MEMORANDUM OF AGREEMENT

BETWEEN THE

AIR FORCE INSTITUTE OF TECHNOLOGY

AND THE

AIR FORCE RESEARCH LABORATORY

1. **BACKGROUND:** The Air Force Research Laboratory (AFRL) and the Air Force Institute of Technology (AFIT) have a long history of mutually supportive activities and beneficial cooperation, motivated by a common interest in maintaining and advancing the technological superiority of the Air Force. Lab personnel have held adjunct faculty appointments in AFIT, sponsored research and served as advisors to AFIT on a wide range of academic and research issues. AFIT student research has supported lab research programs and AFIT faculty members have developed research and educational programs to support the lab community. The two groups have shared co-located libraries and research facilities. Both organizations have an interest in enhancing their collaboration by establishing a holistic approach to include repeatable processes with specific goals that are assessed at a strategic partnership review on a regular basis.

2. **PURPOSE:** The purpose of this Memorandum of Agreement (MOA) is to establish a strategic, long-term partnership between AFRL and AFIT to: (1) jointly develop the expertise and competencies of personnel in research areas of mutual interest, (2) define the support required for major collaborative research programs and shared facilities, (3) regularly review and highlight the accomplishments of the partnership, and (4) identify opportunities for multi-partner teaming with other organizations to accomplish research objectives. The AFIT/AFRL strategic partnership will provide career broadening and developmental opportunities for employees, and stimulate mutual cooperation on the part of both organizations toward the accomplishment of their respective missions. This MOA will incorporate and supersede existing AFRL/AFIT MOA's and MOU's as indicated in the following sections.

3. **PRINCIPLES OF AGREEMENT**: While AFIT and AFRL technology directorates have performed coordinated research programs for many years, AFRL and AFIT seek the mutual benefits that can be attained from this partnership to include the following initiatives.

AFRL and AFIT agree to:

a. Establish primary POCs for overall management of this MOA and its execution. The primary POCs will meet at least quarterly to review the status of action items related to this MOA, including pending and current personnel exchanges. The POCs will also serve as an interface between the members of the working group established in item 3.c, and will assist the working group with initiatives. The POCs will coordinate the inclusion of new Partnership Agreements (see item 3.d) in this MOA as the need arises, and will be cognizant of additional agreements involving AFIT, AFRL, and third party organizations.

b. Establish key periodic events to stimulate constructive interaction between AFRL/AFIT personnel. This shall be established through the following activities:

i) Partnership Summit – Annual meeting of AFIT/CC and AFRL/CC to review this MOA, assess the progress of initiatives, and review/approve new initiatives. The summit will typically occur in the summer.

ii) AFRL/AFIT Interchange Meeting – Annual event in early fall to provide AFRL researchers and AFIT faculty with orientation briefings, information about current research thrusts, new initiatives, opportunities for collaboration, and facilities tours. A social event will typically follow the formal event.

iii) Tech Days – Annual event(s) designed for AFIT students, to provide overviews of current AFRL Technical Directorate (TD) research agendas, present thesis topic requests, and to discuss Science and Engineering (S&E) career management and assignment opportunities. These presentations may be concurrent with the AFRL/AFIT Interchange Meeting, incorporated into AFIT seminar schedules, or arranged as special events.

c. Establish Partnership Working Group – A Partnership Working Group composed of the AFRL Chief Technologist, AFRL Chief Scientists, AFIT Graduate School Deans and Department Heads, or their representatives will

i) identify POCs for thesis topic requests and presentations,
ii) review personnel exchange opportunities,
iii) identify opportunities for collaborative in-house research initiatives and facilities sharing,
iv) facilitate increased AFIT/AFRL participation in multi-institutional collaborative research efforts to leverage a broad base of expertise and resources from civilian institutions/universities, industry, other DoD and Government research partners. Facilitation shall include identifying appropriate means to increase awareness, advertise and encourage participation, provide tracking/assessment opportunities and recognition for participants.
v) discuss AFIT graduate program curricula and AFRL distance learning requirements, and
vi) provide annual updates of activities for the Partnership Summit

Members of the Partnership Working Group will, whenever possible and appropriate, utilize other existing groups such as strategic technology working groups, focused long-term challenge teams, or graduate program reviews to further the goals of the AFRL/AFIT strategic partnership while minimizing duplication of effort. AFRL and AFIT personnel are encouraged to identify possible opportunities for expanded collaboration to the Partnership Working Group member via the appropriate chain of command.

d. Establish Partnership Agreements – Partnership Agreements will address details of long-term collaborative or support arrangements between AFRL and AFIT involving significant resources, and will be included as attachments to this MOA. Goals and accomplishments related to Partnership Agreements will be reviewed annually at the Partnership Summit. Responsibility for updates and operation of the Partnership Agreements listed below and in the following sections is delegated to the identified POCs. Short duration, "ad hoc" agreements consistent with the purposes of this MOA and existing organizational approval processes are encouraged, and do not require explicit inclusion here. The primary POCs for this MOA will review multi-year arrangements requiring resources exceeding $100k/yr to determine the need for initiating formal Partnership Agreements. The AFIT Research Support Fund agreement **(Attachment 1)** provides AFIT with resources that allow AFIT researchers to contribute to the Air Force basic research program. The agreement facilitates new faculty start-ups and development of new areas of research.

(1) AFRL POC: Chief, External Program and Resources Interface (Dr. Kathleen Kaplan, Director, External Programs, AFOSR/PIE, For Basic Research Partnership Only)
(2) AFIT POC: Dean for Research (Heidi R. Ries, AFIT/ENR)

e. Facilitate Scientists and Engineers Personnel Exchange Programs to provide a framework for assignment exchanges between AFIT and AFRL of various durations (**Attachment 2)** for relevant Partnership Agreement.) The goal for each organization's participation in this program will be established annually and reviewed at the Partnership Summit. Each organization will identify appropriate mechanisms for incentivizing participation in these programs. This section supersedes MOUs previously in effect between individual AFRL Directorates and AFIT entitled "Joint Assignment of Scientists and Engineers".

(1) AFRL POC: Technical Advisor (Mr. Jerry L. Straw, AFRL/XP)
(2) AFIT POC: Dean for Research (Heidi R. Ries, AFIT/ENR)

f. Share Research Tools/Infrastructure. Significant sharing of library and laboratory resources between AFRL and AFIT has provided ongoing cost containment for both organizations. It is likely that there are additional, mutually beneficial opportunities for leveraging information technology, sharing software, libraries, laboratories and test equipment. Long term collaborative usage shall be documented, with mutual costs and benefits reviewed at the Partnership Summit. Both organizations encourage ad hoc usage of facilities and equipment on a non-interference basis, with mutually agreed upon support of incremental costs.

i) Library Space and Resource Sharing: Participating institutions are the AFIT Academic Library and the AFRL-Wright Research Site Technical Information Division comprised of the Technical Library, Scientific Technical Information Office (STINFO), and Technical Editing Groups. The MOU "Library Space and Resource Sharing Between AFIT and the AF Research Laboratory – Wright Research Site" **(Attachment 3)** is the result of space planning decisions coordinated through 88 Civil Engineering Group in response to AFRL space requirement Decision Agreement MOA Work Request 96546, 27 Mar 97. Through the MOU, the two libraries are co-located in Bldg 642 and cooperate in all areas of joint services as agreed upon and consistent with licensing arrangements. The POCs for the library MOU, which is hereby adopted as a Partnership Agreement, shall annually update the agreement for review at the Partnership Summit and provide recommendations for continued improvement.

(1) AFRL POC: Lead Librarian, Det 1 AFRL (Ms. Kristen A. Campbell, AFRL/WSC)
(2) AFIT POC: Associate Dean for Academic Affairs (Dr. Paul Wolf, AFIT/EN)

ii) Institutional Review Board (IRB): The Partnership Agreement for Institutional Review Board **(Attachment 4)** support provides a single process for human subject research review in the two organizations, eliminating the necessity of establishing a second IRB at AFIT and facilitating joint projects. The POCs for the IRB agreement shall annually review the MOA and provide relevant updates at the Partnership Summit.

(1) AFRL POC: Lt Andrew DiBella, 711th HPW/IR
(2) AFIT POC: Dean for Research (Dr. Heidi Ries, AFIT/ENR)

iii) Center for Rapid Product Development (CRPD): Establishes collaborative relationships between the Sensors Directorate in AFRL (AFRL/RY), Department of Systems and Engineering Management (AFIT/ENV) and other AFIT resources to jointly support, pursue, and demonstrate rapid application of maturing technologies to solve urgent operational Air Force problems. The CRPD **(Attachment 5)** is one element of AFRL's network of rapid prototyping solution providers that also provides AFIT students opportunities to apply knowledge and principles learned through graduate education to hands-on development efforts.

(1) AFRL POC: Mr. Vince Parisi, AFRL/RYZ
(2) AFIT POC: Dr. Adedeji Badiru, AFIT/ENV

iv) Program For AFRL-ANT Center Collaboration. This program will provide a framework for collaborative research involving the laboratory facilities, faculty, students and staff of the Advanced Navigation Technology (ANT) Center of the AFIT Graduate School of Engineering and Management and the scientists and engineers of the AFRL. (**Attachment 6**)

(1) AFRL POC (Management): Dr Stewart L. DeVilbiss, AFRL/RYR
(2) AFRL POC (Technical): Neeraj Pujara, AFRL/RYR
(3) AFIT POC (Management): Dr. Michael A. Caylor, AFIT/EN
(4) AFIT POC (Technical): Dr John F. Raquet, AFIT/ENG

v) Equipment Sharing: Establishes a cooperative research arrangement between AFRL and AFIT to share laboratory assets and equipment as appropriate opportunities arise. The various AFRL and AFIT POCs are provided for each of the examples listed in (**Attachment 7**)

(1) AFRL POC: Christopher A. Bozada, AFRL/RYD
(2) AFIT POC: Dr. Nathaniel Davis, AFIT/ENG

vi) AFIT Space Propulsion Research Establish a cooperative relationship between the Space and Missile Propulsion Division of AFRL's Propulsion Directorate and AFIT's Department of Aeronautical and Astronautical Engineering for the ongoing support of rocket propulsion research to include the micro satellite propulsion, satellite propulsion simulator, combustion research and associated research studies. (**Attachment 8**)

(1) AFRL POC: Michael T. Huggins, AFRL/RZS
(2) AFIT POC: Major Richard D. Branam, AFIT/ENY

g. Inform each organization through the primary POCs of meetings where participation is encouraged that will enable cross-pollination of research opportunities. Appropriate opportunities may include technical reviews, curriculum reviews, advisory board meetings, and ad hoc working group meetings to develop new research initiatives or facilities plans. Levels of participation may range from informational to formal board membership.

h. Investigate opportunities, to include Fellowship/Scholarship programs, to attract students/personnel to both AFIT and AFRL as an attractive career.

i. Investigate and establish AFIT education opportunities for AFRL within each organization's funding capabilities. AFRL and AFIT will jointly develop educational programs, tailored to the unique needs of AFRL through distance learning or on-site courses. A working group shall be established to determine market for needs at each site, develop a business plan, and make recommendations on an annual basis at the Partnership Summit.

j. Cooperate on engagement with international partners. AFRL and AFIT will share opportunities for collaboration with foreign research institutions, to include coordination in the planning phase of technical assessment visits, sharing of trip reports, and involvement in data and information exchange agreements, where appropriate. AFRL and AFIT will cooperate on the development of collaborative projects with foreign defense research institutions, where appropriate.

k. Information Disclosure. AFIT and AFRL agree to comply with all information disclosure and STINFO regulations and guidance including DoDD 5230.9 which states in part at para 4.2., that it is DoD policy that any official DoD information intended for public release that pertains to military matters, national security issues, or subjects of significant concern to the DoD shall be reviewed for clearance by appropriate security review and public affairs offices prior to release.

