The Harvey Mudd College Clinic Program

Celebrating more than 50 years of Clinic

R. Michael Shanahan Center for Teaching and Learning
Claremont, California
What is Clinic?

- Sponsored capstone-project course (taken by all senior CS majors)
- Starts in September, ends in May
- 10+ hrs / student / week (1200-1500 hours in total)
- Sponsors own all IP

Team of 4-5 students, delivering on an open-ended project with a faculty advisor, sponsor, and sponsor’s liaison(s).
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Matterport: a custom-designed 3d game

Fluxergy: cellular image-processing
Example: Matterport

Innovative uses of 3d modeling:
A real-world, first-person game
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Microsoft: confident reading, by everyone

Verkada: live-stream computer vision + ML
An energy- and geology-motivated application: finding $^{235}$U fission tracks in apatite crystals
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Pure Storage: file-system capabilities
Jones Parking: targeted start-up-teaming
## Clinic Sponsor Commitment

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Project Statement</strong></td>
<td>1-2 pages ~ sponsor, vision, problem, deliverables</td>
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<tr>
<td><strong>Business Agreement</strong></td>
<td>~3 pages, responsive, confidentiality as desired</td>
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<tr>
<td><strong>Fee</strong></td>
<td>$52,000  (divided into three payments)</td>
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<td><strong>Feedback</strong></td>
<td>Throughout. Externally, at the project’s end</td>
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<td><strong>Liaison(s)</strong></td>
<td>Approximately 1-2 hours per week ~ &quot;Aligner&quot;</td>
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Clinic Timeline
Key Dates: 2019-2020

- Winter ~ Spring
  Project Statement developed
- Aug 1, 2019
  Projects opened to students
- May 5, 2020
  Projects Day @ HMC
- May 2019
  Business Agreement Signed
- Sep 5, 2019
  Launch Day @ HMC
Value to Sponsors

- **80%** of 2017-18 clinic sponsors said that their project was “a success”
- In 2018, **5 patent disclosures** were reported by Clinic sponsors
- More than 60% of 2017-18 sponsors estimated the **value of their project** to their company at $100,000 or more. (highest ~ $1.5 m)
Value to Sponsors & Students

MITRE’s team and poster @ Projects Day.  Recruiting / Re-visioning
Value to Sponsors & Students

Final presentations @ Projects Day.  *Collaboration breadth*

then (2006)

now
Value to Sponsors & Students

¾ of AmEx’s team @ NYC site visit

Experience + Engagement
Mudders: bright, inventive, fearless

Highly Selective Liberal Arts College

- 886 students
- 87% of incoming students were top 10%
- Competition: Stanford, MIT, Caltech
- Siblings: CMC, Scripps, Pitzer, Pomona

30% of seniors go directly to graduate school

 Ranked #2 for science + engineering Ph.D.s

Source: Office of Institutional Research and Effectiveness, Harvey Mudd College
Mudders: bright, inventive, fearless

**Harvey Mudd College**
Claremont, CA

- #1 in Engineering Programs (no doctorate) (tie)
- 0 user reviews

Harvey Mudd College is a private liberal arts school known for its strong programs in math, science, and engineering. Harvey Mudd is ...more

- $56,876 Tuition and Fees
- 844 Undergraduate Enrollment
- 4.6 Reputation Score
- SAT, GPA and more

**U.S. News and World Report**
- #1 – Engineering ~ undergrad
- #3 – Campus Ethnic Diversity
- #18 – Liberal Arts Colleges

**Princeton Review**
- #3 – “Students Study the Most”
- #3 – “Most Accessible Professors”

**Forbes 2018**
- #3 – Top 25 STEM Colleges
- #5 – Top Liberal Arts Colleges
Engaged in the world

Global Clinic
• 1-2 projects per year
• International partner (corporate/NGO)
• Academic partner

Social Justice Clinics
• New in 2018
• Non-profit partners
• Social impact through technology ~ with a clear understanding of the impact of their work on society

The CareFusion Clinic Team designed, built and tested a low-cost, high-performance IV infusion delivery system specifically targeting developing healthcare markets.
Past clinics ~ areas of focus

**Computer Science**
- Data science, modeling, analysis
- User experience: UI/UX development
- Machine Learning of all sorts
- (Deep) NN and AI / Robotics
- Image processing and Computer vision
- Threat detection, Cybersecurity
- Algorithm development and assessment
- Domain-specific programming languages
- Workflow and work-process
  - + Streamlining, re-engineering
- Investigative software engineering

**Engineering**
- Design & testing
- Mechanical/Structural
- Embedded Processing
- Robotics
- Systems & Signals, Controls
- Biomedical
- Aerospace, automotive
- Manufacturing, process engineering
- Materials
- Chemical
- Energy & Environment

Explore, prototype & align new, emerging ideas
2017-2018 Sponsors
Projects ... Possible Paths

• Speculative *unerased-whiteboard* opportunities
  • "If we had one more FTE... or team” (to manage)

• Valuable, not critical-path

• There's no typical Clinic project:
  • "R + D for our R & D"
  • "Optimizing – along a new axis"
  • "Exploring hackathons’ 2-5% ideas"
  • "A start-up – internally incubated..."

*Thoughts?*
2017-2018 Sponsors
2015-2016 Sponsors
More information

hmc.edu/clinic
clinic@hmc.edu
The remaining slides provide additional context – they’re not part of our in-person presentations, unless they turn out to help...
The Year’s End: Projects Day

GoDaddy team’s presentation
Year’s End:  Projects Day

AmEx team’s dinner
and beyond…

AmEx team’s visit
The Year’s Rhythms: Orientation Day

- Liaisons invited to campus
- Meet with Clinic Director
  - Strategies and tips
- Meet with team and faculty advisor
  - Cover problem in detail
  - Discuss confidentiality
- Establish communication routine
  - Email/Slack/other
  - Weekly teleconferences
- Jumpstart the project, face-to-face
- Recruiting / internship opportunity
Example clinic projects

MIT LL Imaging team

https://docs.google.com/presentation/d/1I1w54H9rLk70h54dSbwAV8_DphJ4Gp4Ky3H5/edit#slide=id.g4b22172e9_0_2
Mudd: depth, rigor, and breadth

**HMC’s Common Core**

(semesters)

1  Biology (+ associated lab)
1.5 Chemistry (+ associated lab)
1++ Computer Science
1  Engineering
1  Critical Inquiry (Humanities, Social Sciences, and the Arts)
3  Mathematics
2.5 Physics (+ associated lab)
.5  Writing

10 HSA (Humanities, Social Sciences, and the Arts)

Major requirements

Common Core
Past clinics: areas of focus

Mathematics
- Process analytics
- Data science
- Neural networks
- Pricing modeling and optimization
- Data mining

Physics and Biology
- Quantum processing
- Nanoparticles
- Optics
- Photovoltaics