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# The Alliance for Computing, Information, and Automation

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# Executive Summary

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The Michigan Tech **Alliance for Computing, Information, and Automation (ACIA)** is an agreement among:

- Department of Electrical and Computer Engineering (College of Engineering)
- Department of Computer Science (College of Sciences and Arts)
- Programs in Electrical Engineering Technology and Computer Networks & Systems Administration (School of Technology)

to promote:

- cooperation in academic programs
- collaboration in research

so that we may align our scholarly activities more closely with contemporary technological innovation in industry and society.

# RATIONALE

# 1<sup>st</sup> Industrial Revolution

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Transition from manual/animal labor to mechanized means of production via coal, steam, etc.



Predates Michigan Tech, but copper mining in Michigan would have been impossible without it.

# 2<sup>nd</sup> Industrial Revolution

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Transition to mass production and the widespread use of electrical power



Michigan Tech was front-and-center in all the technological developments of the 20<sup>th</sup> century.

# 3<sup>rd</sup> Industrial Revolution

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Advent of computers and information processing



Michigan Tech Department of Computer Science grew out of Mathematics (like in about half the universities in the U.S.)



# 4th Industrial Revolution

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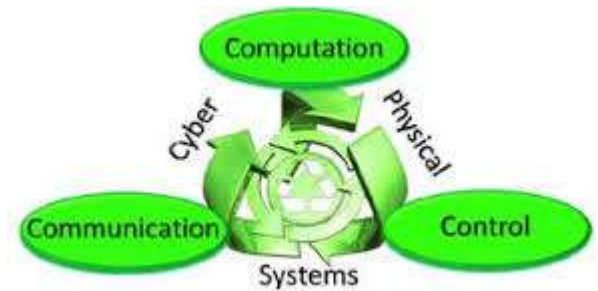
- Pervasive, mobile, ubiquitous computing



