Ethics & Professional Conduct in Electrical Engineering

New Student Orientation, 8/31/2011
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(Partly adapted from EE-5950 Ethics class taught in Fall-2010, and Prof. Joachim Heberlein’s ECE Colloq. Talk)
Outline

• Need For Ethics Study
• Academic Dishonesty
• Data integrity
• Plagiarism
• Scientific/Professional Misconduct
• Authorship
• Disclosure & Conflicts
• Ethical Harassment
Need For Ethics Study

- Solution to ethical situations are shades of gray with no single right or wrong answer: *What is ethical for one person might be unethical for another person.*
- It has a strong effect on public opinion: mistrust in science & institutions
- Increasing number of cases of misconduct and plagiarism in critical fields.
- Need to find a common ground among faculty about what is ethical or not.

- Un-Certainty in Research ethics:
  a) Data Management: *which data is relevant? What should be reported?*
  b) Plagiarism: *what material can be copied in a publication?*
  c) Reporting Misconduct: *is it worth the trouble?*
  d) Conflict of Interest: *How much personal benefit is acceptable?*
  e) Authorship: *who qualifies to be an author/co-author?*
Academic dishonesty in our department

- Not tolerated in our program. Can lead to expulsion from program.
- Two students in EE-5323 VLSI Design Class with same mask layout file (caught by TA)
- Student corrected his graded midterm exam, went back to instructor for more points, instructor showed him (and me) the copy of the original exam
- Student copied a solution from web for a question from web (but with different numbers)
- Two students with similar project reports
- Student copied verbatim a report from the web, and turned it in as her report
- A PhD degree awarded by the university withdrawn after it was discovered that the student had plagiarized 30 pages in his PhD thesis. This was not discoved by the Research Advisor.
Data Integrity

• Accuracy & Reliability of Data: Should outliers be considered?
R.A. Millikan (1923 Nobel prize in Physics): data not supported by theory is bad data, not to be reported.

• The National Society of Professional Engineers code of ethics for engineers state:
Section III 3.1: “engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact necessary to keep statements from being misleading; ……”

• What about students?: Is satisfaction of adviser/supervisor more important than “complete scientific truthfulness”? 
Plagiarism

- “IEEE defines plagiarism as the reuse of someone else’s prior ideas, processes, results, or words without explicitly acknowledging the original author and source.”
- Plagiarism on a rise in IEEE Publications:

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<tr>
<th>Year</th>
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<td>2004</td>
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- Has this always been an issue, and we are now only more sensitive to it?
Plagiarism

- IEEE defines five levels of plagiarism
  1. Uncredited copying a full paper, or copying more than 50% of a paper, or copying within more than one paper
  2. Uncredited copying of 20% - 50% within more than one paper
  3. Uncredited copying of individual parts (up to 20%) in one paper
  4. Uncredited paraphrasing of pages or paragraphs
  5. Credited copying without clear citation

- Credit notices are not enough if quotes or offset text does not indicate copied material.
- Paraphrasing is plagiarism if only a few words are changed or if the original source is not cited correctly.
Plagiarism

• Plagiarism is seen differently in different cultures

• “moreover, copying is imbedded in the culture. Chinese students are taught to reproduce thoughts, right down to using a master’s words without citation.” (Mia Doucet, Building Trust, in Mechanical Engineering, January 2008)
Self Plagiarism

• Section 6.4.1B(h) of the IEEE Policies document states:
  "Except as indicated in Section 6.3.4 (Multiple Publication of Original Technical Material in IEEE Periodicals), authors should only submit original work that has neither appeared elsewhere for publication, nor which is under review for another refereed publication. If authors have used their own previously published work(s) as a basis for a new submission, they are required to cite the previous work(s) and very briefly indicate how the new submission offers substantial novel contributions beyond those of the previously published work(s).”