4. IMPLEMENTATION/AUTHORITY:

a. All costs associated with implementation of this agreement should be clearly identified, including the organizations responsible for providing the funds.

b. This MOA shall be effective and binding from date of the last signature until cancelled in writing. Plans for cancellation shall be coordinated with three months (90 days) prior notice.

c. This agreement and its attachments shall be reviewed annually by key personnel (Commander and supporting Department Heads/Technical Directors) to determine if any changes or amendments should be incorporated. This agreement must be annually reviewed and a funding annex done on attachments as required IAW AFI 25-201, *Support Agreement Procedures*, para 5.4.1. and AFI 65-601, *Budget Guidance and Procedures*. Management POCs are authorized to implement mutually agreed upon changes to attachments that are within their normal scope of authority

SIGNATURES:

PAULA G. THORNHILL
Brigadier General, USAF
Commandant
Air Force Institute of Technology (AETC)
Wright-Patterson AFB OH
Date: 16 MAR 09

CURTIS M. BEDKE
Major General, USAF
Commander
Air Force Research Laboratory (AFMC)
Wright-Patterson AFB OH
Date: 2 APR 09

ATTACHMENT 1

(AFRL/AFOSR – AFIT/EN)

PARTNERSHIP AGREEMENT: AFIT RESEARCH SUPPORT FUND

1. Purpose: The purpose of the Air Force Institute of Technology (AFIT) Research Support Fund is to provide AFIT with resources that allow AFIT researchers to contribute to the Air Force basic research program. Participants should typically be faculty members, postdoctoral research associates, and Ph.D. candidates. Results must be published in refereed journals.

2. Policy:

a. Selection of Research Projects. AFIT will solicit proposals from its graduate school faculty and research centers in April of each year, and will submit proposals to AFOSR by the AFRL intramural program submission deadline. Research proposals will be prepared and processed IAW AFOSRI 61-7, Initiating and Reporting of Basic Research within AFRL, dated 25 Feb 2008.

b. Funds. Subject to Congressional appropriations and availability of funds, the Air Force Office of Scientific Research (AFOSR) agrees to make available to AFIT, in a central fund, up to $350,000 from the Defense Research Sciences PE 601102F. This amount consists of $250,000 which is available for funding the first year of a three year research effort, and is subject to AFOSR approval as described in Out year funding for approved proposals will come directly from AFOSR directorate project funds.

c. The remaining $100K is provided for travel expenses for outside researchers to speak at AFIT, support of new faculty research at the discretion of AFIT's Dean for Research, visiting faculty, or similar initiatives to enhance the AFIT research environment.

d. In addition to central funds, AFOSR's directors may elect to fund proposals from their directorate project funds. These proposals may be either proposals submitted but (although qualified) not selected for funding from the central AFIT fund or proposals submitted directly to the scientific directors.

e. Unless other expenditure guidance is subsequently established via an applicable Broad Agency Announcement (BAA) or written agreement, the following conditions apply to research project funding:

(1) AFIT will use the funds on AFOSR approved projects.

(2) Expenditures of AFOSR funds for AFIT research shall be limited to the following:

- Specific and miscellaneous supplies, equipment, and services identified with an approved project.
- Up to full-time salary and benefits or contract costs for postdoctoral research associates, civilian graduate students, research assistants, or other project personnel specifically identified in proposal budgets or subsequently authorized by AFOSR program managers.
- Travel directly related to performance of research such as gathering data or consultation with experts at distant sites, and to attend technical conferences and symposiums relevant to the approved project.

ATTACHMENT 1 (CONT.)

- Shop work and other specialty services essential to the research project.
- Up to two months' salary and benefits at the usual rates for civilian faculty who are on a 10-month employment contract. AFIT faculty whose non-contract salary is paid by AFOSR shall not receive salary from any other Federal source for the same period (i.e., double charging).
- Direct incremental research costs in accordance with the Air Force Audit Agency guidelines.
- Payment of honoraria, if any, must conform to current public law, statute, and applicable Office of Government Ethics rules.
- Travel and per diem expenses for invited speakers.

(3) At its discretion, AFOSR may perform a review of research performed by AFIT.

(4) In accordance with law, AFIT may not enter into any contract, grant, or cooperative agreement (or similar arrangement) with an overhead rate exceeding 35% of the value of that contract, grant, or cooperative agreement using DOD basic research funds.

3. Proposals Submitted in Response to Specific Broad Area Announcements (BAAs): Research proposals, not intended to use the AFIT central fund, may be directly submitted to AFOSR's scientific directorates. Such submissions will conform to the guidelines spelled out in specific AFOSR BAAs. e.g. Young Investigator Program. AFOSR will evaluate proposals in competition with proposals received from the US academic community and the private sector.

4. National Research Council (NRC) Resident Research Associateship Program: Under a contract with NRC maintained by AFOSR, postdoctoral research associateships are available for persons who have held the doctorate less than five years at the time of application and are made initially for one year but may be renewed for up to two additional years. NRC maintains all program information on their website: www.national-academies.org/rap NRC accepts applications year round.

5. AFIT faculty may serve as advisors for the NRC associates, subject to NRC approval of advisor nominations and availability of AFOSR or other funding. As the NRC Laboratory Program Representative for AFIT, the AFIT Dean for Research is responsible for assisting a research associate placed at AFIT with all administrative aspects of tenure.

6. Administrative Procedures:

a. The AFOSR point of contact is the Directorate for External Programs and Resources Interface AFOSR/PIE. The AFIT point of contact is the Dean for Research in the Graduate School of Engineering and Management, AFIT/ENR.

b. AFOSR issues AFIT research support funds to AFIT/ENR on a reimbursable basis using AF Form 185. If any funding document specifies travel only, AFOSR may send those funds as direct-cite

ATTACHMENT 1 (CONT.)

funds using AF Form 616. AFIT will coordinate all travel arrangements for invited speakers in accordance with standard DoD travel regulations and processes.

c. AFIT will notify AFOSR of any unobligated and unexpended research support funds not later than 30 days before the end of the fiscal year for which funds were issued. AFOSR will recover surplus funds at that time. AFIT will provide current status of research support funds to AFOSR as needed throughout the year.

d. The period of performance shall be one year, typically 1 Nov to 31 Oct. The funding document must be received at AFIT 15 days prior to the start of the period of performance.

7. Reporting: Progress, results and accomplishments will be reported to AFOSR annually in the format used for laboratory research tasks (see AFOSRI 61-7, Annual Task Reports).

For more information or inquiries please contact:

Dr. Kathleen Kaplan
AFOSR/PIE
Phone: 703-696-7312
kathleen.kaplan@afosr.af.mil

Heidi R. Ries, PhD
AFIT/ENR
Phone: 937-255-3636 x 4544
heidi.ries@afit.edu

ATTACHMENT 2

(AFRL – AFIT)

PARTNERSHIP AGREEMENT: SCIENTISTS AND ENGINEERS PERSONNEL EXCHANGE PROGRAM

Overview

The purpose of the AFIT/AFRL Personnel Exchange Program is to provide professional development and foster greater research relationships between AFRL and AFIT scientists and engineers. The goal of the program is to provide AFIT/AFRL personnel with an opportunity to participate in a career broadening assignment and to further develop defense-related research expertise. The assignments may involve the employee working a dual work situation, where he/she maintains work efforts in both organizations or up to a full detail at the gaining organization for a specified period of time. At the end of the research tour, employees will return full-time to their home organization. Exceptions will be negotiated by mutual agreement of all parties concerned. No grade level restrictions will exist; participation must be based on demonstrated level of performance required by management. The assignments will be processed as official Detail actions.

This program provides the framework for assignment opportunities and/or exchanges involving faculty of AFIT's Graduate School of Engineering and Management and AFRL scientists and engineers. This document describes the two AFIT and AFRL exchange programs.

AFRL Faculty Research Fellowship (AFRL-FRF)

The intent of the AFRL Faculty Research Fellowship (AFRL-FRF) program is to provide graduate faculty, who have limited AFRL research experience, an opportunity to engage in research at one of the participating AFRL Directorates. In addition, the AFRL-FRF program provides a funded sabbatical opportunity for senior AFIT faculty. AFRL-FRF research experiences support the AFRL vision and mission to "Defend America by unleashing the power of innovative science and technology" and to "Lead the discovery, development, and integration of affordable war fighting technologies for our air and space force." For more information about AFRL and the AFRL Directorates, please visit http://www.afrl.af.mil/ .

The funding for participation of research fellows will be negotiated between AFRL and AFIT in each case. Typically, AFRL will fund research costs and a portion of salary for extended assignments. AFIT will typically fund a portion of salary costs for junior faculty during their initial term appointment, and for senior faculty selected for a sabbatical.

Any selected faculty and corresponding AFRL colleague interested in adding a student to the team must provide the necessary funds and office space. Students are selected by the faculty and the AFRL colleague and cannot apply to this program.

Research fellowships are awarded to qualified faculty members in science, technology, engineering, logistics or management disciplines for work on collaborative research projects of mutual interest to the fellow and the AFRL Directorate. Each research fellow will work with a colleague from the AFRL Directorate.

The AFRL Faculty Research Fellowship Program is jointly administered by the AFRL and AFIT.

ATTACHMENT 2 (CONT.)

Award Size and Duration

A typical research fellowship award is expected to provide funding for the following:

1. The faculty member's salary during the research period which may range from 3-6 months.
2. TDY expenses to those research fellows who are assigned to a Directorate not located on WPAFB. In addition, AFRL will provide TDY funds for *3* return trips during each 3-month period of the research fellowship.
3. Research related travel expenses.
4. Additional equipment or resources that may be required to accomplish the research objectives.

Note: The additional funding will be determined on a case-by-case basis.

The AFRL-FRF Program is an essential part of AFRL/AFIT Strategic Partnership. Thus the opportunity exists for an AFRL-FRF Fellow to extend his/her fellowship past the scheduled 3-6 month period.

AFIT graduate faculty who are selected to conduct research at AFRL on at least a half-time basis will be accorded either Senior Research Associate (full Professors) or Research Associate (Associate or Assistant Professor) status, with the privileges and responsibilities associated with regular AFRL scientist and engineer assignments.

Selection of an AFIT participant to lead an in-house research project as part of the AFRL assignment requires the concurrence of the home supervisor if the expected completion date is subsequent to the expiration of the research fellowship action. Such concurrence constitutes a commitment to permit the AFIT participant to complete his/her duties as project leader after returning to AFIT.

Eligibility

All faculty applications must originate from AFIT's Graduate School of Engineering and Management in areas related to science and engineering.