- The Internet of Things



- Cyberphysical systems

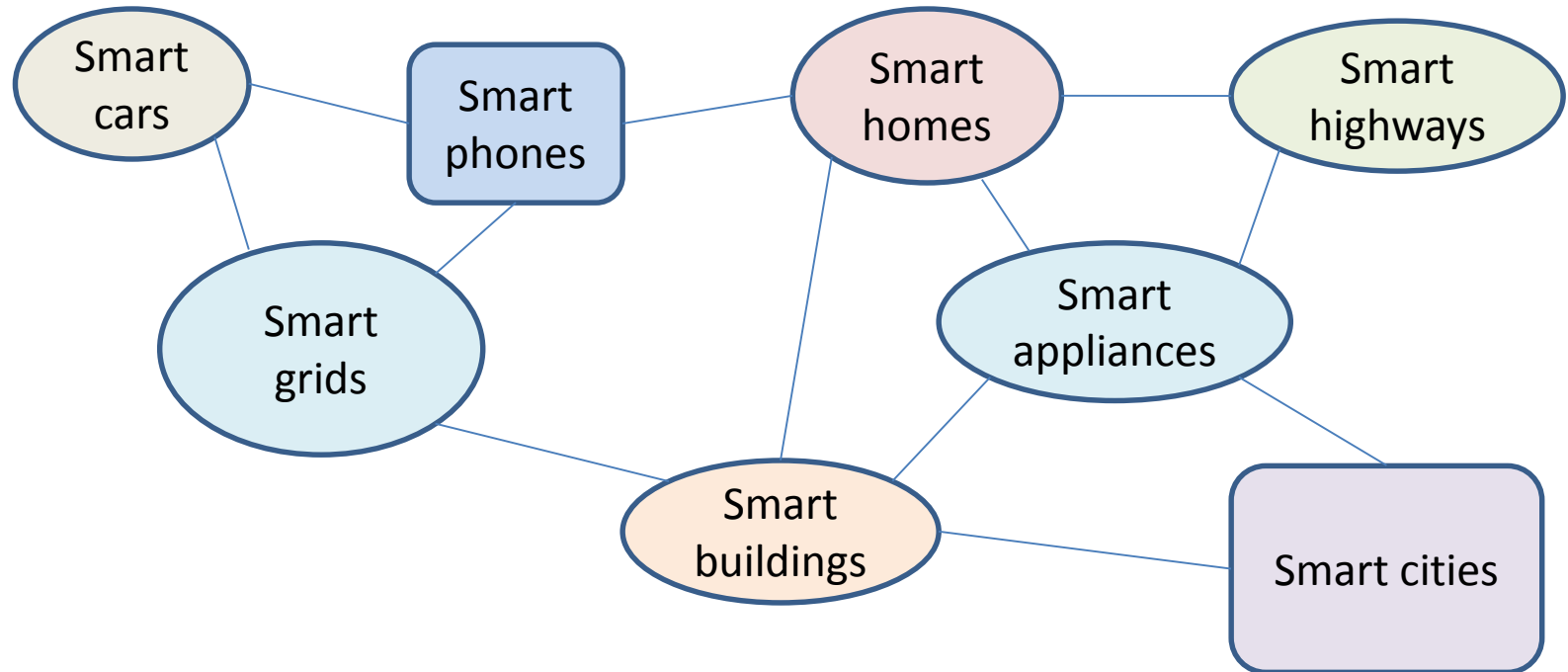


- Industrie 4.0



# 4th Industrial Revolution

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- Everything is sensed
- Everything is networked
- Everything is controlled



# Michigan Tech circa 2000

## Electrical Engineering

- Circuits
- Electronics
- Utility power
- Communications
- Computer hardware
- Signal processing
- Control systems
- Applied physics

