WPI-Hosted Robotics Competition IQP

Andrew Nagal, Nathan Rosenberg, Rohit Unnam
Abstract

• Goal:
  – To develop a collegiate robotics competition hosted by WPI.

• Background research:
  – Researched other competitions to identify what makes them successful.

• What we did:
  – Interviews
  – Develop a plan of action
Background
Robotics competitions at WPI
Robotics Competitions at WPI: FIRST

- Been part of WPI since 1991
- “One of the longest continuously involved universities” – Ken Stafford
Robotics Competitions at WPI: NASA Centennial Challenge

- Ran from 2012 to 2016
- WPI was the only university to host a NASA Centennial Challenge
As a leader in robotics, WPI has never had a collegiate robotics competition...
...It’s time for WPI to host a collegiate robotics competition.
Why?

Why host a collegiate robotics competition?
Benefits

- An opportunity to form relationships with companies in the robotics industry
Benefits

- An opportunity to bring other institutions to WPI
- A way to publicize the robotics program on an international level
Competition Development
Determining Value

- Interviewed:
  - 20 representatives from 18 universities
  - 5 potential sponsors
  - Key stakeholders at WPI

[Images of various universities and companies]
What We Discovered

• Ideal Dates
  – End of May, Beginning of June

• Interests from potential participants
  – Projects with real-world applications

• Corporate interests
  – Development of relevant skills

• WPI stakeholder interests and requirements
  – Admissions
  – Peer to peer recognition
Developing the Event

• Proposed Challenges
  – All-Terrain Challenge
  – Underwater Aquaculture Challenge
  – Mini Fire-fighting Challenge
  – Item Sorting Challenge
  – Autonomous Vehicle Race
  – Mini Warehouse Swarm Robotics Challenge
  – Indoor Drone Competition
Challenges

- Each challenge is based on finding solutions to real-world problems.
Competition Feedback

Interest in Challenges

- All-Terrain Robotics Challenge
- Underwater Aquaculture Challenge
- Item Sorting Challenge
- Autonomous Vehicle Challenge
- Mini Firefighting Challenge
- Warehouse Swarm Robotics Challenge
- Indoor Drone Challenge
Competition Feedback

Likelihood University will Participate

- All-Terrain Robotics Challenge: 4
- Underwater Aquaculture Challenge: 5
- Item Sorting Challenge: 6
- Autonomous Vehicle Challenge: 7
- Mini Firefighting Challenge: 8
- Warehouse Swarm Robotics Challenge: 8
- Indoor Drone Challenge: 8

Worcester Polytechnic Institute
<table>
<thead>
<tr>
<th>Metric</th>
<th>All-Terrain Robotics Challenge</th>
<th>Underwater Aquaculture Challenge</th>
<th>Item Sorting Challenge</th>
<th>Autonomous Vehicle Challenge</th>
<th>Mini Firefighting Challenge</th>
<th>Warehouse Swarm Robotics Challenge</th>
<th>Indoor Drone Challenge</th>
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</thead>
<tbody>
<tr>
<td>Estimated cost range of this competition for teams</td>
<td>$4,000-$12,000</td>
<td>$7,000-$12,000</td>
<td>$1,000-$5,000</td>
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<tr>
<td>Estimated number of students on participating teams</td>
<td>4-10</td>
<td>4-10</td>
<td>4-6</td>
<td>4-10</td>
<td>4-6</td>
<td>4-8</td>
<td>4-6</td>
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<td>Type of space necessary to host</td>
<td>200x100 ft Indoor Space Minimum, 100x100 ft Outdoor space minimum</td>
<td>Swimming Pool</td>
<td>Up to 100x100 ft Indoor Space</td>
<td>200x200 ft Outdoor Space Minimum</td>
<td>Up to 100x100 ft Indoor Space</td>
<td>Up to 100x100 ft Indoor Space</td>
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Our Proposed Event
Hosted in Collaboration with TouchTomorrow

- Fun and exciting audience-friendly event
- Early June is the ideal time for a collegiate robotics competition
- Friday and Saturday

TOUCHTOMORROW
JUNE 9

TouchTomorrow
June 9

WPI-Hosted Robotics Competition IQP

Worcester Polytechnic Institute
Warehouse Swarm Challenge

- Related to warehouse robotics, such as the Amazon warehouse robots
- Develops swarm robotics and systems skills
Indoor Drone Challenge

- Related to transporting goods and people
- Develops advanced computer vision and navigation and control skills
Mini Fire Fighting Challenge

- Related to search and rescue
- Develops navigation and basic robotics concepts
- Based on Trinity Fire Fighting Contest
Making this a Reality
Sponsors

• Through corporate sponsorship, the event would be cost-neutral
• Companies would sponsor competitions
• Job fair and booths
• Networking opportunities
TouchTomorrow Locations

- Harrington
  - Drone & Warehouse Sorting Challenges
- Riley Commons
  - Mini Fire Fighting Challenge
- Rec Center
  - Robot Pits
    - Team pits
  - Basketball Courts
    - Sponsor booths/career fair
Future Work

• Implementation
  – Formation of a committee
• Earliest could host would be during TouchTomorrow 2019
• Rules released in June 2018
<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
<th>Year</th>
<th>Scale of 1-10</th>
<th>Scale of 1-10</th>
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<td>Will Smith</td>
<td>Duke</td>
<td>Freshman</td>
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<td>University of Texas at Austin</td>
<td>Junior</td>
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<td>Sairahul Adharapurapu</td>
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<td>Zulkifl Gire</td>
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<td>Alex Hattori</td>
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<td>James Trapp</td>
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<td>Jared Lehmann</td>
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<td>Quinn Khosla</td>
<td>Colorado School of Mines</td>
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