EiE Founder

Embedded in Embedded (EiE) is an extracurricular initiative in Electrical and Computer Engineering (ECE) schools that delivers hands-on embedded systems training from an industry perspective. It is designed to compliment core curriculum and bridge the gap between theory in the classroom and application in industry. Most importantly, EiE builds and maintains relationships between students, schools, and local industry. EiE is led by trained Leaders who are in the classroom face-to-face with students every week.

Bridging the gap between academics and industry
Jason Long, P.Eng, is the creative engineer behind EiE. While completing his undergrad, Jason craved more hands-on technical skill development and needed to develop the communication and leadership skills essential for success in industry.

This inspired Jason to start an extracurricular program to pursue his passion for microprocessors while meeting his technical and personal goals. The program was simply called “MPG” for Microprocessor Group, and the journey to EiE began. After more than 15 years of effort, Jason has consistently proven that EiE is “Re-engineering Engineering Education” in a win-win-win way for ECE schools, industry and students.

Re-Engineering Engineering Education
EiE is an immersive program that truly embeds engineers into the world of embedded system design. It connects outstanding students with outstanding companies. By working together with students, schools, and industry, EiE cultivates relationships and meets the complex set of needs of everyone involved.
A school and local industry members form a node of EiE, but will also be fully integrated into the entire ecosystem.

The EiE program has been tested in a dozen universities in Canada.

Arrow Electronics estimates there are over 10,000 embedded systems companies in North America.

The embedded systems industry is valued at over 150 billion USD annually and aggressively growing.

There are nearly 50 accredited Electrical and Computer Engineering [ECE] Schools in Canada.

The United States has over 350 Electrical and Computer Engineering Schools.

There are over 20,000 ECE graduates each year in North America.

It can cost over $100,000 to recruit, train, and then dismiss the wrong person. The opportunity cost can be exponentially more.
Universities must look to offer more courses aligned to the jobs market and incentivise them if necessary. In turn, businesses should engage with the education sector to ensure that the skills they need are incorporated into university courses. [4]

Exponentially Improve Recruitment

EiE helps companies find exceptional students by building relationships over nearly four years. The program provides 16-20 months of technical training interleaved with 16-20 months of summer/co-op employment with companies. Students and companies can continue to build their relationship with a design project, and students can gain 4-8 months of leadership experience as EiE mentors. No other program exists that comes close to the level of quality and integration that EiE enables.

By graduation, both the student and company know exactly how they work together, and the student is able to immediately contribute to the company when hired. Companies can access the EiE network to meet students who continuously prove their passion for the industry. Every year we are blown away by students who accomplish amazing things and we have seen them go on to brilliant careers.

Without EiE, the time and cost of training junior employees is staggering. It is almost crazy to think about investing in an employee who is selected after just a few hours of interviews. With EiE, the value of integrating a person with your team and working with them over 4 years before extending a full-time offer is immeasurable. EiE is a game-changing way to find the right “fit” for your organization.

Be part of the solution you have asked for

Industry has identified that many graduating post-secondary students do not have the hands-on technical skills nor the social, communication or leadership skills that are needed in industry. This is not just the school’s problem, or the student’s problem, or industry’s problem. It has to be solved by everyone investing.

What about retention of your existing staff? One of the highest ranking incentives to employees is that they feel valued. EiE encourages your existing staff to be involved as mentors and be champions of your own technology by bringing it into the program. This can be an incredible motivator to staff. In fact, we challenge companies to allocate two hours a week so your staff could participate. This experience eclipses any communication or leadership course you will ever find at a fraction of the cost.

Get Involved Today

The costs of EiE are minimal and are shared between companies, students, and schools - a mutual investment that in itself contributes to the quality of the experience. EiE offers two levels of participation for industry: “member” and “partner.” Members pay $1,500 and partners pay $15,000 annually. Both require three-year commitments. Members have full access to the local EiE program and the global EiE network. Partners have the added benefits of appearing in all EiE media and may also add specific content or technology to the program. Please see the budget page for additional information.
“Employers of engineering graduates complain that their new hires lack high-level analytical and critical thinking skills, communication and teamwork skills, and understanding of engineering and business practice.” [3]

Passionate new hires with practical and communication skills

Improved employee satisfaction through participation

“If someone has a demonstrated interest in doing the things we are passionate about that is usually someone that is going to be very successful and interesting to work with.”