Faculty Applicants

Faculty applicants must meet all of the following criteria at the time the application is submitted:

Faculty applicants must be full-time tenured or tenure-track faculty members. A Ph.D. in an engineering, mathematics, science, logistics or management discipline applicable to AFRL research and/or technology development needs is highly desirable. In addition, faculty applicants must already possess the clearance level required to conduct the proposed research. Previous AFRL Faculty Research Opportunities Program (AFRL-FRF) participants who have completed no more than one quarter in the AFRL-FRF program since 2005 may apply. Finally, applicants must not be a former AFRL principal investigator receiving more than $300,000 of AFRL funding in the past five years (Applicants who are current/former principal investigators or co-investigators on AFRL research awards must identify the amount of funding from such awards that support or have supported their part of the research). AFIT faculty eligible for a sabbatical may request a waiver of these criteria.

ATTACHMENT 2(CONT.)

Submission Limitations

- There is no limitation on the number of applicants from any single AFIT department.
- Eligible faculty may apply for a research fellowship at no more than two AFRL Directorates.
- Faculty members who have yet to attain tenure are limited to utilizing this opportunity for their intercessional period only.

Expected Outcomes for AFRL-FRF Awards

Based on the research conducted, the following outcomes are expected and will be evaluated at the end of the research period by the selected Directorate's technical leadership:

The AFRL-FRF Fellow will:

1. Complete at least one 3 month research fellowship at one of the participating AFRL Directorates.
2. Co-author one or more papers between the AFRL-FRF Fellow and the AFRL research colleague if appropriate.
3. Write a brief (5 page) final report.
4. Conduct a research seminar at the AFRL Directorate near the completion of the research fellowship period.
5. Work with the AFRL research colleague to identify future research funding and opportunities for AFIT students.

The AFRL research colleague will:

1. Provide the AFRL-FRF Fellow with opportunities to participate in cutting-edge research that contributes to the world's premier Air Force and to his/her understanding of the AFRL vision and mission.
2. Assist the AFRL-FRF Fellow to identify future research funding and opportunities for AFIT students.

Application Schedule and Procedures

Completed applications for AFRL Faculty Research Opportunities must be submitted annually to AFIT/ENR by 4:00 p.m. Eastern Time, 1 May for selection consideration.

Application instructions

A complete application package consists of the following:

- Letter of endorsement from candidate's Department Head
- Curriculum Vitae, limited to 5 pages, including
  - Contact Information
  - Colleges attended, with dates of attendance and degrees received, field, and titles, of theses and dissertations.
  - Chronology of professional employment and significant academic and professional activities
  - List of publications. List referred journal articles separately from reports, abstracts, paper in conference proceedings, etc.
  - Research experience.

ATTACHMENT 2(CONT.)

  - Courses taught
  - References
- Research Proposal including
  - executive summary
  - statement of work including
    - period of performance
    - intended AFRL location and proposed research colleague contact information (if available)
  - deliverables
  - budget
- Statement of Academic Benefit (description of how the AFRL FRF will benefit teaching and research activities at AFIT, i.e. new course, new curriculum, new research project)
- Listing of AFRL funding (project title, sponsoring office, and amount) pending in current fiscal year, and received in current plus previous five fiscal years
- Optional Survey

Discussion of proposed research with appropriate AFRL Directorate personnel before submission of an application for that AFRL Directorate is strongly encouraged.

Evaluation criteria

Applications will be evaluated based on the following criteria: Relevance and Intrinsic Merit of the Research, Faculty Applicant Qualifications, and Academic Benefit.

1. Relevance and Intrinsic Merit of the Research: Relevance of the research interest statement to an AFRL research topic -- including relative importance to the particular AFRL Directorate -- and the potential contribution to the AFRL missions. (40%)
2. Faculty Applicant Qualifications: Qualifications of faculty applicant. Evidence of the researcher's skills, experience, and past accomplishments for capability to participate in an AFRL mainstream research program. (40%)
3. Academic Benefit: Overall academic benefit to the Faculty Applicant and AFIT as described by the Applicant. (20%)

Applications will be evaluated by a joint AFRL/AFIT Board. The AFRL Chief Technologist and the AFIT Dean of the Graduate School of Engineering and Management shall each appoint two board members at the level of Colonel or equivalent civilian rank with relevant expertise. At least one member of the board will be at the SES/ST level. Initial selections will be made by consensus of the board, subject to finalization of funding details.

AFIT Fellowship Research Program (AFIT-FRP)

The intent of the AFIT Fellowship Research Program (AFRL-FRP) is to provide AFRL personnel with an opportunity to engage in research, instruction, and student mentoring in AFIT's university environment. AFIT-FRP research experiences support the AFRL vision and mission to "Defend America by unleashing the power of innovative science and technology" and to "Lead the discovery, development, and integration of affordable war fighting technologies for our air and space force." For more information about AFRL and the AFRL Directorates, please visit http://www.afrl.af.mil/ .

ATTACHMENT 2(CONT.)

The participation of AFIT-FRP Fellows shall be funded by AFRL.

Any selected AFIT-FRP Fellow and corresponding faculty interested in adding a student to the team must provide the necessary funds and office space. Students are selected by the AFIT faculty and the AFRL research fellow and cannot apply to this program.

AFIT-FRP Fellowships are awarded to qualified AFRL members in science, technology, engineering, logistics or management disciplines for work on collaborative research projects of interest to AFRL. Each AFRL research fellow will work with a faculty colleague from AFIT.

The AFIT Fellowship Research Opportunities program is jointly administered by the AFRL and AFIT.

Award Size and Duration

A typical research fellowship award is expected to be $10,000 - $30,000 for a 3 – 6 month period to cover research related expenses and will be determined on a case by case basis. The selected AFIT-FRP Fellow's TDY expenses will be provided by the AFRL Directorate for those AFRL research fellows who are not from WPAFB. In addition, the AFRL Directorate will provide TDY funds for 3 return trips during each three months of the research fellowship.

The Exchange Program is an essential part of AFRL/AFIT Strategic Partnership. Thus the opportunity exists for an AFIT-FRP to extend their research fellowship past the scheduled period.

For AFRL research fellows who are selected to conduct research at AFIT on at least a half-time basis, AFIT will:

i) Provide office space, laboratory space (subject to availability), and general administrative support for the AFRL research fellow.
ii) Accord visiting faculty status, via AFIT's Standard Promotion and Tenure Committee process. This status conveys typical faculty privileges with the exception of academic tenure and Faculty Council voting rights.
iii) Allow the visiting professor to chair thesis and dissertation committees, subject to AFIT's standard qualification and approval processes. Due to the necessity of providing continuity for students, the AFRL supervisor must agree to permit the research fellow to continue advising responsibilities upon his/her return to AFRL.
iv) Allow the visiting professor to teach relevant graduate courses.

Eligibility

All AFRL applications must originate from AFRL in areas related to the science and engineering technical areas (except for those engineers who are bargaining unit employees and until those bargaining unit obligations have been met).

AFRL Applicants

AFRL applicants must meet all of the following criteria at the time the application is submitted:

A Ph.D. in an engineering, mathematics, science, logistics or management discipline applicable to AFRL research and/or technology development needs is highly desirable. Previous AFIT Fellowship Program

ATTACHMENT 2(CONT.)

(AFIT-FP) participants who have completed no more than one quarter in the AFIT-FP program since 2005 may apply.

Submission Limitations

- There is no limitation on the number of applicants from any AFRL Directorate.
- Eligible personnel may apply for a research fellowship at no more than two AFIT Departments.

Expected Outcomes for AFIT-FRO Awards

Based on the research conducted, the following outcomes are expected and will be evaluated at the end of the research period by the selected Directorate's technical leadership:

1. Complete at least one research fellowship at AFIT.
2. Co-author at least one paper between the AFIT-FRO research fellow and the AFIT research colleague.
3. Write a brief (5 page) final report.
4. Conduct a research seminar at the AFRL Directorate near the completion of the research fellowship period.
5. Provide AFRL personnel with opportunities to participate in cutting-edge research that contributes to the world's premier Air Force.
6. Understanding of the AFIT vision and mission and requirements to support the overall Air Force mission.
7. Identification of future research funding opportunities to be conducted between AFRL and AFIT.
8. Identification of AFRL opportunities for AFIT students.

Researchers who have made a significant contribution to the overall body of scientific knowledge as a result of the research conducted are eligible for special recognition, such as a Special Act/Service award, Civilian Achievement Award, or other appropriate service awards. If an award is given, it will be at the discretion of the Technical Director over the Directorate sponsoring the research. Funds for any award granted will be sourced by the owning Directorate.

Application Schedule and Procedures

Completed applications for AFIT Faculty Research Opportunities must be submitted annually to AFRL/XP by 4:00 p.m. Eastern Time, 1 May for selection consideration.

Application instructions

A complete application package consists of the following:

- Resume/Curriculum Vitae, limited to 5 pages, including
  - Contact Information
  - Colleges attended, with dates of attendance and degrees received, field, and titles, of theses and dissertations.
  - Chronology of professional employment and significant academic and professional activities
  - List of publications. List referred journal articles separately from reports, abstracts, paper in conference proceedings, etc.
  - Research experience

  - Current research funding
  - Courses taught
  - References
- Research Proposal including
  - executive summary
  - statement of work including
    - period of performance
    - intended AFIT location and proposed research colleague contact information (if available)
  - deliverables
  - budget
- Statement of Teaching Interest
- Statement of Benefit to AFRL
- Contact information for AFIT faculty colleague (if applicable)

Discussions of proposed research with appropriate AFIT personnel before submission of an application for that AFIT Department is strongly encouraged.

Evaluation criteria

Applications will be evaluated based on the following criteria: Relevance and Intrinsic Merit of the Research, Applicant Qualifications, and Research Benefit.

1.0 Relevance and Intrinsic Merit of the Research: Relevance of the research interest statement to an AFRL research topic -- including relative importance to the particular AFRL Directorate -- and the potential contribution to the AFRL missions. (40%)
2.0 Applicant Qualifications: Qualifications of AFRL applicant. Evidence of the researcher's skills, experience, and past accomplishments for capability to participate in an AFRL mainstream research program. (40%)
3.0 Research Benefit: Overall research benefit to the Applicant and to AFRL as described by the Applicant. (20%)

Applications will be evaluated by a joint AFRL/AFIT Board. The AFRL Chief Technologist and the AFIT Dean of the Graduate School of Engineering and Management shall each appoint two board members at the level of Colonel or equivalent civilian rank with relevant expertise. At least one member of the board will be at the SES/ST level. Initial selections will be made by consensus of the board, subject to finalization of funding details.

For more information or inquiries please contact:

Jerry L. Straw
AFRL/XP
Phone: 937-656-9059
Jerry. Straw@wpafb.af.mil

Heidi R. Ries, PhD
AFIT/ENR
Phone: 937-255-3636 x 4544
Heidi.Ries@afit.edu

ATTACHMENT 3

(AFRL – AFIT)

PARTNERSHIP AGREEMENT: MANAGEMENT AND OPERATION OF THE JOINT AFIT/AFRL LIBRARY

1. **INTRODUCTION**: Participating institutions are the Air Force Institute of Technology (AFIT) and the Air Force Research Laboratory (AFRL) Wright Research Site (referred to as the parent organizations). This agreement is the result of an AFSO21 Rapid Improvement Event (RIE) and is based on the space planning decisions coordinated through 88th Civil Engineering Group in response to AFRL space requirement "MOA Between 88th Civil Engineer Group and Wright Laboratory Work, Request #96546", 27 Mar 1997 and the "Decision Agreement to Provide Temporary Space to the Wright Research Site Technical Information Division (Det 1 AFRL/WST), Tracking No.980101", 11 Mar 1998.