• Concerns with Self Plagiarism:
  a) It misrepresents the quantity of one's academic output.
  b) It misuses the “scarce resource” of page space in professional journals and conference proceedings.
  c) Legal concerns: If someone publishes a work under one publication and then attempts to publish the same work under another publication, copyright laws may be violated.
IEEE Case Study: Plagiarism
Abu Baker

• In 2008, Abu Baker, a PhD student at the University of Louisiana, submitted a paper to IEEE on LDPC Decoder.

• After this paper was published in the 3rd quarter issue of the IEEE journal, it was flagged for two main acts of plagiarism.

• He had made minor modifications to original work, he did not reference the original work, and made the plagiarism difficult to trace.

• He made it very clear that he was the only author who plagiarized in this article and that the co-authors were completely unaware of it.

• In a second act of plagiarism that occurred in the paper authored by Mr. Baker, he had “inappropriately plagiarized some paragraphs” from a paper and again did not reference the original work in any way. Once again the co-authors were unaware of it.

• As a result of this plagiarism, the paper was revoked from publication and Abu Baker had to write a formal public apology letter.

• Since the public apology in the 2008 3rd quarter addition of IEEE Circuits and Systems Magazine, Abu baker has not published any other work.
Case Study: Plagiarism
Ohio University

- In 2004 a Master’s student, Thomas Matrka discovered that several masters’ theses had copied chapters, nearly word-for-word, from previous master’s theses.
- May 2006: Committee recommendations:
  - Dismiss department chair, dismiss additional faculty member (11 violations), place third faculty member on probation for 2 years (5 violations)
  - Remove theses containing plagiarism from library and revoke degrees
  - Review all 106 master’s theses advised by the problem faculty
  - Review PhD dissertations
  - Increase thesis committee from 2 faculty to 3.
- The faculty members argued that it is not practical for an advisor to be sure that every sentence in every thesis that they advise is either original or properly cited
- The graduate students argument was that their research was original and that they had never been told that copying portions of prior art into their literature-review sections was wrong.
Plagiarism

- On May 12, 1991, H Joachim Maitre, Dean of BU’s College of Communications, repeated nearly verbatim sections of an article by a film critic Michael Medved, in a commencement speech.
- He failed to cite his source.
- Plagiarism charge printed in *The Boston Globe* on July 2nd.
- Dean Maitre resigned on July 13, 1991.
Scientific Misconduct

- Scientific misconduct is the violation of the standard codes of scholarly conduct and ethical behavior in professional scientific research. [wiki]

- Motivation for misconduct:
  a) Career pressure
  b) Laziness
  c) Ease of fabrication

- Forms of scientific misconduct:
  a) Fabrication & Falsification of Data.
  b) violation of ethical standards regarding human and animal experiments
  c) Misappropriation of data
  d) Plagiarism, self-plagiarism
Case Study: Data Falsification
UofM Stem Cell Research

• 2001 article in *Blood* described cells isolated from human bone marrow.
• 2002 article in *Nature* suggested a rare type of adult stem cell was ‘pluripotent.’
• Patent application submitted to U.S. Patent Office
• 2007 - *New Scientist* points out irregularities in results published in *Nature*.
• Investigation Committee was formed which finds 4 figures falsified and 3 duplications of data and incorrect labeling.
• The committee recommends retracting one paper and notifying other journals of discrepancies in figures.
• University notified the company holding patent interests
• Principal Investigator was cleared of misconduct charges.
• A former Graduate student was implicitly accused of misconduct.
• Reason for misconduct: “Poor scientific method, inadequate training and oversight for project “
• Former Graduate Student: “These were honest errors in part due to inexperience, poor training and lack of clear standards about digital image handling” – New Scientist
Case Study: Data Fabrication
Woo-Suk Hwang stem cell research

- February 2004: Hwang claimed that he extracted stem cells from unfertilized human eggs by cloning; which until then scientists had thought was impossible.
- August 2005: Hwang announced the first successful dog cloning.
- Others failed to repeat Hwang's experiment due to its complexity.
- November 2005: A researcher from University of Pittsburgh, made an announcement that he had ceased his collaboration with Hwang because of his concerns regarding egg donations in Hwang's research.
- January 2006: The Seoul National University announced that Hwang's 2004 and 2005 papers on Science were both fabricated.
- May 2006: Hwang was “indicted on embezzlement and bioethics law violations linked to faked stem cell research.”
Case Study: Data Fabrication
Woo-Suk Hwang stem cell research

• June 2007: The government subsequently barred Hwang from conducting human cloning research.

