

Is Education Underwater?

Addressing the Need for a Qualified Workforce

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PRICE OF ADMISSION: AMERICA'S COLLEGE DEBT CRISIS



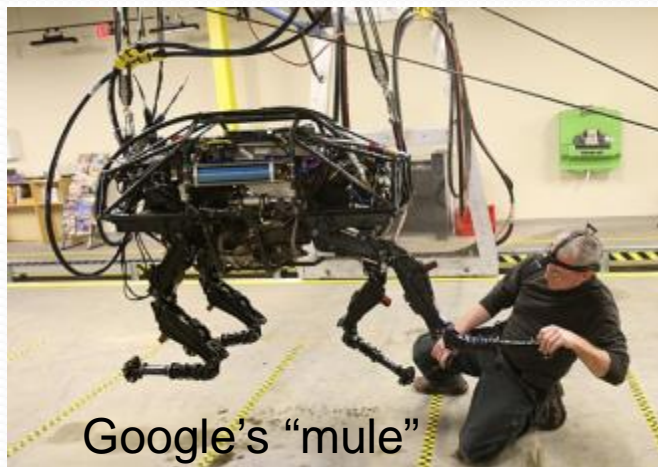
STUDENT DEBT IS NEARING 1 TRILLION DOLLARS.
Could this be the next bubble to burst? Go inside the debt crisis that could keep taxpayers on the hook for generations.



Are Robots Hurting Job Growth?

Jobless Recovery, Technological Unemployment

Kiva's autonomous warehouse robots



Google's "mule"

The Atlas Robot



Google's self-driving car

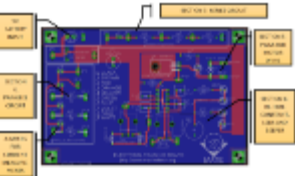
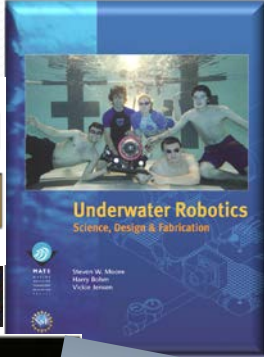


Da Vinci Surgery Robot



MATE Center Programs

Textbooks, Curriculum, Kits



SeaMATE



At-Sea Internships



Partnerships
 800+ Academic Institutions
 150+ Industry partners
 6 Professional Societies
 8 Federal Agencies

Workforce Studies



Teacher Education



Underwater Robotics Competitions



Career Awareness

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CENTERS FOR OCEAN SCIENCES
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Knowledge and Skill Guidelines

KNOWLEDGE AND SKILL GUIDELINES FOR MARINE SCIENCE AND TECHNOLOGY

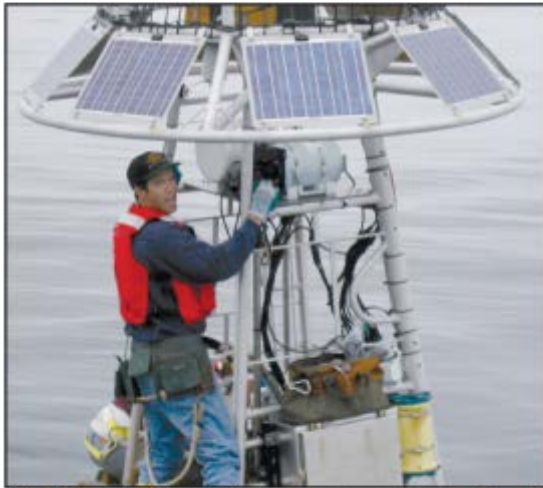
VOLUME 4

Oceanographic Instrumentation Technician

The Importance of Oceanographic Instrumentation Technicians and Ocean Observing Systems

Oceanographic Instrumentation Technicians play an important role in the collection of scientific measurements that allow us to understand how the oceans work and to use the ocean and its resources more safely and wisely.

Historically, most ocean measurements were made from ships, but increasingly they are being made from unmanned platforms such as moorings, drifters, and autonomous underwater vehicles. The earliest of these measurements or observations were made in the spirit of pure exploration: to describe what the ocean floor looks like, where the strongest currents are, how salty the water is, etc. As new technologies were invented and new theories advanced, targeted ocean measurements were made to try to understand ocean dynamics and biological and geological interactions: why the



Mike Kelley, Ocean Observing Supervisor, works on a mooring observing system in Monterey Bay.

managing fisheries, mitigating oil spills, and forecasting storm surge. The advent of ocean observing systems that take an

The goal of ocean observing systems is to pull together data from various sources to present a cohesive picture of

- Job functions & tasks
- Personal characteristics
- Occupational titles
- Educational backgrounds
- Salary range
- Instruments and tools used
- Professional societies and conferences
- Future trends and more