2. **PURPOSE**: The purpose of this agreement is to define the cooperative working relationship between the parent organizations for the joint operation of the library.

3. **PRINCIPLES OF AGREEMENT:**

3.1. Organization: Joint management and operational processes will be established to support the library within the confines of the legal requirements; i.e. accountability, Air Force Federal Library (FL) number designations, staffing, and funding/fund transfer/etc.

3.2 Joint Services: The library shall be jointly managed in a cooperative environment. Two joint planning groups and one board, each chartered by a cooperative agreement, are established to address the following:

- Strategic Planning – e.g., developing long-term goals, operational support, facilities, funding, information resource sourcing, out-reach, marketing, staff professional development, and other issues.
- Operational Planning – e.g., short-term budget execution, metrics reporting, customer support/education, and other issues requiring resolution.
- Customer Advisory Board – e.g., feedback from users (issues, problems, requirements)

Other joint groups or boards may be created as the need arises.

3.3. Maintenance:

a. Facility: The parent organizations shall coordinate to achieve agreement regarding any facility changes that may impact the operations of either organization.

b. Equipment: Equipment maintenance expense remains the responsibility of the organization owning or leasing the equipment.

c. Operations: Each organization shall provide staffing as needed to cover the parent organization's core operating hours.

3.4. Financial Resources: Funding for the joint operation of the library shall continue as separate lines to provide distinct services for each parent (funding) organization. The parent organizations shall retain responsibility for all costs and expenses of information delivery for their respective

ATTACHMENT 3 (CONT.)

organizations and each library staff shall remain accountable to its parent organization for program budgeting decisions.

4. **IMPLEMENTING AGREEMENTS**: The library management shall document implementing charters and agreements covering specific services. Specific charters are attached to this partnership agreement as Appendices 1-3.

5. **ISSUE RESOLUTION**: Issues in dispute and not resolved by library management shall be raised through the respective organizational chains.

6. **PERIOD OF PERFORMANCE**: This MOA shall become effective upon signature and shall be reviewed annually by library management.

7. **POINTS OF CONTACT**:

AFIT	AFRL
Paul J. Wolf, Ph.D.	Kristen Campbell
Associate Dean for Academic Affairs	Lead Librarian
255-6565 x4216	255-2419
paul.wolf@AFIT.edu	kristen.campbell@wpafb.af.mil

ATTACHMENT 3

Appendix 1

CHARTER FOR THE LIBRARY OPERATIONS WORKING GROUP

1. PURPOSE:

The purpose of this charter is to identify how the Library Operations Working Group (hereafter, just the Working Group) will manage and conduct day-to-day planning and issue resolution activities to enhance the cooperative working relationship between the parent organizations with a focus on improvements that will satisfy joint customer requirements. To accomplish this, the charter outlines the responsibilities and expected interactions of all stakeholders.

2. MEMBERSHIP

The Working Group will be composed of the AFIT 1st line supervisors for Reader Services and Technical Services, the assistant Lead Librarian for AFRL, the AFRL Library Director (contractor), and the AFRL Integrated Library System (ILS) computer support representative. Designees may represent these members, as required. Others may be invited (by either party) to specific meetings when their expertise or guidance is deemed appropriate. Preparing agendas, leading meetings and minute taking will be alternated between organizations.

3. OBJECTIVES AND SCOPE OF ACTIVITIES

The Working Group is charged with addressing day-to-day operational working issues such as, but not limited to:

- Recommendations for funding requirements and operations efficiencies
- Initial customer complaints and resolution
- Routine facility maintenance and support issues
- Operational metrics review
- Minor space utilization issue resolution
- Communication and marketing implementation
- Daily operational support
- Web site and ILS issues

Those issues that deal with policy or that cannot be resolved at the Working Group level will be elevated to upper management for direction or decision.

4. REFERENCES

- Current Air Force Research Laboratory (AFRL) Performance Work Statement (PWS). (A-76)
- Library MOU
- Library Strategic Planning Charter

ATTACHMENT 3

APPENDIX 1 (CONT)

5. CUSTOMERS

Library users include AFIT students, staff, and faculty members; AFRL scientists, engineers, and researchers; as well as other WPAFB employees and guests.

6. DELIVERABLES

- Inputs to short-term (current FY) financial documents including obligations/expenditures, etc.
- Inputs to space utilization Facility Manager
- Short range schedule and roadmap
- Short-term reference and research journal, database, and document acquisitions
- Short-term operational support strategy
- Meeting minutes to include action items and key decision materials

7. MEETINGS

The Working Group will meet not less than quarterly on the first Wednesday of the first month of each FY quarter. Additional meetings may be held as necessary.

8. CHARTER EFFECTIVITY

This charter is effective upon joint AFIT and AFRL approval and will be updated and reviewed at least annually.

PAUL J. WOLF, Ph.D.
Associate Dean of Academic Affairs
255-6565 x 4216
paul.wolf@AFIT.edu

RICHARD A. BISSAILLON
Air Force Institute of Technology
Air Force Research Laboratory
Wright-Site Director

ATTACHMENT 3

Appendix 2

LIBRARY ADVISORY BOARD CHARTER

1. PURPOSE:

The purpose of this charter is to articulate the process by which the combined Library Advisory Board (hereafter, the Advisory Board) will manage and conduct macro-level customer advisory activity. Its purpose is to enhance the cooperative environment between the parent organizations and the research customer and student /faculty member. To accomplish this, the charter will highlight responsibilities and expected interactions of stakeholders.

2. OBJECTIVES:

To create and efficiently operate the joint Advisory Board composed of the appropriate individuals to consider customer issues on a collective basis; address, at a minimum, the following subject areas:

- Joint customer service interactions, policies and contractual issues (improved communication and understanding)
- Enhanced customer experience and resource sharing opportunities
- Outreach marketing and networking activity
- Identification of joint facility, materials, communications (IT) and personnel services requirements
- Exploration of improvements related to new technologies and "State-of-the-Art Information Science" and "Best Practice" models

3. REFERENCES:

(a) Air Force Research Laboratory (AFRL) Performance Work Statement (PWS). (A-76)

(b) Library MOU

(c) Library Operations Charter

(d) Minutes from primary customer feedback groups

4. CUSTOMERS: Library users include AFIT students, staff, and faculty members; AFRL scientists, engineers, and researchers; as well as other WPAFB employees and guests.

5. RESPONSIBILITIES AND ACTIONS:

(a) Purpose of group: defined above

(b) Format/schedule: executive level meetings, as required, and an open "State of the Library" meeting at the start of each new fiscal year.

ATTACHMENT 3

Appendix 2 (Cont)

(c) Membership:

(1) AFIT Library Director and Associate Dean of Academic Affairs

(2) AFRL Library Lead and the Wright-Site Director

(3) Parent organization representatives (as required)

(d) Deliverables, as appropriate:

(1) Joint requirements/concerns listing

(2) Inputs to Space Utilization Process and Facility Manager

(3) Decision and policy packages

(4) State of the Library Science/Art initiative reports

(5) Meeting minutes including action items

7. CHARTER EFFECTIVITY: This charter is effective upon joint approval of the AFRL WS Site-Director and the AFIT Associate Dean of Academic Affairs. The charter will be updated/reviewed annually.

PAUL J. WOLF, Ph.D.
Associate Dean of Academic Affairs
Air Force Institute of Technology

RICHARD A. BISSAILLON
Wright-Site Director
Air Force Research Laboratory

ATTACHMENT 3

Appendix 3

LIBRARY STRATEGIC PLANNING GROUP CHARTER

1. PURPOSE: This charter articulates the objectives and responsibilities of the Joint AFIT/AFRL Library Strategic Planning Group. The group is formed primarily to formulate long-range planning strategies to address issues affecting the welfare of the library and its ability to support the needs of researchers, students, and faculty members. This body will also provide a means to enhance the cooperative working relationship between the parent organizations.

2. OBJECTIVES:

   a. The Joint AFIT/AFRL Library Strategy Planning Group will formulate a long-range planning strategy and coordinate the strategy with their appropriate parent organizations for their respective commander approval. The following subject areas, among others, shall be considered in the planning process:

      (1) Funding requirements and mechanisms
      (2) High-Level Operational Efficiencies
      (3) Service strategies
      (4) Space utilization and planning
      (5) Outreach Marketing
      (6) Long-term operational support
      (7) Metric development
      (8) State-of-the-Art Information Science

   b. Resolve issues from other working groups as necessary.

3. REFERENCES:

   a. Air Force Research Laboratory (AFRL) Performance Work Statement (PWS).
   b. (A-76) Partnership Agreement on the Management and Operation of the Joint AFIT/AFRL Library attached to the AFIT/AFRL MOA
   c. Wright Site Library Operations Charter

4. CUSTOMERS: Library users include AFIT students, staff, and faculty members; AFRL scientists, engineers, and researchers; as well as other WPAFB employees and guests.

5. RESPONSIBILITIES AND ACTIONS:

   a. Purpose of Group: Defined above

   b. Meetings: The Strategic Planning Group shall meet quarterly at an agreed upon location. Additional meets can be scheduled as needed.

ATTACHMENT 3

Appendix 3 (Cont)

c. Membership:

(1) Decision authority rests with the Associate Dean for Academic Affairs (AFIT) and the Wright-Site Manager (AFRL)

(2) Advisors include the AFIT Library Director and the AFRL Library Lead

(3) Parent Organization representatives may attend meetings of the Strategic Planning Group as required or needed.

d. Deliverables:

(1) Strategic planning document defining the out-year goals, objectives, and direction the library.

(2) Inputs to financial planning documents including POM.

(3) Inputs to space utilization process and Facility Manager.

(4) Meeting minutes including action items and key decision materials

6. CHARTER EFFECTIVITY: This charter is effective upon joint AFRL/Det 1 Commander and Dean of the Graduate School (AFIT) approval and will be updated and reviewed annually.

M.U. THOMAS, Dean
Graduate School of Engineering & Management
Air Force Institute of Technology

JOHN B. WISSLER, Col, USAF
Commander
Wright Site Air Force Research Laboratory

ATTACHMENT 4

(711th HPW – AFIT/EN)

PARTNERSHIP AGREEMENT: INSTITUTIONAL REVIEW BOARD

1. PURPOSE: The purpose of this Partnership Agreement is to establish support of the AFRL Institutional Review Board (AFRL IRB) to AFIT for review of proposed research and oversight of research in progress on human subjects. This agreement is designed to ensure resources are expended wisely and minimize unnecessary resource duplication.

2. AUTHORITY: Air Force Instruction 40-402, Protection of Human Subjects in Biomedical and Behavioral Research

3. GENERAL:

a. SCOPE. This Partnership Agreement provides guidance and documents agreement on IRB support by 711 Human Performance Wing to AFIT in regards to research investigations using human subjects. This Partnership Agreement is not intended to supersede existing regulations or agreements.

b. ASSUMPTIONS.