• October 2009: He was sentenced to two years suspended prison sentence at the Seoul Central District Court.

• His words: "I was blinded by work and my drive for achievement."

• Journals’ peer-review processes was highly criticized, suggestions were made to increase the number of reviewers, creating open access to reviewers’ comments, and improving reviewers’ access to primary data.

Case Study : Bell Labs Case

• In 2001, Jan Hendrik Schon, a German physicist at Bell Labs, announced in *Nature* that he had produced a transistor on the molecular scale.
• Record of a average of one journal publication per 8 days, known to be on a fast track to a Nobel prize.
• Whistleblowers: Prof. Lydia Sohn (Princeton), Prof. Paul McEuen (Cornell) found same noise pattern (which are unique) in two different experiments in two different publications.
• In May 2002 Lucent began a formal investigation: Schon was accused of 24 cases of scientific misconduct involving 25 papers
• Schon was found guilty of scientific misconduct.

QUESTIONS RAISED :
• why did he do it ? : Career pressure, Being a “true believer”
• Responsibility of peer reviewers ? : If fraud is suspected in every publication it becomes impossible to review journals efficiently.
• Responsibility of team leader and co-authors ? : They share the fame, so they should share the disgrace. Asking for too much verification impedes teamwork. Certain level of trust is necessary in scientific work.
• More Info : [http://en.wikipedia.org/wiki/Jan_Hendrik_Sch%C3%B6n](http://en.wikipedia.org/wiki/Jan_Hendrik_Sch%C3%B6n)
Case Study: Dr. J. Reece Roth, Arms Export Violation and Fraud

• Unlawfully exporting in 2005 and 2006 fifteen different “defense articles” to a citizen of the People’s Republic of China in violation of the Arms Export Control Act.
• Wire fraud involving defrauding the University of Tennessee of his honest services by illegally exporting sensitive military information relating to this USAF research and development.
• Roth gave his graduate students access to sensitive information while they researched a plasma-guidance system for the USAF UAV (unmanned aircraft).
  – Xin Dai is a citizen of the People’s Republic of China
    • Foreign National - Violation of the Arms Export Control Act.
Case Study: Dr. J. Reece Roth, Arms Export Violation and Fraud

- When traveling to China for a lecture tour in 2006, Roth had security sensitive reports and related studies on his laptop. He sent an email containing sensitive data via a Chinese college’s uncontrolled Internet connection.
- Four years in Jail followed by 2 years of supervised release.
- Defense Contractors as well as Research Institutions are not immune from prosecution.
- Providing Export Controlled technology to a foreign national by any means is an export.

Jin Chen Case Study

• PhD from EE, University of Texas, Austin, Worked for Motorola/Freescale before returning to China.
• 2003 : Chen’s research group announced that they had designed Hanxin 1, a Digital Signal Processing chip based on 0.18 micron technology and claimed to be first DSP chip that was wholly designed by Chinese researchers.
• Hanxin 2-4 announced in 2004-2006.
• Became a National Hero, secured many awards, and Millions of Dollars in funding.
• December 2005: A previous group member posted Internet messages and wrote letters to governments, accusing Chen’s works are all fake
• May 2006 : Investigation is conducted by Shanghai Jiao Tong University, Ministry of Science and Technology, and Ministry of Education
• Chen used Freescale 56800 chip in the demonstration of Hanxin 1
  – Chen reportedly asked workers to scratch off the original logo and print “Hanxin” on it
• Hanxin 2-4 used IP cores from other party; Not “wholly designed” by them at all.
• Chen was dismissed by SJTU, Awards were revoked, Remaining funds were frozen
  – 60M CNY (8M USD) spent.
More Info : http://www.nytimes.com/2006/05/15/technology/15fraud.html?_r=1
SBIR Fraud Case from Prof. Samim Anghaie of University of Florida