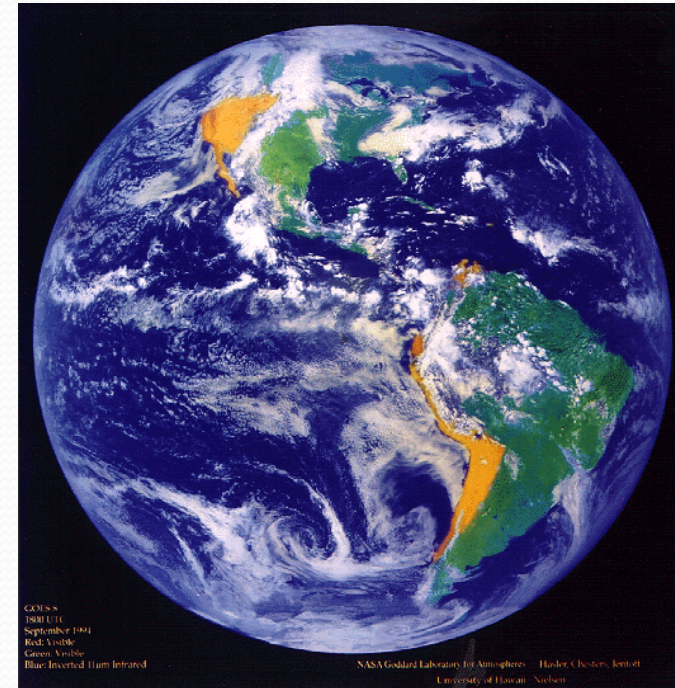


MATE Strategy for Improving the Marine Technical Workforce

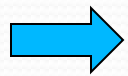
PRODUCTS	DESCRIPTION
Needs identification ↓	List of critical workforce needs from employer queries
Occupational definitions ↓	Employer recognized occupational categories
Occupational guidelines ↓	Employee identified knowledge and skills for specific occupations
Competencies ↓	Knowledge and skills grouped by subject area
Educational products and services ↓	Competency-based assessments, modules, courses, faculty development workshops, and internships
Educational programs ↓	Degree and certificate programs aligned with workforce needs
Career management programs	Job placement programs, professional development courses

The Marine Economy

- National Security/Defense
- Transportation and Commerce
- Energy and Exploration Activities
- Telecommunications
- Recreation and Tourism
- Fisheries and Aquaculture
- Search & Recovery Operations
- Nautical/Underwater Archeology
- Government Assessment and Regulation
- Scientific/Medical Research
- Education and the Arts

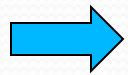


Ocean Developments



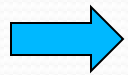
Working deeper

- Drilling for oil
- Fishing
- Search and recovery



Long-term observations/climate change

- Ocean Observing Systems
- Marine safety and health concerns
- Environmental protection (storms/sea level rise)



Renewable energy and food

- Offshore wind and wave energy installations
- Offshore fish aquaculture



Trends in Technology

- **Increased use of Remote Sensing**
 - Atmosphere, Land, Sea Surface, Sea Floor, Mid- Ocean
- **Increased use of Miniaturization/Automation/Robotics**
 - Cheaper, lighter, smarter (ROVs, AUVs, GPS, Animal Tags)
- **Increased use of Computer Processing Power**
 - Smarter equipment, data streams, real-time data
 - Higher level data products, 3-D Sonars, modeling
- **Increased use of Molecular Biology**
 - Species identification, bioengineering