(1) AFRL Instruction 40-402, Protection of Human Subjects in Research, describes local AFRL procedures for implementing Air Force Instruction 40-402, Using Human Subjects in Research, Development, Test, and Evaluation. These instructions supplement Title 32, Code of Federal Regulations, Part 219.

(2) AFRL operates an IRB in accordance with AFRL Instruction 40-402, Protection of Human Subjects in Research, supporting a substantial volume of 711th HPW research. AFIT conducts only a minimal volume of research requiring IRB review and oversight. Use of the AFRL IRB to support AFIT's IRB requirement provides appropriate expertise and administrative support while minimizing cost to the Air Force.

(3) The AFIT Commandant and/or AFIT's Authorized Institutional Official will ensure that AFIT policy and procedures are consistent with AFRL Instruction 40-402. Appropriate AFIT equivalencies as required to reflect differing organizational structures appear in AFIT/EN Operating Instruction 40-1, Protection of Human Subjects in Research.

4. RESPONSIBILITIES:

a. 711 HPW will provide resources and administrative staff to maintain an IRB that includes support of AFIT for review of proposed human research. 711 HPW will assume responsibilities for AFIT as identified in Paragraphs 1.3 (Institutional Review Boards) AFRL Instruction 40-402.

b. In regards to using human subjects in research, development, test and evaluation, AFIT will:

- Assign the Office of Research and Sponsored Programs (AFIT/ENR) to assist the AFRL IRB as required to facilitate this agreement and otherwise ensure compliance with relevant requirements of AFRL Instruction 40-402.

ATTACHMENT 4 (CONT)

- Provide nominations to 711 HPW of IRB Members as requested.
- Conduct reviews of all proposed research to ensure an awareness of the local procedures in regards to using human subjects.
- Nominate faculty members to complete USAF/SGRC Research Reviewer training. Qualified individuals approved by USAF/SGRC may be appointed to serve as AFIT Research Reviewers authorized to review research activities with humans and to make determinations, on behalf of the assigned institution, as to whether an activity is not human research, exempt human research, or non-exempt human research requiring Institutional Review Board oversight.

5. POINTS OF CONTACT:

a. AFIT/ENR: Dean for Research (Dr. Heidi Ries, AFIT/ENR)
b. AFRL POC: Lt Andrew DiBella, 711th HPW/IR

ATTACHMENT 5

PARTNERSHIP AGREEMENT: CENTER FOR RAPID PRODUCT DEVELOPMENT

A Designation: The official designation for this collaborative effort and associated activities is the Center for Rapid Product Development (CRPD).

B. Authority: The parent Memorandum of Agreement (MOA) between the Air Force Institute of Technology and the Air Force Research Laboratory to which this agreement belongs states that, "The AFIT/AFRL strategic partnership will provide career broadening and developmental opportunities for employees, and stimulate mutual cooperation on the part of both organizations toward the accomplishment of their respective missions." The MOA further states that AFRL and AFIT agree to establish partnership agreements to support long-term collaborative interests.

C. Purpose: The purpose of this partnership agreement is to establish collaborative relationships between the Sensors Directorate in AFRL (AFRL/RY) and the Department of Systems and Engineering Management (AFIT/ENV) to jointly support, pursue, and demonstrate rapid application of maturing technologies to solve urgent operational Air Force problems. The CRPD supports a portion of the AFRL, AFIT, and AFMC missions by applying creative technology solutions to Air Force problems. As one element of AFRL's network of rapid prototyping solution providers, the CRPD also provides AFIT students opportunities to apply knowledge and principles learned through graduate education to hands-on development efforts. Joint AFRL/AFIT solutions teams also benefit from experience-based training.

D. Responsibilities: There are two interdependent primary responsibilities for the CRPD.

1) Develop rapid solutions to urgent operational needs as identified through AFRL's rapid reaction process. This includes rapid prototype development and demonstration as well as product incubation and rapid transition to deployment. The principal areas of technical focus are centered on and draw upon local expertise in sensors, air vehicles, air-breathing propulsion, materials, and human interface.
2) Provide graduate education to AFIT students and experience-based training to joint solution teams to prepare individuals to lead rapid product development efforts.

E. Structure: To delineate responsibilities, actual product development and operating activities associated with the center will be under the purview of the Center Director and all graduate education functions will be overseen by the Center Director of Graduate Education.

1) The Center Director will be under the operational control of the Director of AFRL Sensors Directorate, and is accountable for all planning, resource management and the safe, effective and efficient operations of the Center.
2) The Center Director of Graduate Education has responsibility for academic issues and will report to the Head, Department of Systems Engineering and Management, at AFIT. In this capacity, he/she also supports the Center Director to ensure safe, effective, and efficient operations of the Center in accordance with AFRL Sensors Directorate operating procedures.

F. Procedures: CRPD activities must comply with both AFRL and AFIT standard operating procedures. To minimize duplication of effort, and whenever possible, compliance with procedures from one will be considered to have met the intent of comparable procedures from the other organization. The

following procedures are listed as representative procedures that must be followed and should not be considered the sole requirements.

1) CRPD will comply with the AFRL rapid reaction processes for problem selection, solution identification and development and transition planning.
2) The Rapid Reaction (CP3) process owner will provide the primary interface to customers and stakeholders for rapid solution development.
3) CRPD will report status of overall operating performance, resource allocations and expenditures, and individual project performance to AFRL/CC biannually through the CP3 process owner and the Director of AFRL/RY, both of whom may require more frequent status reports at their level.
4) AFRL/RY Safety Office is the primary office for oversight and support of CRPD safety processes and procedures. AFRL/SE and AFRL Wright Site Safety offices will monitor and support AFRL/RY and CRPD requirements as required.
5) CRPD Director is responsible to the Director AFRL/RY for environmental compliance under AFRL policies and procedures.
6) As an office of AFRL/RY, the CRPD is subject to compliance inspections, reviews, and reporting in conjunction with AFRL/RY scheduled activities. The Director of AFRL/RY has full authority to administer additional oversight and/or corrective actions if deemed necessary to ensure compliance.
7) CRPD will conduct risk analysis and safety review processes in accordance with AFRL and Wright Site facility operating procedures. When AFIT students are involved, AFIT may require additional reviews as required; this may include safety related issues as well as the protection of human subjects in research activities.
8) AFIT has full authority over and responsibility for academic issues. To ensure academic rigor, student involvement in projects must complement material presented in classes.
9) AFRL/RYY is the primary office for oversight and support for the CRPD for security policies and procedures.

G. Support: Support for the CRPD will come from AFRL and AFIT.

1) AFRL will provide the leadership and manpower to execute the center's product development activities. AFRL will continue to provide the existing facilities including additional space for staff offices. Computer service and support will be provided by AFRL/RY. AFRL will authorize and fund over-hire slots to the core team. AFRL will provide contracting support and access to appropriate rapid procurement contract vehicles.
2) AFIT will establish and lead the education and training component of the center. Although AFIT students, in conjunction with their educational programs, will represent a significant portion of the center's manpower, academic rigor will not be sacrificed. AFIT equipment and infrastructure established to support the Operational Technology Program and Project: Angel Fire will be transferred to AFRL to serve as the initial core of the center's equipment (equipment identified in separate document). The AFIT machine shop will be available to support the center within reasonable limits (i.e., minor usage not incurring recoverable costs); major efforts will require project funds for overtime and/or supplies. When appropriate, AFIT faculty will be encouraged to lead solution teams.
3) In all cases, the activities of solution teams will follow AFRL/RY and Center Director established policies and procedures for development, experimentation, demonstration, and communication with customers.
4) Sponsors of individual projects will provide the necessary financial resources to accomplish their demonstration or product development effort.

ATTACHMENT 5 (CONT)

5) The CRPD will be expected to fund its share of AFRL/RY common support costs, based on its usage, out of its CP3 operating budget or project funding (see paragraph G4).

H. Review of Agreement: This agreement shall be reviewed annually to evaluate the requirement for changes in support, oversight, or process. The agreement may be rescinded by either participating organization with 90 days notice to the other member organization, during which time a new charter will be developed or the overarching MOA renegotiated. However, if the agreement is rescinded, provisions will be made to ensure that the academic progress of students is not jeopardized.

For more information or inquiries please contact:

a. AFRL POC: Mr. Vince Parisi, AFRL/RYZ
b. AFIT POC: Dr. Adedeji Badiru, AFIT/ENV

ATTACHMENT 6

PARTNERSHIP AGREEMENT: PROGRAM FOR AFRL-ANT CENTER COLLABORATION

This program will provide a framework for collaborative research involving the laboratory facilities, faculty, students and staff of the Advanced Navigation Technology (ANT) Center of the Air Force Institute of Technology's (AFIT's) Graduate School of Engineering and Management and the scientists and engineers of the Air Force Research Laboratory (AFRL).

1. Purpose:

As stated in this MOA, "Both organizations encourage ... usage of facilities and equipment on a non-interference basis, with mutually agreed upon support of incremental costs ... while minimizing duplication of effort." The purpose of this Partnership Agreement is to establish and maintain cooperative relationships between the AFRL and the ANT Center of AFIT for the purpose of conducting mutually beneficial research to develop advanced navigational technology via the significant sharing of laboratory resources providing ongoing cost containment for both organizations. This Partnership Agreement formalizes successful working relationships already existing between the ANT Center of AFIT (which developed out of the Department of Electrical and Computer Engineering, AFIT/ENG) and AFRL.

This arrangement is mutually beneficial. AFRL will benefit from access to expertise of the ANT Center faculty and staff, access to an "in-house" laboratory to conduct navigation-related research to support its own customer's needs, access to ANT Center equipment (currently valued at over $1.5M), and exposure to ANT Center sponsors. AFIT will benefit from access to expertise of AFRL personnel, exposure to AFRL customers, and baseline funding support for ANT Center infrastructure costs.

2. Program Scope

a. Provides AFRL access to the physical ANT Center and center resources (expertise, personnel, equipment, software, supplies, building, electricity, heat, air conditioning, etc.) located on the AFIT campus.

b. As set forth in paragraph 5.b.5., shares costs of ANT Center infrastracutre (i.e., costs that are not directly tied to a particular project).

c. Shares insight, experience, and perspectives, leading to win-win situation for both organizations by developing better products for both customers and sponsors.

d. Provides closer ties between theory, modeling, experiment, testing, prototyping, product development, and the end product, by having ANT Center faculty (AFIT) and AFRL researchers (from multiple directorates) work together.

3. Equipment Ownership

a. As of the date of implementation of this Partnership Agreement, all equipment, supplies, contracts, software, and patents will continue to remain in the ownership of the organization that owns them, regardless of location, unless otherwise mutually agreed upon in writing.

ATTACHMENT 6 (CONT)

b. After the date of the implementation of this Partnership Agreement all equipment, supplies, contracts, software, and patents will continue to be owned by the organization that purchases them, regardless of location, unless otherwise mutually agreed upon in writing. (For clarification: If AFRL sends AFIT funding to sponsor research, and with this sponsored funding from AFRL, an ANT faculty member buys equipment for the ANT Center, then the AFIT organization is the owner of that equipment in the ANT Center.)

