Embedded Systems

Embedded systems are computers inside other machines. Automobile entertainment systems, robots, and even microwave ovens are examples of embedded systems. Creating embedded systems requires knowledge of both hardware design and software programming.

Embedded systems are ubiquitous, yet only one other university in Michigan offers a program of study in embedded systems.

Industries that utilize embedded systems engineers include defense, robotics, communications, consumer electronics, and aeronautics.

Skills and Competencies

This program is a hybrid. It is designed to teach students both how to design and build computer controlled machines, and how to program the resulting devices. The Electronics Technologies classes fulfill the first objective, and the Computer Science classes fulfill the second objective.

Where are these applicable:
- Industrial Machines, automobiles, medical equipment, space, cameras, household appliances, agriculture, airplanes, vending machines, cellular phone, PDA, toys.
- Automotive embedded including robotics; Healthcare devices; Telecommunications (Mobiles,2G,3G,4G,LTE, Data Communications); Satellite communications; Avionics (Aeroplanes); Testing and Measurement Sub Domains

Course Work

This degree includes the following courses as part of the program requirements, and specific major requirements along with general education and graduation requirements.

Engineering Technology Core

ET112	DC Circuit Analysis (4 cr.)	
ET113	AC Circuit Analysis (4 cr.)	
ET210	Discrete Semiconductors (4 cr.)	
ET211	Digital Electronics (4 cr.)	
ET212	Advanced Linear Circuits (3 cr.)	
ET321	Embedded Systems Programming (4 cr.)	
ET415	Controls (3 cr.)	
ET420	Microcontroller Applications (3 cr.)	
ET431	Senior Project I (1 cr.)	
ET432	Senior Project II (2 cr.)	

Computer Science Core

CS120	Computer Science I (4 cr.)
CS122	Computer Science II (4 cr.)
CS201	Programming in C++ (3 cr.)
CS222	Data Structures (4 cr.)
CS228	Network Programming (3 cr.)
CS330	Microcomputer Architecture (4 cr.)
CS422	Algorithms Design and Analysis (3 cr.)
CS426	Operating Systems (4 cr.)

Major Electives
Choose a minimum of seven credits:

CS Electives (not including CS101)
ET Electives (not including ET101 or ET110)
MA115   Precalculus or above (4 cr.)

Other Required Courses

MA161   Calculus I (4 cr.)

Detailed course descriptions can be found at www.nmu.edu/bulletin.

Career Development

You should begin the resume-building process as soon as you can. The Academic and Career Advisement Center can assist you with career planning, while Career Services will help you fine tune your resume and look for jobs related to your field. In the meantime, the more hands-on experience you have, the better you prepare for employment. Becoming involved in a professional related internship is a way to develop your professional skills and gain experience. Your academic course work is important as well, so be sure to maintain a high grade point average.

Additional Considerations

This is a new interdisciplinary program using existing classes from the computer Science and Electronics Technologies programs, and finish with a new capstone course.

Internship experience and organizational affiliations are beneficial to persons interested in pursuing any number of professional careers related to Embedded Systems.

Job Outlook

The U.S. Labor Department projects a 4% growth in the need for electronic engineers, and a 22% growth in the need for programmers. They also report that hardware engineers have a median salary of $90,000, and software engineers $102,000. The Intel Corporation (our biggest internship sponsor) has asked for more students with this skill set.

Potential Careers

NMU's Embedded Systems Program prepares students for employment in the following careers:

Embedded Software Engineers

System software engineer (Kernel and RTOS)

Application software engineer
            (Device Drivers)

Software test engineer

Driver Development - Linux

GPS/AGPS Developer

RF / WiFi / Communications Protocol
            Engineer

Embedded Hardware Engineers

Hardwareengineer

Board Design Engineer

Board (hardware) validation engineer

Application Engineers

Application Engineer Technical Support

Tech Support Engineer

Product Application Engineer (PAE)

Marketing and Sales

Marketing executive

Sales executive

Additional Resources and Information

NORTHERN MICHIGAN UNIVERSITY

MARQUETTE, MICHIGAN

The Academic & Career Advisement Center

2022

What to do with a major in...

Embedded Systems