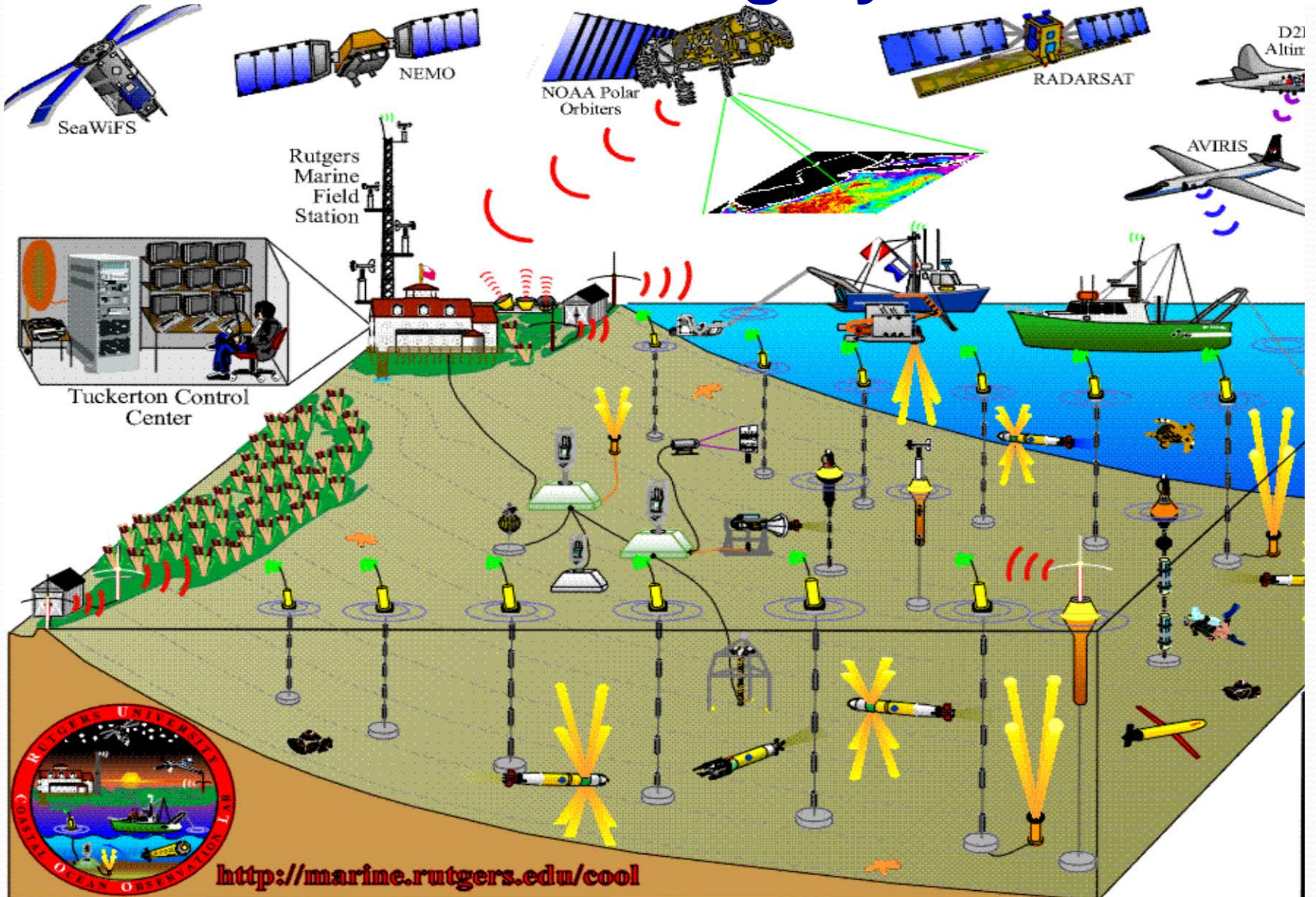


Time's Best Inventions List

- Green algae for biofuel
- Tank-raised bluefin tuna
- Bioengineered salmon
- Fish friendly tidal turbine
- Underwater Kite for energy production
- Google's Atlantic Wind Connection
- Google's Floating Data Center
- Lifeguard Robot



Ocean Observing Systems



BattleSpace on Demand



- *the ultimate objective for precise Navigation and Timing*

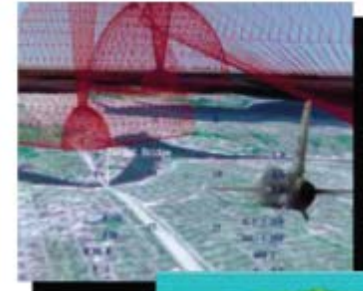


4D Cube

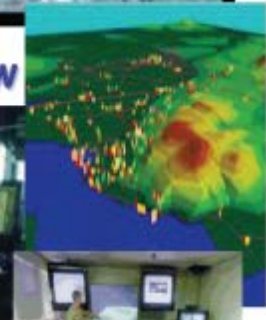
- Today there are nautical charts, topographic charts and aero charts
- Tomorrow there will be an integrated 4D cube of digital data.



The Old



The New



ATE

Occupations Difficult to Fill in the Ocean Industry

- Electronics Technician
- UW Vehicle Pilot / Tech
- Diver
- Machinist / Welder
- Software Engineer
- Electrical Engineer
- Mechanical Engineer
- Engineers/Scientist with acoustic backgrounds
- Computer Programmer/Scientist
- Project / Program Manager
- Ship Officer / Crew



There is a widespread need for employees with a broad range of knowledge and skills