4. Administration

a. An AFRL-ANT Center Working Group will be formed. This group will communicate and collaborate in the most effective and efficient way it deems fit, meeting in person together at least three times a year. The ANT Center will provide administrative support for this group.

b. The AFRL-ANT Center Working Group will consist of AFRL representatives from each directorate that is participating in the partnership described by this Appendix (as defined in Section 5), and the ANT Center will contribute an equivalent number of representatives to the working group (including the ANT Center Director). To be effective, representatives should commit to this group for a two year term and be federal civilians or military officers.

c. The AFRL-ANT Center Working Group will communicate with each other often (e-mails, phone calls, ad-hoc meetings) as a whole or in sub-groups, as required, to collaborate effectively on research projects of mutual interest. The Working Group will prioritize research projects, de-conflict any ANT Center scheduling, in particular, access to equipment or computer resources, personnel, etc., and effectively be the day-to-day coordinating body of this Partnership Agreement.

d. Once a year, the AFRL-ANT Center lead points of contact designated in section 7a and 7b of this Partnership Agreement will meet. This may occur in conjunction with the annual AFRL-AFIT Partnership Summit. The purpose of this annual meeting will be to broadly outline, plan, and establish the upcoming year's (and possibly future years) AFRL-ANT projects, baseline support funding levels, personnel requirements, major equipment purchases, outstanding issues, etc. Any amendments to this Partnership Agreement (Appendix) will be prepared in advance, given any final revisions, and approved at this meeting.

5. Procedures for Participation

a. The ANT Center agrees to the Partnership Agreement outlined in this Appendix. The extent of participation will correspond with the level of participation by the participating AFRL directorates, and the extent of participation will be agreed upon annually by the AFRL-ANT Center lead points of contact and routinely by the AFRL-ANT Center Working Group. The ANT Center will provide access to AFIT space and facilities with the support of the Head of the Electrical and Computer Engineering Department and the Dean of the Graduate School of Engineering and Management. The ANT Center agrees to provide AFRL the following:

(1) Access to the ANT Center in a way that the AFRL directorates can consider the ANT Lab an "in-house" research capability, to include as mutually agreed upon, with support and approval from the ENG Department Head and the EN Dean: laboratory and office space for AFRL researchers, administrative support, technical support, and access to ANT Center equipment, lab supplies, computers, software, etc.

(2) A budget forecast during the first month of each fiscal year proposing how the funding from each of the participating directorates is to be used through the year.

(3) Exposure to ANT customers to include: meetings, conferences, collaborative research agreements, collaborative research proposals, etc.

(4) Administrative support for the ANT Center Working Group.

(5) Sufficient representation for the ANT Center Working Group (as described in Section 4).

(6) Consultations in scientific and technical advisory roles as agreed upon.

(7) Short courses as agreed upon.

(8) Submit Amendments to this Appendix as required, updating contact information and any significant increases or decreases in levels of participation.

(9) Other items to further the objectives of the partnership as mutually agreed upon.

b. The participating Directorates of AFRL agreeing to the Partnership Agreement outlined in this Attachment will appoint a representative to the AFRL-ANT Center Working Group as outlined in Section 5. The extent of participation will be decided by each AFRL directorate, and the level of participation can change as outlined below when research interests and requirements of the directorate change. In detail this will be agreed upon annually by the AFRL-ANT Center lead points of contact, and routinely by the AFRL-ANT Center Working Group. Directorates of AFRL participating at the AFRL-ANT Center Working Group level agree to the following:

(1) Provide the ANT Center access to AFRL scientists, researchers, and technical staff as agreed upon.

(2) Review and approve the budget submitted annually by the ANT Center, when it becomes satisfactory to AFRL.

(3) Provide the ANT Center exposure to AFRL customers to include as agreed upon: meetings, conferences, collaborative research agreements, collaborative research proposals, etc.

(4) Appoint one representative to the AFRL-ANT Center Working Group

(5) Provide baseline funding support for the ANT Center infrastructure. Note that any funding for specific projects would be in addition to this baseline funding, which is intended primarily for maintaining the ANT Center at such a level that it would be of value to AFRL. Also, a directorate must contribute baseline funding to be considered a participating directorate at the following levels:

a. For AFRL/RY: $200,000/year

(6) Other items as mutually agreed upon.

ATTACHMENT 6 (CONT)

(7) Submit Amendments to this Appendix as required, updating contact information and any significant increases or decreases in levels of participation.

c. Directorates of AFRL interested in learning more about this Partnership Agreement or possibly joining at the AFRL-ANT Center Working Group level can participate as follows: If the ANT Center Director or the majority of the AFRL-ANT Center Working Group agrees that another AFRL directorate (not currently on the AFRL-ANT Center Working Group) has enough ANT-related research interests/projects to warrant exploring participation in this agreement, then an AFRL directorate may designate a representative to be a guest member of the AFRL-ANT Center Working Group. Even though the decision is made by the Director or the Working Group, this item can be initiated by AFRL or by ANT. It can be formal or ad-hoc. A guest member of the AFRL-ANT Center Working Group has no power of authority or decision, but participates in the Working Group in order to become familiar with processes, and also to learn more about the ANT Center and exactly what it can offer an AFRL laboratory directorate as an "in-house" research capability. Within one year, the guest member and the AFRL directorate he or she represents can either withdraw or submit a proposed Amendment to this Appendix (as outlined in Section 6d) adding their directorate to the Partnership Agreement (including contact information and basic information concerning the level of participation).

6. Participating directorates

a. Current participating directorates and the specifics of their participation include:

(1) AFRL/RY

a. Baseline funding provided by AFRL/RY to ANT Center: $200k/year.

b. AFRL/RY will provide two AFRL researchers to work in the ANT Center conducting AFRL-ANT collaborative research on a part-time basis (approximately one day per week).

7. Points of Contact

a. The lead Points of Contact for AFRL-ANT Center research and technical program planning and execution:

Dr John F. Raquet
Director, Advanced Navigation Technology (ANT)
Associate Professor of Electrical Engineering
Dept. of Electrical and Computer Engineering
Air Force Institute of Technology
2950 Hobson Way
Wright Patterson AFB, OH 45433-7765
937-255-3636 x4580
DSN 785-3636 x4580
FAX 937-656-4055
John.Raquet@afit.edu

Dr. Stewart DeVilbiss
Principal Electronics Engineer
Reference Systems Branch, AFRL/RYR
Air Force Research Laboratory
Bldg 620, NE Delivery Dock
2241 Avionics Circle
Wright Patterson AFB, OH 45433-7333
937-255-6127 x 4274
DSN 785-6127 x 4274
FAX 937-656-4301
Stewart.Devilbiss@wpafb.af.mil

ATTACHMENT 6 (CONT)

b. The lead Points of Contact for AFRL-ANT Center administrative planning and execution:

Dr. Michael A Caylor
Director of Sponsored Programs
Office of Research and Sponsored Programs
AFIT/ENR
Air Force Institute of Technology
2950 Hobson Way
Wright Patterson AFB, OH 45433-7765
937-255-3636 x7104
DSN 785-3633
FAX 937-656-7139
michael.caylor@afit.edu

Neeraj Pujara
Chief Reference Systems Branch,
AFRL/RYR
Air Force Research Laboratory
Bldg 620, NE Delivery Dock
2241 Avionics Circle
Wright Patterson AFB, OH 45433-7333
937-255-6127 x
DSN 785-6127 x
FAX 937-656-4301
Neeraj.pujara@wpafb.af.mil

ATTACHMENT 7A

PARTNERSHIP AGREEMENT: EQUIPMENT SHARING

UNCLASSIFIED
PARTNERSHIP AGREEMENT
BETWEEN
THE AIR FORCE INSTITUTE OF TECHNOLOGY'S
GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT(AFIT/EN)
AND
THE AIR FORCE RESEARCH LABORATORY'S
SENSORS DIRECTORATE (AFRL/RY)
ON
ELECTRON BEAM LITHOGRAPHY

1. PURPOSE:

a. This Partnership Agreement (PA) establishes a partnership between the Air Force Institute of Technology's Graduate School of Engineering and Management (AFIT/EN) and the Air Force Research Laboratory's Sensors Directorate (AFRL/RY). The purpose of this partnership is to significantly improve collaboration between AFIT/EN and AFRL/RY electron beam lithography-related capabilities including our mutual clean room resources. Both organizations enjoy a long history of collaboration in the design, fabrication, and characterization of microelectronic devices. Further, AFRL/RYD has sponsored numerous masters and doctoral candidates from AFIT's engineering and physics departments, often with the work continuing beyond graduation.

b. An MOA establishing a strategic, long-term partnership between AFIT and AFRL already exists. This Electron Beam Lithography (EBL) PA documents a specific collaboration between the two organizations.

2. BACKGROUND:

a. AFIT/EN received $828.9K of FY06 funding to purchase an EBL system to provide AFIT's clean room this new capability. AFRL/RY has recently installed an EBL system with greater capability than the system AFIT had planned to purchase. AFRL's new EBL system is more than capable to satisfy the EBL needs of both organizations.

b. EBL systems are complex, requiring many man-hours of familiarity to develop repeatable processes. In addition, dedicated resources (both equipment and manpower) are further required to keep such an advanced system in working order, let alone running at a state-of- the-art capability. The Electron Devices Branch, AFRL/RYDD, has therefore suggested an EBL collaboration with the Department of Electrical and Computer Engineering, AFIT/ENG. Under this collaboration, AFIT transferred its EBL equipment funding to AFRL. In return, AFRL will grant access to its EBL capability to AFIT faculty and students. The following sections outline the PA agreement between AFIT/EN and AFRL/RY.

ATTACHMENT 7A (CONT)

3. PRINCIPLES OF AGREEMENT:

a. AFIT/EN and AFRL/RY will collaborate on the purchase, integration, and use of the new EBL system in AFRL/RYD's clean room. It is anticipated that this partnership will naturally flow into other clean room-related functions and technologies, many of which are associated with the nanolithography capability provided by the EBL system.

b. AFIT/EN agrees to:

1) Provide at least one faculty member to be present at system acceptance and installation. This faculty member will also attend all EBL system training to become an authorized EBL system user.

2) Abide by the same housekeeping standards as AFRL EBL system users.

3) Acquire training for EBL users on necessary support equipment for EBL.

4) Ensure only fully trained and qualified AFIT researchers (faculty/staff) will operate the EBL system autonomously. All students will be supervised by AFIT or AFRL EBL system users. If any unauthorized user representing AFIT is found operating the system unattended, AFIT will forfeit EBL system operator status.

5) Have AFIT's primary EBL user train additional AFIT researchers.

6) Have AFIT's primary EBL user retain system proficiency through regular use. If more than 1 quarter passes with no usage, the user will have to be recertified.

c. AFRL/RY agrees to:

1) Train an AFIT faculty member who will be responsible for e-beam processing for AFIT personnel.

2) Grant authorized AFIT researchers (faculty/staff) access to the EBL system via an equipment sign-up process with the same priority as RYD users. In the event of a conflict, AFIT's primary EBL user and RYDD Branch Chief (currently Mr. Ross Dettmer) will reach a consensus on priority scheduling methodologies.

3) AFRL guarantees availability of the EBL system for AFIT use (excluding downtime for maintenance and repairs) not to exceed one week per month. More system time will be made available through negotiation depending on current usage load. System-usage by AFIT is not limited to any application and may involve external projects if desired.

4) Students will be granted access to the system capabilities through the authorized AFIT researchers. Only long-term students with certification on all other EBL support equipment will be considered eligible to become an operator.

