Defining Industry Sponsored Capstone Projects

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1 Course Background

- OU Electrical and Computer Engineering Capstone operates with a process by which classes of 10 to 60 can ***research, design, develop, demonstrate and document*** a product in a single semester(1)
  - Industry supplies the Need, a Mentor, and Funding
  - Two 4-person teams on each Project (3- or 5-person OK)
  - Setting project scope is critical to challenge the students, yet allow time to complete the full process

Instructor must work with sponsors 2-months before class
To identify and scope potential projects

2 Choosing Partners

- Designing to an explicit need by an involved sponsor is critical to focus the design (2)
  - Validating the Requirement
  - Constraining and refining (not defining) the solution
  - Rewarding the students by seeing their installed product
- Mentors have a key role (3)
  - Participation in Design Reviews – Guiding Decisions
  - Monitoring Weekly Progress Reports – Averting Problems
  - Identifying Resources – Facilitating Development
  - Communicating/Invoking the Engineering Process

Instructor must actively recruit local/regional sponsors
Government Agencies, Large/Small Industries, Start-ups
Who have appropriate resources and personnel

3 Structuring Appropriate Projects

- Two over-arching, critical characteristics:
  - A good project can be designed and built in less than a month by a couple of experienced Engineers
  - A project mentor who understands and is invested in the need should be available and willing to participate
- Statement of Need (SoN) needs to focus on the "What" not the "How" (4)
  - Identify the required and desired outcomes
  - Identify the time, cost and performance constraints
- The "Requirement" evolves through Design Reviews
  - Preliminary Design Review (PDR) focuses on Functional Needs
  - Critical Design Review (CDR) focuses on Features and Performance
- Demonstration Highlights key performance capabilities
- Documentation tracks decisions throughout the process

End Product is defined thru selection of Student Team-Derived Alternatives
That meet the "Needs" of the Sponsor
And include "Desirements" as affordable additions

4 Developing Student Teams

- Successful student teams are comprised of students with the right talent base, each of whom has a defined role on the team (5)
  - Two teams balanced in GPA and skills on each Project
  - Matrix positions set the stage for self-management
    - » Program Manager, Configuration Manager,
    - » Team Correspondent, Financial Officer
- Course Structure Provides key roles for each
    - » PM's lead PDR, CM's lead CDR
    - » CO's lead publications, FO's negotiate and execute Budget

It is important to consider work experience & extra-curricular strengths of students
When constructing balanced teams

5 Successful Project Attributes

- Direct Product Application: so students may see how product fits into the environment
- Sufficient Funds: to affect a professional solution to the problem
- Committed Mentor: who will benefit from the product and who will guide not direct
- Design Breadth: involving technology and techniques that challenge EE and CpE students

Staffed with students who rank the project as one of their top-two choices

6 Attributes to Avoid

- Over-Specification: when the SoN focuses on how to design vs what it must do.
- Time-Crunch: Timely need for the product takes priority or rushes the product to short-term solution vs process derived solution
- Technology Mismatch: Student experience
- Mentor Overload: Too much travel or other crises can be lethal if undetected by Instructor

Success requires Sponsor Commitment, Balanced Teams with
Appropriate Resources and Clear Processes to pace and monitor Progress

References

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