- Prof. Anghaie and his family members set up a company called New Era Technology, which was known as NETECH.
- NETECH submitted fraudulent proposals to NASA for proposed research contracts. As a result, NETECH received several NASA contracts.
- since 1999, NETECH was awarded 13 contracts from the government, and NETECH's bank records show NASA, the Air Force and the Department of Energy deposited nearly $3.4 million into the corporate account since 2000.
- Falsely claimed to have a state-of-the-art analysis and data communication laboratory, and that their company, New Era Technology, or NETECH, had a partnership with UF's Innovation Nuclear Space Power and Propulsion Institute.
- Anghaie and his wife diverted hundreds of thousands of dollars of illegally obtained government funds from their corporate bank account to personal accounts.
- Some of the work that was supposed to have been done by NETECH was actually work done at UF and a lab in Russia.
- Accused of fraud, money laundering and false reports.
- If convicted, they face up to 20 years in prison.
Professor Leon Shohet, University of Wisconsin-Madison

- Convicted of providing false data to the government to assure grant renewal.

- Inflated number of companies associated with an engineering research center.

- NSF: change of number had no effect on decision.

- 3 months in Jail.
Reporting Plagiarism/Misconduct

- To what extent is checking of documents by advisor/co-authors necessary?

- How strictly should self plagiarism be interpreted?

- Is it worth the trouble? It’s a NO WIN situation for all:
  - The accused: convicted
  - The whistleblower: No one likes a traitor
  - The Institution: credibility & public perception.
Authorship, Role of Authors and who should be co-Authors?

• Definition: Authorship is reserved for persons who receive primary credit and hold primary responsibility for a published work, it encompasses not only those who do the actual writing but also those who have made substantial scientific contributions to a study that lead to the publication.

• Authorship credit should be based on meeting the following conditions:
  a) Substantial contribution to the study:
  b) Provide important intellectual contribution towards the conceptualization or writing and reviewing multiple drafts of the article or abstract in a timely fashion.
  c) Are prepared to take public responsibility for the paper.

• Acknowledgment of other contributions of a less substantial nature may be determined by negotiation between authors. (The usual practice is for these contributions to be cited as acknowledgments or in a footnote)

• For contributors who are recognized as paid consultants to the research output, their inclusion as authors is usually left to the discretion of the research team.

• The Principal investigator or the First author of an individual paper is responsible for initiating the discussion of authorship order.
Students as Co-Authors

• Under the guidance of their supervisor, students who participate in a research project are required to negotiate their role with the entire research team early on in their involvement including expectations of team members and expectations for authorship.

• Students will normally be primary authors on research publications that arise from their masters or doctoral thesis work provided they meet journal requirements.

• Supervisors may only be included as a co-author on a research student's publication if they meet the above mentioned authorship criteria.
Disclosure: Nature Journal’s Competing Financial Interest Policy

- The Goal is to provide transparency and enable the readers to judge if there are any biases.
- What Needs to be Disclosed?
  a) Funding: Research support from organizations that might financially gain or lose through the research paper publication.
  b) Employment: recent, present or anticipated employment by any organization that might financially gain or lose through the research paper publication.
  c) Personal Financial Interests: stocks, shares, consultation fee or other forms of remuneration from companies that may gain or lose through the publication.
  d) Patents or patent applications whose value might be affected by the publication.
Individual Conflict of Interest

- UoM has set a policy to keep faculty and staff from getting involved in the issue of conflicts of interest
- The goal of this policy is to ensure that all covered individuals relationships with Business Entities should be transparent, with objectivity and do not improperly influence their professional judgment.