5) Provide process development support for existing processes and EBL expertise to assist AFIT researchers in becoming proficient EBL system users. This offers a

ATTACHMENT 7A (CONT)

6) natural opportunity to exploit the strengths of each organization resulting in several masters and doctoral level research efforts.

7) Provide training to EBL users required for EBL support equipment, including spinners, optical microscopes, basic optical lithography tools, and gold sputtering.

8) Provide access to metallization and etching as needed for EBL processes through metallization and RIE/ICP system operators (currently Joe Breedlove and Paul Cassity).

4. ORGANIZATIONAL BENEFITS:

a. AFIT and AFRL mutually benefit from this agreement from both long- and short-term viewpoints. This section offers a brief discussion of these benefits and is not all inclusive.

b. Although AFIT will not receive its own EBL system in the AFIT clean room, it gains access to a more capable EBL system. AFIT currently has no capability for fabricating devices beyond that which was available over 20 years ago. An EBL system will enable AFIT to fabricate nanostructures which are 2500 - 5000 times smaller than currently possible. This EBL system will provide nanolithography enabling many semiconductor devices including advanced transistors, quantum dot devices, photonic crystals, and three-dimensional structures such as Nanoelectromechanical Systems (NEMS). Such a capability is essential to conduct research on current Air Force requirements for state-of-the-art nanoelectronics/photonics, nano energy transfer/conversion, and nano-chem-bio sensors. EBL is a common tool to explore and exploit multi-disciplinary nanotechnology and is essential for AFIT's materials, devices, and sensor systems research capability. This capability will support education in laboratory coursework, faculty research, and students in electrical engineering, applied physics, materials science, and electro-optics programs at both the master's and doctoral levels.

c. AFRL receives significant funding to enhance the capability of their EBL system purchase and the operational efficiency of their existing infrastructure. Another key benefit of this agreement to AFRL is a strong sustained research and student relationship with AFIT. Historically, AFRL has been the number one benefactor of AFIT's graduate programs in electrical engineering, applied physics, materials science, and electro-optics. Partnering with AFIT to provide faculty and students access to a world-class fabrication technology ensures AFRL will continue to receive graduates having the skills needed to support AFRL's cutting edge mission.

1. IMPLEMENTATION:

This PA will become effective from the date of the last signature. Although this PA may be reviewed or amended at any time, subject to the approval of both parties, it is expected to remain effective for the typical service life of the EBL system being purchased or until this system is replaced.

ATTACHMENT 7B

PARTNERSHIP AGREEMENT
BETWEEN
THE AIR FORCE INSTITUTE OF TECHNOLOGY'S
GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT (AFIT/EN)
AND
THE AIR FORCE RESEARCH LABORATORY'S
SENSORS DIRECTORATE (AFRL/RY)
ON
PLASMA ETCHING SYSTEMS

1. PURPOSE:

a. This Partnership Agreement (PA) establishes a partnership between the Air Force Institute of Technology's Graduate School of Engineering and Management (AFIT/EN) and the Air Force Research Laboratory's Sensors Directorate (AFRL/RY). The purpose of this partnership is to significantly improve collaboration between AFIT/EN and AFRL/RY plasma etching-related capabilities, including our mutual clean room resources. Both organizations enjoy a long history of collaboration in the design, fabrication, and characterization of microelectronic devices and micro-electromechanical systems (MEMS). Further, AFRL/RY has sponsored numerous masters and doctoral candidates from AFIT's engineering and physics departments, often with the work continuing beyond graduation.

b. A Memorandum of Agreement establishing a strategic, long-term partnership between AFIT and AFRL already exists. Additionally, an electron beam lithography (EBL) PA was completed on 6 Sep 06 documenting a specific collaboration between our two organizations.

2. BACKGROUND:

a. AFIT/EN received $550K of FY06 funding to purchase a deep reactive ion etch (DRIE) system to provide AFIT's clean room this new capability. AFRL/RY already has two plasma (dry) etching systems for etching V materials, but no capability for dry etching silicon or silicon carbide materials. The DRIE system, which will be purchased using AFIT's funding, is more than capable to satisfy the silicon etch needs of both organizations.

b. Due to the gases required to form the plasma, dry etching systems require sophisticated source and exhaust gas handling systems. In addition, dedicated resources (both equipment and manpower) are required to efficiently operate and maintain a dry etch system. The Department of Electrical and Computer Engineering (AFIT/ENG) has therefore suggested collaboration with the Devices for Sensing Branch (AFRL/RYDD). Under this collaboration, AFIT would transfer its DRIE equipment funding to AFRL to cover the full purchase and installation costs for the new system to be installed in AFRL's clean room. In return, AFRL would grant access to the DRIE, as well as their existing plasma etching system to AFIT faculty and students. The following sections outline the PA agreement between AFIT/EN and AFRL/RY.

3. PRINCIPLES OF AGREEMENT:

a. AFIT/EN and AFRL/RY will collaborate on the purchase, integration, and use of the new DRIE system in AFRL/RY's clean room. It is anticipated that this partnership will naturally flow

into other clean room-related functions and technologies, many of which are associated with the capability provided by the DRIE system. In many ways, this agreement can be considered a result and extension of the EBL partnership completed in Sep 06.

b. AFIT/EN agrees to:

- Assist AFRL/RY, as necessary, to integrate the DRIE system into AFRL/RY's clean room.
- Provide at least one faculty member to be present at system acceptance and installation.
- This faculty member will also attend all DRIE system training to become an authorized DRIE system user.
- Abide by the same housekeeping standards as AFRL's DRIE, Plasma Therm Shuttlelock 770, and Unaxis 790 system users.
- Acquire training for AFIT DRIE users on AFRL/RY support equipment required for DRIE or other dry etching operations.
- Ensure only fully trained and qualified AFIT faculty, staff, or students will operate the DRIE, Plasma Therm Shuttlelock 770, or Unaxis 790 systems autonomously. All students will be supervised by AFIT or AFRL plasma etching system users.
- Have AFIT's primary DRIE user train additional AFIT researchers.
- Have AFIT's primary DRIE user retain system proficiency through regular use.

c. AFRL/RY agrees to:

- Arrange for at least one AFIT faculty member to attend all DRIE system training offered by the DRIE system vendor. The training will be to the same level of training received by AFRL's primary users. AFRL will also assist in training a future AFIT faculty member in the event AFIT's initial primary user leaves AFIT before a follow-on user can be selected and trained.
- Provide training to AFIT faculty/staff on the two existing plasma etching systems in AFRL's clean-room. This offers a natural opportunity to exploit the strengths of each organization resulting in several masters- and doctoral-level research efforts.
- Grant trained AFIT faculty, staff, and student access to all three plasma etching systems (plasma Therm Shuttlelock 770, Unaxis 790, and the new DRIE system) via the same process used by RYD users. In the event of a conflict, AFIT's primary DRIE user and RYDD's Branch Chief will reach a consensus on priority scheduling methodologies.
- Provide for annual maintenance on the new DRIE system.

ATTACHMENT 7B (CONT)

4. ORGANIZATIONAL BENEFITS:

a. AFIT and AFRL mutually benefit from this agreement from both long and short term viewpoints. This section offers a brief discussion of these benefits and is not all-inclusive.

b. Although AFIT will not have a plasma etching system in its own clean room, the DRIE system will be placed within an infrastructure which is better suited to operate and maintain such a system. AFIT currently has no capability for plasma etching semiconductor devices or MEMS structures. By funding the purchase of this new DRIE system and agreeing to have this system installed in AFRL's clean room, AFIT gains access to three plasma etching systems. Collectively, these systems are capable of etching -V materials, dielectrics, and silicon. Plasma etching is a common tool to explore and exploit optoelectronic technology and is essential for AFIT's materials, devices, and sensor systems research. This capability will support education in laboratory coursework, faculty research, and students in electrical engineering, applied physics, materials science, and electro-optic programs at both the master's and doctoral levels. This capability will allow for the fabrication of various advanced semiconductor devices and MEMS structures, which is expected to result in many publication quality research efforts.

c. AFRL receives a state-of-the-art tool for high aspect ratio etching of silicon and silicon carbide structures. AFRL currently has no capability to perform consistent and quality etching of silicon structures which is required for conducting research on advanced optoelectronic devices as well as novel high functionality MEMS structures. AFRL gains immediate and ready access to this tool within their own clean room at no equipment or installation costs to themselves. Another key benefit of this agreement to AFRL is a strong sustained research and student relationship with AFIT. Historically, AFRL has been the primary benefactor of AFIT's graduate programs in electrical engineering, applied physics, materials science, and electro-optics. Partnering with AFIT to provide faculty and students access to a world-class fabrication technology ensures AFRL will continue to receive graduates having the skills needed to support AFRL's cutting edge mission.

5. IMPLEMENTATION:

This PA will become effective from the date of the last signature. Although this PA may be reviewed or amended at any time subject to the approval of both parties, it is expected to remain effective for the typical service life of the DRIE system being purchased or until this system is replaced.

ATTACHMENT 7C

PARTNERSHIPAGREEMENT
BETWEEN
THE AIR FORCE INSTITUTE OF TECHNOLOGY'S
GRADUATE SCHOOLOF ENGINEERING AND MANAGEMENT (AFIT/EN)
AND
THE AIR FORCE RESEARCH LABORATORY'S
SENSORS DIRECTORATE (AFRL/RY)
ON
THE RADIATION AND SCATTERING MEASUREMENT FACILITY

1. PURPOSE:

a. This Partnership Agreement (PA) establishes a partnership between the Air Force Institute of Technology's Graduate School of Engineering and Management (AFIT/EN) and the Air Force Research Laboratory's Sensors Directorate (AFRL/RY). The purpose of this partnership is to significantly improve the Antenna and Radar Cross Section (RCS) Measurement capabilities within AFIT/EN and AFRL/RY. Both organizations enjoy a long history of collaboration in the antenna measurements and RCS field with many of AFIT's students performing research sponsored by AFRL and continuing work for them upon graduation.

b. A Memorandum of Agreement (MOA) establishing a strategic, long-term partnership between AFIT and AFRL already exists, dated 17 Aug 05. This Antenna and Scattering Measurement Facility PA documents a specific collaboration between the two organizations.

2. BACKGROUND:

a. AFIT/EN received $2.4M of FY06 funding to upgrade its RCS measurement facility. This level of funding is insufficient to purchase a new anechoic chamber and associated radar measurement equipment. When these funds were requested several years ago, the intent was to upgrade AFIT's existing RCS measurement facility which was located in building 168, Area B. At that time, the $2.4M funding would have been sufficient for completing the upgrade.

b. Unfortunately, the base civil engineers have since placed building 168 on the demolition list, with demolition currently scheduled in FY09. Since being placed on the demolition list, building 168 has not received ongoing maintenance and its physical condition continues to deteriorate. Furthermore, the age, manner of construction, and condition of the components used in the RCS chamber in building 168, and especially the radar absorbing material that lines the chamber walls, precludes moving that chamber to another building. Thus, AFIT/EN requires either a new chamber or access to one within the local area within the next three to five years.

c. The Department of Electrical and Computer Engineering (AFIT/ENG) has been searching for a viable alternative to building 168. Through its ongoing collaborations with AFRL/RY, AFIT/ENG has learned of the "OneRY Chamber" concept. The Base Realignment and Closure (BRAC) commission is essentially co-locating all AFRL/RY activities to Wright-Patterson AFB. As a result of this realignment, four RCS measurement facilities with varying capabilities are being closed at Hanscom AFB. One additional facility with different capabilities is being closed in Rome NY. Also, as a result of the BRAC decision, two facilities at WPAFB

must close. The $30M "OneRY Chamber" concept proposed by AFRL/RY combines the capabilities of these seven existing facilities into a single large antenna and RCS measurement complex.

d. AFIT/ENG and AFRL/RY have reached an agreement whereby AFIT/ENG will supplement the "OneRY Chamber" development using AFIT's FY06 $2.4M funds. In return, AFRL/RY will grant AFIT/EN researchers (faculty, students, etc.) access privileges to the "One RY Chamber" once construction is completed and the facility becomes operational. AFIT/EN's access will occur on an as-needed-as-available basis with availability subject only to classified customer requirements. The following sections outline the PA between AFIT/EN and AFRL/RY.

