



YEAR 3 SECOND QUARTERLY REPORT

February 1, 2006 – April 30, 2006

**CURRICULUM IMPROVEMENT
PARTNERSHIP AWARD PROGRAM**

Allan Hancock College

Name of Institution

Robert Alldredge, PI & Ardis Neilsen, Co-PI

Principal Investigator

Year 3
2nd Quarterly Report – February 1, 2006 through April 30, 2006

- 1.0 Name of Institution** Allan Hancock College (AHC)
- 2.0 Name of Principal Investigator(s)** Robert W. Alldredge, PI
 Ardis L. Neilsen, Co-PI
- 3.0 Name of CIPA Project** Mechatronics Curriculum Expansion Project

4.0 Project Activities

A description of Year Three, Second Quarter activities is provided below.

Objective 1: To provide a summer youth Mechatronics Institute and Space Endeavour Camps featuring NASA curriculum in mechanical engineering, mechatronics, GPS, satellite tracking, and robots. Thirty minority students will attend. At least 50% will demonstrate a significant increase in knowledge.	
Status:	Planning and preparation for summer 2006 Mechatronics Institute and Space Camps are ongoing.
Year Three, 2nd Quarter Progress	<p>Outreach and recruitment for the summer institute and camps are in full swing. Promotional flyers and application forms for the 2006 Mechatronics Institute and Endeavour (Space) Camps for high school and junior high school students, respectively, have been distributed throughout the community.</p> <p>Five additional reference textbooks have been purchased to support the Mechatronics Institute, to be taught this summer by Mr. Andrew Williams, the Endeavour Academy's lead instructor at California Academy of Math and Science, Los Angeles.</p> <p>Electronics faculty and staff participated at College & Career Day at Pioneer Valley High School on April 7 and at Righetti High School on April 28, capitalizing on opportunities for Mechatronics Institute recruitment as well</p>



Figure 1: Margaret Lau

	<p>as promotion of the electronics technology program. Numerous hands-on interactive displays and a presentation board depicting NASA CIPA and NSF SpaceTEC-funded activities were featured attractions. Targeted outreach continues through several local contacts.</p> <p>In a creative move to resolve anticipated transportation issues, as faced by some of the youth participating in the week-long summer Endeavour Camps during Years 1 and 2, contact has been made with program leadership of the Boys & Girls Club of the Santa Maria Valley, Inc. The organization currently serves a population of youth that is estimated to be 75% Hispanic and, noting the possible availability of their 15-passenger vans, has agreed to a partnership opportunity whereby AHC can offer Endeavour Camp scholarships to selected junior high school-age Boys & Girls Club members. In turn, the organization will meet the students' daily transportation needs to and from the Endeavour Center.</p>
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<p>Objective 2: To increase the ability of the electronics faculty to quickly assess students' electronics skill levels and knowledge to facilitate student academic success. Purchase four NIDA workstations. Train 30 students per semester. Develop an open access electronics lab. College minority student enrollment will increase by 15% (from 217 students in fall 2002 to 249 students in fall 2005) and by 20% by 2006.</p>	
<p>Status:</p>	<p>Achievement and ongoing progress noted.</p>
<p>Year Three, 2nd Quarter Progress</p>	<p><u>NIDA Electronic Consoles/Workstations</u></p> <p>The electronics lab currently houses a total of ten state-of-the-art NIDA consoles and two NIDA programmable logic controller trainers. In addition, a variety of companionable lab experiment card sets and computer-aided instructional software were procured to enhance instruction of core and specialty courses that will be supporting the new Mechatronics degree and certificate program.</p> <p><u>Open Access Electronics Lab</u></p> <p>EL 379 "Electronic Computer and NIDA Certification Lab" (1-unit) continues to be offered for student access throughout spring 2006.</p> <p><u>Program Enrollment, Student Retention and Student Success</u></p> <p>Comprehensive data and analysis of spring 2006 enrollment, including student demographic and outcome statistics, will be reported in the subsequent Year 3, 3rd Quarterly Report.</p>