- Who are covered?
  a) Those who are involved in human subjects research subject to review by IRB (Institutional Review Board)
  b) Those who are involved in clinical health care.
  c) Those who are involved in technology commercialization
  d) Those who are in a position to exert control over the content of University curriculum that could benefit the commercial interests of a business entity.
  e) Those who are in a position to take any other action on behalf of the University that could benefit the commercial interests of a business entity
Individual Conflict of Interest

- **Section I:** Reporting & Managing Relationships with Business Entities: report significant financial interests and business interests with respect to themselves and their family members. (REPA forms)

- **Section II:** Standards Governing Relationships With Business Entities:
  - Consulting with Business Entities: Professional fees paid for the consulting services provided should fall within reasonable parameters of the fair market value.
  - Using Products Developed and Provided by Business Entities: May not disseminate to students or require students to use educational materials that promote a product or service of a business.
  - Attending or Participating in Events Sponsored by Business Entities: Individual is speaking and acting solely in his or her individual capacity and not on behalf of the University.
  - Prohibited External Relationships or Activities: Make Endorsements for product or service developed or sold by a particular business.
Institutional Conflicts of Interest

• “A situation in which the research, teaching, outreach, or other activities of the University may be compromised because of an external financial or business relationship held at the institutional level that may bring financial gain to the institution, any of its units, or the individuals covered by this policy”

• The university mandates that a financial disclosure form has to be submitted by the following people.
  1. Regents.
  2. University Officials.
  3. Department/Unit Heads
  4. Other Individuals
Institutional Conflicts of Interest

• Potential avenues for Conflict of Interest:
  1) When a company that has a financial or business relationship with the University also donates a gift to the University.
  2) When the University owns equity in a company and the company has a financial or business relationship with the University.
  3) When the University licenses an invention to an entity that also has a financial or business relationship with the University.
  4) When a vendor or potential vendor also has a financial or business relationship with the University.
  5) Additional safeguards are in place when the financial or business relationship involves conducting research with human subjects.
  6) Procedures are also in place for University officials who make decisions on behalf of the institution. These individuals do not conduct research, teaching or faculty service projects in their administrative capacities but may be in a position to influence how they are conducted and reported.
Ethical Harassment

• “Ethical harassment is what happens when another person (the harasser) attempts to coerce someone (the harassed) into perpetrating what the harassed regards as an ethical impropriety.” (employment at will doctrine)

• Ethical harassment can interfere with one’s work and cause problems for:
  – Harassed
  – The one who has witnessed the harassment
  – The harasser (under some circumstances)
    • For example for the employers it might cause employee dissatisfaction and in some cases legal actions
Different Categorization of Ethical Harassment

• First categorization:
  - Job benefit in exchange of unethical behavior (e.g. employee threatened for not complying or offered promotion for complying)
  - Hostile work environment: the act of interfering with employee’s work performance, or creating an intimidating or abusive or offensive work environment

• Second categorization:
  - Institutionally encouraged (or tolerated) harassment: structural ethical harassment built into an organization
  - Informal harassment: happens at pleasure of particular managers.

• Third Categorization:
  - Up-front or unequivocal harassment
  - Subtle and devious: in this case the harassed might be reluctant to claim harassment because of the fear he/she might have misunderstood the harasser’s intent
How to Mitigate Ethical Harassment

- We can get some insight into this problem by looking at its analogue, namely sexual harassment. How to take action:
  - Naming it.
  - Talking about ethical harassment and condemning it.
  - Taking individual action when you yourself are victimized.
  - Helping individuals victimized by harassment.
  - Negotiating to get agreements to include statements forbidding ethical harassment into codes of ethics or management policies.
  - Working to ensure that a training program is implemented for management.
  - Working to change the law to address ethical harassment.
  - Insisting on the right to act ethically as a fundamental human right.
Email Responsibility (July 2009)

• Boston Police Officer Justin Barrett referred to Harvard Prof. Henry Louis Gates, Jr. as “Banana Eating Jungle Monkey” in an Email.
• Officer was placed on administrative leave, and was suspended from military as Captain in Army National Guard.
Conclusion

• Education and Training in ethics is necessary.
• Faculty supervision must include ethics training.
• Funding agencies must increase emphasis on ethics training.
• NSF requires mandatory training beyond this talk.