Ross Sterling, Director of ANT Wireless, Garmin
“Electronic engineering is a key enabling technology for economic growth, yet we’ve seen nearly a 50% decline in students entering electronic engineering degrees in just a few years. We’re working to reverse this decline and to ensure graduates are better prepared for the exciting and rewarding careers in our industry” [4]

“MPG [EIE] is able to fill in a lot of the holes that we can’t address at the scale that we have to operate.”
Dr. David Westwick, Schulich School of Engineering

Better students make better universities

The mission of EIE is to compliment ECE curriculum. EIE adds balance by helping students understand the value of fundamental knowledge while feeding their need to apply skills and see results. This improves attitudes, relationships, and even GPAs. It inevitably produces better graduates who feel more value and rank their education higher. We see it with students every year.

Increase enrollment to ECE programs

Global business leader Indro Mukerjee co-founded the UK Electronics Skills Foundation to connect employers with universities in an attempt to reverse the diminishing engineering skills in the electronics sector.[9]

The vision of EIE is much the same, aiming to entice students into ECE, support them with real world applications, and connect them to industry people whom they will eventually work with. That connection works both ways and embraces industry relationships that grow from mutual benefit.
“People are challenging the value of $100,000 debt and 4 years of time for an engineering degree that doesn’t provide real-world skills when they can take a 12-week programming boot camp and land a six-figure job at a start-up.”

Tess Trethewey, Arrow Electronics, while doing IoT Business Development in Silicon Valley

Grow with EiE

EIE requires no cash from schools and is free for students. EIE even creates a job for a graduate student as the EIE Leader at each school. We think that is pretty amazing, and it is possible thanks to the strong foundation of the program. The small annual cost of EIE is funded from our partners and member companies. The school only needs to allocate a computer lab for the program. The one-time lab capital cost is covered by the program budget and enhances a space not just for EIE, but for all students to use. Most importantly the program brings in people, many of whom will be alumni of the school who can now come full circle in the educational experience.

EIE is not a complicated partnership involving contracts, politics, branding, or money. It is a mutually beneficial relationship with as much or as little involvement as the school wants. Your endorsement and support helps us grow and be better every year. The opportunities are endless. The value is infinite.

We are honored to work with you and your staff.
EiE hardware consists of a PC, EiE development board, ANT wireless USB stick and USB-to-Serial adapter. Soldering equipment is optional.

The top 10 technical skills that students develop with EiE

1. Fluency in the technical language of embedded hardware and firmware
2. Core hardware skills including surface mount soldering, schematic interpretation, component identification, and applications
3. Use of industry-grade development software [IAR Systems]
4. Use of industry-grade schematic capture and PCB software [Altium Designer]
5. Version control [SVN and Git]
6. Fundamental C programming for embedded systems
7. Using an API to create programs that run in an existing framework
8. Emphasis on big-picture thinking for code planning, design, and implementation
9. Critical testing and troubleshooting skills with essential lab equipment
10. Ownership of projects and individual responsibility to create and innovate a firmware project.
A wireless LED messaging sign connects to the EiE development boards and across the EiE network.

An EiE lab uses an existing computer lab or student laptops. EiE signage and hardware is supplied from the course budget for up to 24 seats allowing EiE classes of 48 students with teams of two. Equipment is open for everyone to use.

All EiE material is open source and online. Nearly 50 modules are available to explore embedded systems hardware and firmware development.

The custom EiE development boards feature the latest ARM Cortex-M3 processors, 2.4GHz low power wireless technology, and extensive peripherals used in embedded systems.