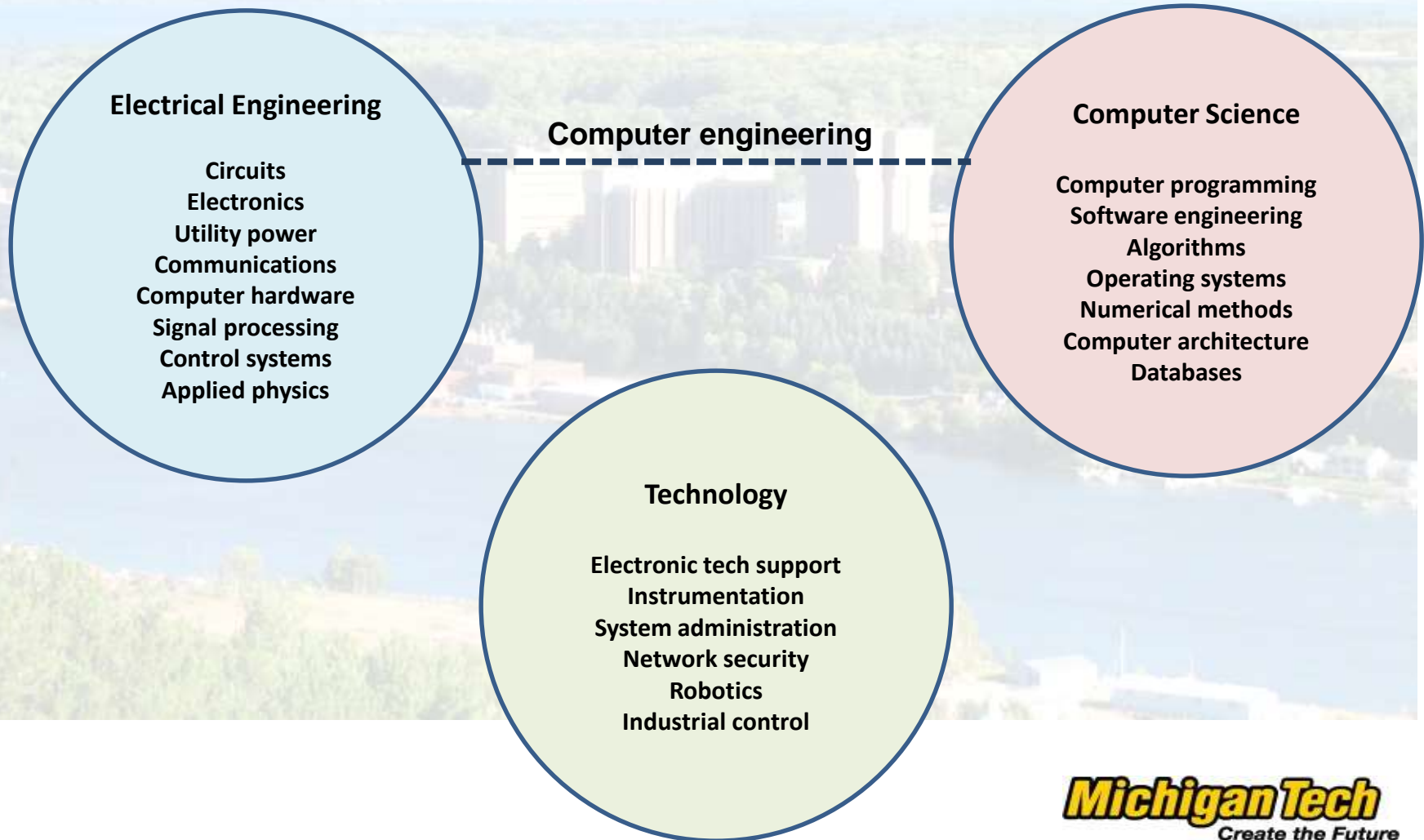
## Computer Science

- Computer programming
- Software engineering
- Algorithms
- Operating systems
- Numerical methods
- Computer architecture
- Databases

## Technology

- Electronic tech support
- Instrumentation
- System administration
- Network security
- Robotics
- Industrial control

# Michigan Tech circa 2000



# Industry Now

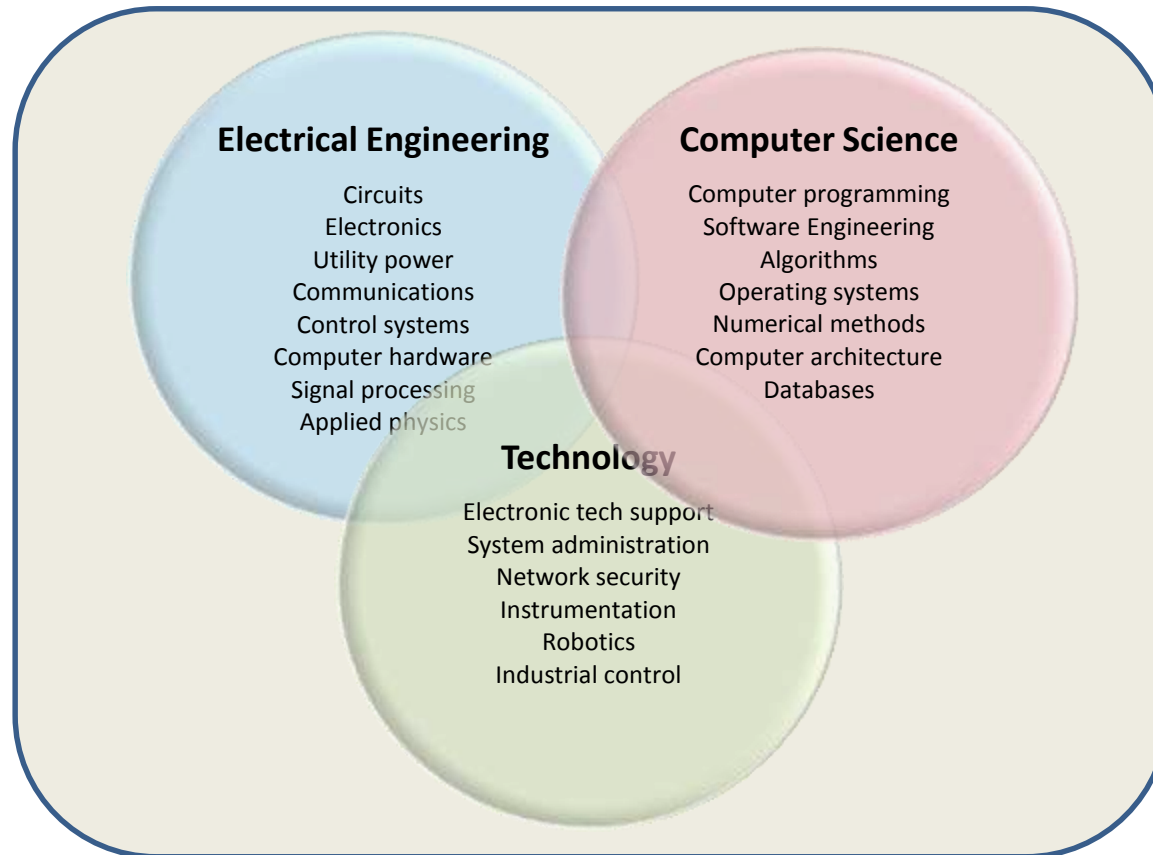
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## Electro-Techno-Computer “Stuff”