<p>Objective 3: To partner with the Endeavour Center, a NASA Teacher Resource Education Center, to infuse NASA curriculum into the college’s electronics program and to provide professional experience opportunities for students. Offer two field trip experiences for a minimum of 10 students each to varied NASA research/education sites or private industry research sites.</p>	
<p>Status:</p>	<p>Achievement and ongoing progress noted.</p>
<p>Year Three, 2nd Quarter Progress</p>	<p><u>CURRICULUM DEVELOPMENT/EXPANSION</u></p> <p>Input from recent meetings with the Industry Advisory Council, both in committee and by individual consultation, has cited a need for a broader range of skill sets to be created to complement existing technology-focused programs. Working with aerospace industry partners, modifications were made to the plan of execution of electronics to mechatronics expansion as originally proposed. Michael Steinore, a new computer science instructor at AHC, has modified existing computer science programming courses, improving sequencing and content to better serve students and meet local industry needs through the infusion of mechatronics-related curriculum. The courses with mechatronics emphasis are: Fundamentals of Programming I and II, Object-Oriented Programming, and Software Engineering. Bob Alldredge, Principal Investigator (PI), updated and included hardware development language programming into existing Com Sc 141 and 142 “Computer Fundamentals in Digital Design” courses.</p> <p>Seven new courses, many of which focus on manufacturing, were created to broaden the scope of the new Mechatronics degree program (Attachment A). One of the new courses focuses on the processor used to control radar operations for range safety at Vandenberg Air Force Base. The new courses are: Introduction to Robotics and Mechatronics; Renewable Energy; Programmable Logic Controllers (PLC); Transducers & Sensors; MC68000 Microprocessor Family; Motors & Rotating Machinery; and Fluid Power & Control. To enhance student awareness and facilitate course registration, the courses have been cross-listed under Electronics, Computer Science, Engineering Technology, as well as in a new category, Computer Electronics.</p> <p>The PI reports that the fall 2006 Schedule of credit courses will feature the modified Com Sc 141 and 142 “Computer Fundamentals in Digital Design” courses as well as EL 104 “Intro to Robotics and Mechatronics.” In current development are four new courses that will be added to the mechatronics degree’s specialty course options as early as spring 2007: Introduction to Microwave and Radar; Signal Processing; Fiber Optics, and Avionics.</p>

The debut of the Mechatronics Expansion Project website has been temporarily delayed due to the requisite time and effort requirements to complete an institutionally mandated, biannual program review of the electronics technologies program during 2005-2006.

EDUCATIONAL OUTREACH & PROFESSIONAL EXPERIENCE/DEVELOPMENT OPPORTUNITIES



Figure 2: Eva Marie Macias

Cooperative planning and effective use of leveraged resources have resulted in several highly successful educational outreach and professional development activities during this reporting period. On February 22, “Reaching Beyond Barriers: Women in Engineering,” a forum featuring a panel of five female engineers representing a variety of career fields, attracted a crowd of 75 members of the public, students, faculty, staff, administrators and board members. One of the panelists was Eva Marie Macias, a Vocational ESL Intro to Electronics instructor,

representing the field of aerospace engineering. Publicity for this forum included outreach to local junior high and high school math/science faculty and career center staff. The forum, followed by an informal reception, was co-sponsored by the Mathematics, Engineering & Science Achievement (MESA) Program and NASA-CIPA.



Figure 3: Lakeview Junior High School students

Sixty Lakeview Junior High School students were treated to hands-on, interactive displays in the AHC electronics lab on March 13, hosted by PI Bob Alldredge. The students participated on a campus excursion as guests of the college’s California Student Opportunity and Access Program (CalSOAP).



Figure 4: MESA students

On March 24 and 25, a group of 21 MESA students, accompanied by five faculty and staff members, traveled north on an overnight field trip to visit NASA Ames Research Center and tour the New United Motor Manufacturing, Inc. facilities, where Toyota Corollas and Tacomas and Pontiac Vibes are made, exemplifying lean manufacturing principles and state-of-the-art robotic

welding equipment. John Laporga, a former AHC MESA student and current mechanical engineering major at San Jose State University, led participants on a tour of the campus and engineering department facilities during its annual open house. The trip culminated in a visit to the Tech Museum of Innovation.

For the third time in three years, a successful K-14 Educators' Launch conference was held at Allan Hancock College's Lompoc Valley Center and the Endeavour Center, with leveraged NSF SpaceTEC funding. Space 179 "CALIPSO/CloudSat Educators' Launch Workshop" (0.5-unit) attracted an enrollment of 23 educators to the April 19 – 20 event. Participants included six afternoon workshop presenters, in addition to evening keynote addresses by Dr. Graeme Stephens, NASA CloudSat PI; Dr. Chip Trepte, NASA CALIPSO Deputy PI; and Dr. Scott Messer, NASA Launch Services program manager for The Boeing Company.

Principal Investigator Bob Alldredge, Co-Principal Investigator Ardis Neilsen, and program coordinator Margaret Lau participated in numerous meetings involving educational, commercial, military, and government entities, to present industry-driven curriculum advances that have recently been implemented and continue to be developed in the electronics program, made possible by generous funding through NASA CIPA and other leveraged sources. The strategies developed to increase enrollment, retention, and success rates of underrepresented, educationally disadvantaged student populations continue to be implemented and promoted throughout the community. The following represent activities, not reported elsewhere in this report, that were capitalized on for partnership growth and program expansion:

Feb 2006: Bob Alldredge and Margaret Lau met with Lockheed Martin Technical Operations trainer Myrick Buttler and April Johnson, multimedia group lead, to discuss space operations and mechatronics curricula and certification/assessment needs.

Ardis Neilsen, Margaret Lau, and other AHC administrators and faculty met with seven members of Boeing senior management, led by Bruce Franta, manager of Delta Launch Sites Training Services, to discuss curriculum, training, and skill assessment needs at Vandenberg AFB.