3. PRINCIPLES OF AGREEMENT:

a. AFIT/EN and AFRL/RY will collaborate on "OneRY Chamber" development, construction, validation, and operation.

b. AFIT/EN agrees to the following:

(1) Transferred to AFRL/RY, via a MIPR, the FY06 $2.4M monies (accepted as a reimbursable MIPR) for an AFRL/RY purchase of a radar upgrade to its existing radiation and scattering measurement facility, known as RASCAL. The radar purchase was initiated in FY06, and the radar was delivered and installed in FY 08. AFRL/RY will provide all technical specifications needed to complete the purchase. A two year extended warranty contract was included as part of the radar purchase.

(2) Assist AFRL/RY with integrating the radar upgrade into RASCAL. This upgrade effort is expected to support several master's-level thesis research efforts.

(3) Continue operating the current RCS measurement facility located in building 168 subject to the demolition status of the building itself.

(4) Work with the base civil engineers to delay building 168 demolition until after the "OneRY Chamber" is completed and becomes operational.

c. AFRL/RY agrees to the following:

(1) Purchased the RASCAL radar upgrade using the GFY06 $2.4M monies that were received as reimbursable MIPR funds from AFIT/EN. AFRL/RY will also provide technical specifications for the radar upgrade as required completing the purchase.

(2) Direct the upgrades to the RASCAL facility as warranted and to the BANTAM near-field range as warranted in order to characterize the compact range measurement validation.

(3) To grant AFIT researchers (faculty, students, etc.) access to the upgraded RASCAL facility on an as-needed-as-available basis with availability subject to a prioritization/utilization process to be controlled by AFRL/RY. It is anticipated that the availability will be consistent with current and past collaborative efforts between AFRL/RY and AFIT/EN.

ATTACHMENT 7C (CONT)

(4) Upon delivery and integration of the RASCAL radar upgrade in FYO8:

(a) Transfer the existing RASCAL radar unit and necessary peripheral equipment for that radar's operation to AFIT/ENG for use in their current chamber in building 168. This refers specifically to the RF test head as the principle component of the RASCAL radar.

(b) Assist AFIT/ENG with integrating the existing RASCAL radar unit into the chamber in building 168.

(5) Once the $30M "OneRY Chamber" becomes operational:

(a) To grant AFIT researchers (faculty, students, etc.) access on an as-needed-as-available basis with availability subject to a prioritization/utilization decision by AFRL/RY.

(b) AFIT/ENG moves the RASCAL chamber and AFIT-purchased radar upgrade to an AFIT/ENG facility and location. At that time, ownership of the RASCAL chamber and associated equipment required for operation (anechoic material, reflector, etc.) transfers to AFIT/ENG.

(6) If the "OneRY Chamber" project is cancelled or its capabilities become sufficiently degraded due to limited funding, AFRL/RY agrees to transfer the AFIT-funded radar upgrade to AFIT. AFRL/RY will keep the RASCAL chamber and associated equipment required for operation (network analyzer, control, anechoic material, reflector, etc.). In this case, AFRL/RY will provide AFIT with guidance to design and construct an anechoic chamber equivalent to RASCAL and integrate the radar into this new compact range. AFIT students will be used whenever possible to make the chamber design and fabrication process a learning exercise. Determination of "sufficiently degraded capabilities" will be made solely by AFRL/RY.

4. ORGANIZATIONALBENEFITS:

a. AFIT and AFRL mutually benefit from this agreement from both long- and short-term viewpoints. This section offers a brief discussion of these benefits and is not all inclusive.

b. Until the "OneRY Chamber" is constructed and becomes operational, AFIT receives access to RASCAL, a compact range antenna, and RCS measurement facility with a quiet zone approximately four times larger in cubic volume than AFIT/ENG's far-field RCS measurement facility in building 168. Also, integrating the current RASCAL radar into the building 168 facility provides a significant upgrade in terms of measurement fidelity. In return, AFIT's $2.4M radar upgrade to RASCAL provides AFRL with cutting edge RCS measurement equipment, greatly improving imaging capability and throughput due to significant upgrades in processing speed while also offering greater dynamic range through an improved noise floor. Furthermore, enhancements in transmit waveform diversity offer unique opportunities for future experimentation and research. In the short term, there is significant mutual benefit.

c. Upon completion of the "OneRY Chamber," AFIT gains ownership of RASCAL with the upgraded radar. As briefly discussed in the previous paragraph, this acquisition is a tremendous

upgrade to the current RCS measurement capabilities located in building 168. AFIT does lose the ability to make bistatic measurements when building 168 is demolished since RASCAL does not currently provide this capability. However, plans for the "OneRY Chamber" include both bistatic and multistatic measurement capability. Thus, AFIT researchers (faculty, students, etc.) will have access to bistatic measurement capability on an as-needed/as-available basis with availability subject only to classified customer requirements.

d. One major benefit of this agreement to AFRL upon completion of the "OneRY Chamber" is a strong sustained research and student relationship with AFIT. Historically, AFRL has been the number one benefactor of AFIT's graduate programs in electromagnetics, low observables, radar, and antennas. Maintaining a world-class antenna and RCS measurement facility at AFIT ensures AFRL will continue to receive graduates having the skills needed to support the "OneRY Chamber."

e. Another tremendous benefit of this agreement to AFRL is the experience gained by incorporating the new radar upgrade into RASCAL. One of the primary hurdles when building a new antenna and RCS measurement facility is the software for the radar. The radar AFRL plans to purchase for the "OneRY Chamber" is the identical model currently planned for the radar upgrade under this PA. As such, AFRL gains three to five years of experience working with the radar. Furthermore, AFIT gains an earlier version of the exact radar AFRL will use in the "OneRY Chamber." There is no question as to the benefits and experience gained when both organizations are using the same hardware for collaborative work.

5. IMPLEMENTATION:

This PA will become effective as of the last date set forth in the overarching MOA's signature blocks and may be reviewed or amended subject to the approval of both parties. This PA dissolves upon completion of the above agreements.

ATTACHMENT 8

(AFRL/RZS – AFIT/ENY)

PARTNERSHIP AGREEMENT:
SPACE AND ROCKET PROPULSION RESEARCH

1. Purpose: The purpose of this partnership is to establish a cooperative relationship between the Space and Missile Propulsion Division of the Air Force Research Laboratory and the Department of Aeronautical and Astronautical Engineering of the Air Force Institute of Technology (AFIT) for the ongoing support of rocket propulsion research to include the micro satellite propulsion, satellite propulsion simulator, combustion research and associated research studies.

2. Objective: AFRL/RZS and AFIT/ENY will cooperatively develop and pursue research in the areas of rocket and space propulsion in support of AFRL.

3. Background:

   a. The Aeronautical and Astronautical Engineering Department (AFIT/ENY) is responsible for developing AFIT's ability to support the Air Force space research objectives of providing unrivaled military space graduate education, research and technical expertise.
   b. The primary goals of this MOA are:
      1) Educate Air Force personnel in space and space related disciplines to support the space organizations in the Air Force at the graduate level.
      2) Perform state-of-the-art research in rocket and space propulsion supporting existing and future Air Force space programs.
      3) Involve world class researchers at the Air Force Research Laboratory in the education process of the next generation of space professionals in the Air Force.

4. Scope:

   a. This MOA establishes the basic working agreements between AFRL/RZS and AFIT/ENY for the design, test, and research for rocket and space propulsion. It also addresses the dissemination of these efforts to the research community and the Air Force.
   b. This MOA will be reviewed annually and amended as required. The duration of this MOA is five years from the date of origination. Termination in advance of this agreed expiration date can be made by either party but shall require 180 days advance written notification by the withdrawing party.

5. Responsibilities:

   a. AFRL/RZS

ATTACHMENT 8 (CONT)

1) Government facility tours and information exchange meetings: RZS will coordinate meetings and tours for AFIT personnel and students in order to introduce these personnel to Air Force test and research capabilities.
2) Special test equipment and research hardware: RZS will provide hardware and special test equipment as a loan for specified periods in support of specifically designated research as available.
3) Technical program support, RZS will provide experts to advise on MS and PhD level research efforts. These experts will participate in the thesis process including editing and grading of the research report as well as attending the research defense at AFIT.
4) Funding: RZS will provide annual funding as defined in section 7 of this MOA.

b. AFIT/ENY
1) AFIT will solicit research topics and keep a current list from RZS in rocket and space propulsion topics. These topics will be used to guide and direct student research in support of current and future RZS projects.
2) AFIT will pursue research topics of interest to RZS both in-house at AFIT and as appropriate in conjunction with personnel and resources at Edwards AFB.
3) AFIT will garner further support for rocket and space propulsion research topics from other external interfaces and relationships.
4) AFIT will consult with RZS on rocket and space propulsion research topics, laboratory development, diagnostic tools procurement and future
5) AFIT will present research results to RZS and the research community. AFIT will present research at conferences and submit papers to journals to accomplish this task. AFIT will provide RZS copies of all theses in support of this MOA.

6. Contingencies:

a. AFIT and RZS will immediately notify the other party if they withdraw from this agreement or if there are other programmatic issues requiring renegotiation.

7. Program Management And Funding:

a. AFRL/RZS will fund/provide:
1) Funding for rocket and space propulsion research. This funding will be used to purchase consumable supplies (i.e. xenon gas), diagnostic equipment, research hardware, and to travel to conferences and meetings.
2) RZS agrees to a funding level of $75,000/year for the duration of five years of this MOA.

b. AFIT/ENY will fund/provide:
1) Facilities, infrastructure and manpower to design, build, test and construct rocket and space propulsion research facilities at a level to be agreed upon between AFRL/RZS and AFIT/ENY consistent with available resources.

ATTACHMENT 8 (CONT)

8. Points Of Contact:

Michael T. Huggins, GM-15, DAF
Chief, Space and Missile Propulsion Division
AFRL/RZS
Air Force Research Laboratory
5 Pollux Drive
Edwards AFB, CA 93524-7048
Duty Phone: (661)275-5230
michael.huggins@edwards.af.mil

Major Richard D. Branam
Assistant Professor of Aerospace Eng.
AFIT/ENY
Air Force Institute of Technology
Department of Aero/Astro Engineering
2950 Hobson Way
WPAFB, OH 45433
Duty Phone: (937)255-3636 x7485
richard.branam@afit.edu