Nearly 50 modules are available to explore embedded systems hardware and firmware development.
Every school that hosts the EiE program will have a dedicated leader who is a Masters or Ph.D student hired for 10 hours per week for 20 weeks across two academic terms. The EiE leader is the liaison to the department and will be responsible for promoting the program to students and running the weekly EiE meetings. The leader will also be the main point of contact to local industry. The leader can run competitions locally or with other EiE schools, and hosts the year-end open house including selecting the bursary winner. The diversity in this role and the experience and opportunities that it will provide might make it the best job in world.

When a leader is hired, he or she is given an intensive two-week, in-person, train-the-trainer course. The training is designed to:

- Create a fun way to learn and feel comfortable with administering and delivering the program
- Learn to communicate with and organize students
- Network with peers and build industry relationships

Leaders are not compensated directly for this training, but travel expenses are reimbursed and the course fee is covered - roughly $6000 in value in exchange for 10 days of time. If the leader extends to additional years, the training costs are applied to their compensation instead.

The level of commitment allows the leader to remain focused on their education while teaching and reinforcing the technical knowledge in EiE. The program Leaders foster trusting relationships with the students and local industry that result in exponential personal and professional growth.

“I was a volunteer and it was really cool to see the skills directly related to things I was doing, even that day, at work. It’s amazing how applicable the course is to what you are going to be doing in the industry”
Jacqui Lim, 4iiii Innocations Inc.

“I took the program throughout my career as a student, it was extremely useful with launching my career as an embedded systems designer. Jason has put endless hours to make sure students have exposure to the most cutting edge technology and design processes.”
Jon Bichel, Embedded Design Engineer, PK Sound
EIE requires an operating budget of just $15,000 per year per school. Most of the budget is used to train and pay the Leader. Leaders commit to at least 8 months of running EIE in the academic year, and are encouraged to continue in subsequent years with additional salary from savings in training. Amazingly, the budget also includes:

- Establishing the EIE lab in the school including all required hardware and software
- Annual open house / student presentations / wrap-up networking event
- The EIE student bursary program
- Building and maintaining relationships between students and local industry members
- Regular reporting to members/partners
- All administration of the program

Growth funding for EIE is provided by the program’s partners which commit at least $15,000 annually. Partners are recognized across the program in all media, website, and in the classroom. Once a program is established locally it is sustained by member companies who will pay $1,500 per year. Members may volunteer at and/or attend EIE meetings, will be invited to and recognized at local EIE events, and are listed on the member’s web page. Partners and member will have access to the EIE job board and are encouraged to dedicate jobs or projects for EIE.

EIE is administered by Jason Long [the EIE founder] through his company Engenuics Technologies. Engenuics will supply Leader training and EIE lab equipment. All of the content, planning, and experience for the foundation of EIE are being provided at no cost. The portion of the budget for training, equipment and administration enables Jason to dedicate Engenuics to EIE and ramp up staff as the program grows. Engenuics will hire roughly 1 person for every 20 schools running EIE.

Any excess funds will be reinvested into the program with priority to subsidize other cities who do not have enough member support and also to grow the program. An annual report with full financial disclosure will be provided to all members and partners. After a three year pilot of the EIE program with at least 10 schools in North America, we will determine if the model is working for all stakeholders. At that time, converting the program to a not-for-profit organization will be considered if the benefits outweigh the cost and effort. However, we strongly believe that operating as a business with full transparency is a better solution for EIE.
No cash cost to schools

EiE is free for students

program budget per school

Leader Training 20%
Program Administration 20%
Leader Salary 20%
Advertising, Celebrations, Competitions & Awards 10%
Software 15%
Soldering Equipment 10%
Basic Equipment & Signage 5%
Embedded in Embedded is a program that bridges the gap between academics and industry in Electrical and Computer Engineering. It equips students with practical technical and social skills that enhances their post-secondary experience. It connects people and builds long-term relationships. We have proven this for 15 years, and we will continue to prove it as we grow.

Schools: We would love to meet with your faculty to demonstrate how EiE compliments your core curriculum and will improve student enrollment and satisfaction.

Industry: Join as a member or partner today. Save immense cost by directly accessing the brightest and most motivated students. Start training your new hires while they are still in school. Empower your employees to contribute to the future of your company.

www.embeddedinembedded.com
eie@embeddedinembedded.com
sources