Mar 2006: California Space Authority hosted two mandatory partner conferences in support of the California Innovation Corridor, its three-year, \$15M Department of Labor WIRED initiative, attended by Ardis Neilsen. AHC is one of 67 CSA WIRED partners; a subcontract award would represent a significant boost toward mechatronics program sustainability.

On March 31, Bob Alldredge gave a presentation to 40 Lompoc

	<p>High School students as part of an articulation meeting and campus tour with Sue Coupland, LHS computer instructor.</p> <p>Apr 2006: Bob Alldredge and Margaret Lau accompanied Space Operations faculty Dr. Larry Gooch and David Richardson and dean of mathematical, life, and physical sciences, Dr. Paul Murphy, to meet with 12 members of InDyne, Inc., senior management to discuss curriculum and workforce training needs. InDyne represents the largest employer of electronics technicians at Vandenberg AFB. The meeting concluded with an extensive, two-hour tour of its Western Range operations, communications, and information systems.</p>
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<p>Objective 4: To expand the partnership with the NSF SpaceTEC Consortium to share curriculum, employment research information, and national cost-effective strategies to provide training to new technicians.</p>	
Status:	Achievement noted.
Year Three, 2nd Quarter Progress	<p>Supported by the NSF SpaceTEC grant, a targeted aerospace industry needs-based labor survey was completed. Selected survey participants were asked to identify local incumbent and future workforce training needs, assess short and long-term technician employment demand, as well as to solicit ideas for partnership opportunities with AHC, e.g., student internships, participation on industry-education advisory council, etc. The results of the survey, combined with follow up meetings with senior management (reported under Objective 3, above), revealed overwhelming need and support for the AHC electronics and mechatronics degree programs. Demand for a variety of customized, topic-specific training modules for incumbent workers was especially noted.</p>

5.0 Personnel Changes

None.

6.0 Expenditures

At April 30, 2006, \$82,475.88 remains to be expended of the \$300,000 awarded for Years 1 through 3, with encumbrances totaling \$29,118.58 for NIDA equipment received, but not yet paid. Direct labor (salaries and benefits), equipment, and youth educational outreach remain the three highest categories of accrued expenditures to date.

7.0 Additional Remarks

None.

Engineering Technology with Emphasis in Mechatronics

General Ed:		21 units		
Core Courses:		37 units		Type of Change
COM SC-121	Fundamentals of Programming I	4		N
EL-104 or COM EL-104 or ET-104	Intro to Robotics and Mechatronics	3		N
EL-111 and 112- 8 wk courses	Basic Electronics DC with Lab	2.5		
EL-113 and 114 8 wk courses	Basic Electronics AC with Lab	2.5		
EL-122 and 123	Analog and Op-Amp with Lab	5		
COM SC-141 or EL-125	Computer Fund. in Digital Design	3		M
COM SC-142 or EL-126	Computer Fund. in Digital Design Lab	2		M
MT-330 or WLD-306	Print Reading/Layout & Fab	3		
EL-146 or WLD-189	Fabrication and Project Design	2		
MT-109	Survey of Machining	4		
ET-140	Engineering Drawing	3		
Space-128	Materials and Processes	3		37
Specialty Courses:		15 units		
COM SC-122 or COM SC-175	Fundamentals of Programming II Object-Oriented Programming	3		N M
COM SC-164	Software Engineering	3		N
EL-105 or COM SC-105 or EL-320 or COM SC-320	PC Preventive Maintenance & Upgrade Computer Maintenance Certification	3		
EL-106 or COM SC-106	Networking Essentials 1	3		
EL-107 or COM SC-107	Networking Essentials 2	3		
EL-128 or COM EL-128 or ET-128	Renewable Energy	2		N
EL-131 or COM EL-131 or ET-131	PLCs	3		N
EL-132 or COM EL-132 or ET-132	Fiber Optics	3		n
EL-133 or COM EL-133 or ET-133	Transducers and Sensors	3		N
EL-134 or COM EL-134 or ET-134	Signal Processing	3		n
EL-137 or COM SC-137	Microcontroller Systems	4		
EL-138 or COM EL-138 or ET-138	Intro to MC68000 Microprocessor Family	3		N
EL-139 or COM EL-139 or ET-139	Motors, Rotating Machinery	3		N
EL-148 or COM SC-148	Mechatronic Systems	4		
EL-160 or COM EL-160 or ET-160	Fluid Power and Control	2		N
ET-100	Computer Aided Drafting and Design	3		
ET-150	Descriptive Geometry	3		
MT-110	Machine Tool Practices	4		
Physics 100 or 110 or PHY SC 111	Basic Physics Matter, Energy, and Molecules	3/4		
Space-104	Quality Management Control and Safety	3		
WLD 106	Beginning Welding	3		
WLD 107	Advanced Welding	3		
WLD 307 or 308	GMAW - TIG Welding	3		
WLD 315	Metal Fabrication	4		
Degree Units:		73 units		

N ⇒ new course; n ⇒ in progress; M ⇒ major modification to existing course