Internet  
social networks      UAVs  
sensor networks      big data  
cybersecurity      renewable energy  
cell phones      medical devices      GPS  
surveillance      games      smart grids  
electric vehicles      industrial control  
computational intelligence  
quantum computing      eldertechnology

# What Do We Need to Do?

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# CHARTER

# Definition and Mission

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## Definition

An agreement among the ECE Department, the CS Department, and EET and CNSA programs in the School of Technology, to establish formal mechanisms for cooperation in academic programs and collaboration in research.

## Mission

To create a scholarly environment for teaching and research in computing, information, automation, that is a reflection of contemporary technological innovation in industry and society at large.

# Governance

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- Three person ACIA Executive Committee: ECE department chair, CS department chair, Dean of SoT. Annual rotation of chair of this committee.
- Representative democracy model. There will be meetings and discussion involving all participating faculty, but there are no votes anticipated at the individual faculty level.
- Units retain autonomy in all academic and personnel matters



# Cooperation in Academic Programs

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A standing ACIA Curriculum Coordinating Committee will be established with a mandate to:

- Increase awareness of course offerings across units
- Seek efficiency in course offerings and develop better sequences
- Identify gap areas and course needs
- Identify possible cross-listings and recommend staffing plans
- Recommend curriculum changes that allow for more flexibility in the 1<sup>st</sup> and 2<sup>nd</sup> year
- Address retention concerns

# Collaboration in Research

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The Alliance shall work to establish a new university-level research center in the area of computing, information, and automation. This center will supersede the Center for Computer Systems Research.

The center shall have an Executive Director whose responsibilities will be 100% in research and research funding.

Faculty members from outside the Alliance units are invited to participate.

# Ratification

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The charter for the Alliance for Computing, Information, and Automation was ratified by a majority vote in each of the three participating units as of

***March 10, 2014***

# UNIVERSITY AND EXTERNAL SUPPORT

# New Staff Position

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## ACIA Academic Advisor and Communication Director

### Responsibilities:

- Knowledge of course offerings and degree requirements in all three units
- Resource for students, particularly undecided students
- Communication of Alliance goals, objectives, and programs through traditional and modern media

# Website

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An ACIA common website will be established to:

- Provide information to current and potential students regarding course offerings, degree requirements, academic planning, changing majors, multiple majors, and career guidance
- Promote academic and research activities to outside audiences, including potential students, parents, alumni, industry, and funding agencies

Website will be updated and maintained by the ACIA Academic Advisor and Communication Director

# New Faculty Position

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The University commits to filling:

- Open position of department chair in Computer Science (in progress)
- Open faculty position in Computer Science (in progress)
- One **new** position in one of the three participating units, following analysis of gap areas and needs



# Summer Salary

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The University will provide up to 4 weeks of summer salary for the members of the ACIA Standing Curriculum Coordinating Committee

# Endowed Professorships

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The University, working the Office of Advancement, will seek external funds to create and fill two endowed professorships:

- Executive Director of the new research center
- New faculty position in Data Science

Aside: the new MS programs in Data Science are tangentially related to the Alliance but are not a part of the Alliance *per se*. The Data Science programs are run by the Office of the Dean of the Graduate School, and will have significant involvement from the Department of Mathematics and the School of Business and Economics. Data Science faculty may well be a part of the ACIA research center.

# Graduate Assistantships

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The University, working with the Office of Advancement, will seek funds for two new graduate student assistantships to support new courses in the Data Science MS program and contribute to research activities in the new ACIA center.

# SUMMARY

# An Innovative Path Forward

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**Our challenge:** to be a relevant and driving force in technology, Industry, and society, while being unique and true to ourselves as members of the Michigan Tech community.

The **Alliance for Computing, Information, and Automation** is a one-of-a-kind agreement that will be an example nationwide, and that will open new pathways for Michigan Tech students and faculty to make their mark in the 21<sup>st</sup> century.