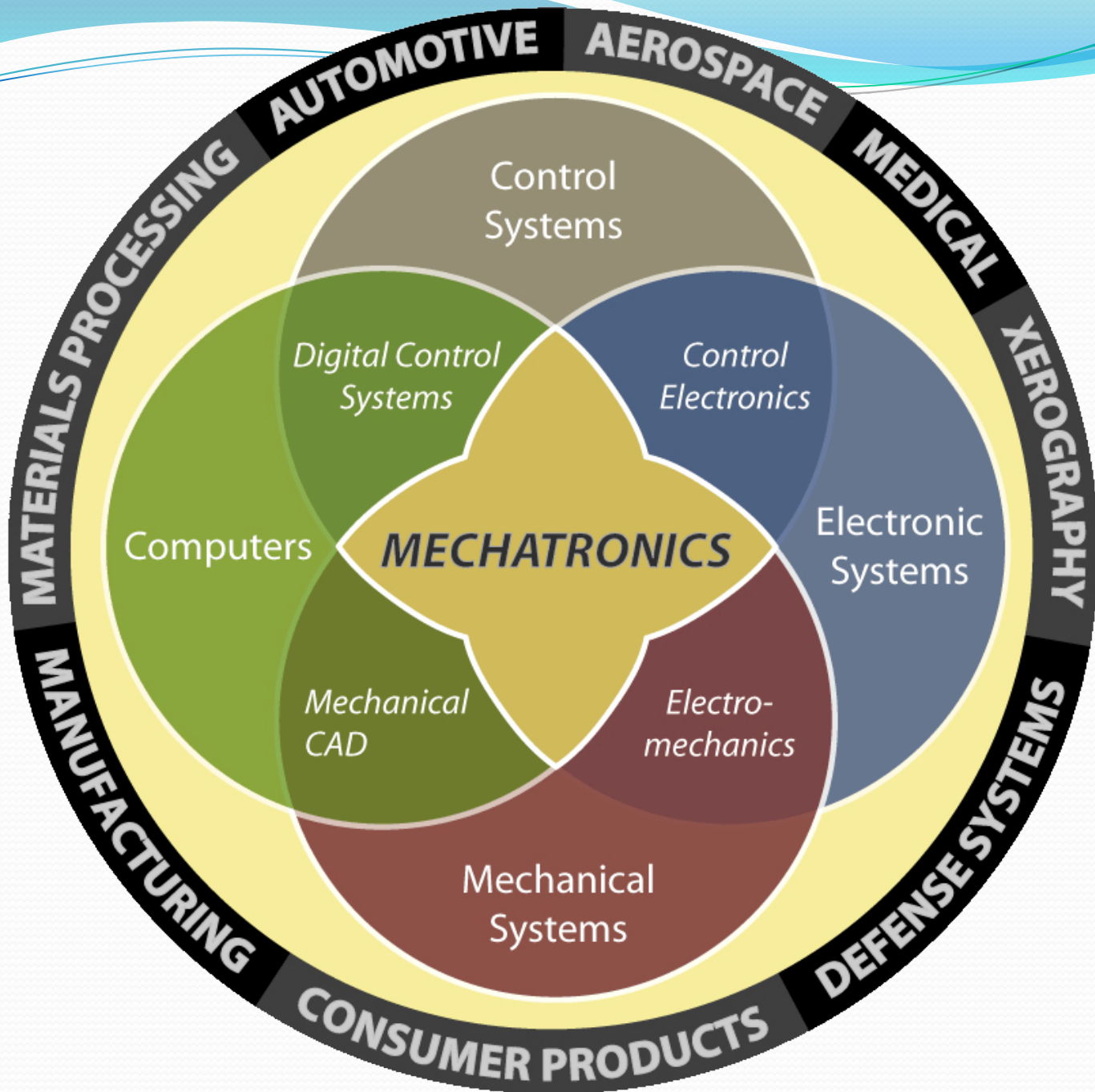
Interdisciplinary

- **Engineering (EE & ME) + physical oceanography**
- **Computer science + physical oceanography**
- **Marine biology + physics**
- **Marine biology + math/modeling**

Science + technology

- **Oceanography + electronics**
- **Oceanography + high performance computing**
- **Oceanography + remote sensing**
- **Marine resource management + GIS**
- **Geology + software development**





How are Educational Programs based on Occupational Guidelines/Competencies different?

- Courses are project-based using problems from the workplace; competences and assessments are tied to Occupational Guidelines. (Projects w/ timelines & budgets)
- Critical thinking and problem solving are integral.
- Program development occurs across grade levels with elementary, middle and high schools and community colleges and universities working together. (Can eliminate redundancy)
- Many courses are interdisciplinary.
- Internships and working with industry and community members is essential.



Provide activities that give real-world life skills

- Communication skills
- Teamwork
- Leadership
- Critical thinking
- Creative problem solving
- Stress management
- Project management
- Ability to learn/access information
- Motivation
- **Entrepreneurial skills**
- **A vision for their future**

GRIT



MATE

The Common Core

<http://www.youtube.com/watch?v=dY2mRM4i6tY>





MATE

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Questions?

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