ResearchLink

Taking the search out of Undergraduate Research

Design Presentation
April 20, 2016
CS 410
Orange Team:
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Outline

• The Team
• The Problem
• The Solution
• Design Approach
  • Current process
  • Modified process
• Development Approach
  • Work breakdown structure
  • Software requirements
  • Hardware requirements
  • Algorithms
• Risks
The Team

Asim Amjad
Database Specialist

Kevin Ashley
Web Developer/Graphic Artist

Kitt Parker
Database Specialist

John Raha
UI Specialist

Matthew Redenius
UI Lead

Dinah Watkins
Project Manager/Web Developer
Ms. Brunelle serves as an Assistant Chair of the Old Dominion University Computer Science department and is the Chief Departmental Advisor.
Domain Expert

Dr. Jing He is an Associate Professor in the Computer Science Department at Old Dominion University. She has a Phd. in Structural & Computational Biology & Molecular Biophysics, a M.S. in Applied Mathematics, & B.S. in Applied Mathematics.
Computer Science Graduate Students

- **2014:**
  - 2,430 ODU Graduate applicants
  - 796 Graduate enrollments
  - 139 Computer Science Graduate students

- **2020 STEM Jobs**
  - Computer Researcher represents 1% of Computing jobs

[CS Presentation 2015]

[ODU Factbook]
More than Studying

Prospective graduate students need more than lectures and textbooks. To fully prepare themselves for the rigorous demands of graduate school, students need to participate in undergraduate research.
The Problem

Undergraduate research opportunities are not effectively communicated to and from intended stakeholders (faculty, students, external organizations).
The Solution

Research Link

Taking the search out of Undergraduate Research
The Customer

- Universities
  - Old Dominion University (Case Study)
  - Other Universities
  - Community Colleges
- Funding Agencies
  - National Science Foundation (NSF)
  - National Institute of Health (NIH)
  - National Aeronautics and Space Administration (NASA)
Current Process

Research opportunity becomes available

Information is sent to a faculty member (Professor/Academic Advisor)

**Miscommunication of opportunity information to correct department

Faculty member posts opportunity outside office

Opportunity is emailed to student

**Student deletes or loses email

Opportunity is verbally communicated to student

**Miscommunication or misunderstanding of opportunity information

**Outdated delivery method of opportunity information

**Student loses bulletin before follow up

Student misses out on research opportunity
Objectives to Achieve the Solution

- Customizable Profiles (Faculty & Students)
- Automated Filtering
  - Based on profile
- Time-line Management (expiration of posts)
- Department level profiles
- Interdisciplinary feature to facilitate collaboration between departments
- Student research idea proposal submission
- Data Mining
Modified Process

Research opportunity becomes available

Faculty member receives opportunity information

Faculty member places opportunity information into ResearchLink

Research Link

Student creates a profile

Student receives automatic notifications of new research opportunities

Research Professor creates a profile and searches for qualified students

Research Professor receives profile results based on desired criteria

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The Competition

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Functional Components

- **ResearchLink Portal**
  - Automatic student registration
  - Mobile friendly
  - User/faculty/department Profiles
  - Authorized users and visitors

- **Database of opportunities**
  - Searchable
  - Student and faculty proposals
  - Research related internship opportunities
  - Internal and external research opportunities
Hardware

UNIX - APACHE
- 2 x 8 core 2.6GHz Xeon
- 128GB RAM
- 8 x 500GB SSD (RAID 6)
- NIC Teaming

Software

- MySQL database
- Graphical User Interface
- ODU system interfaces
- HTML, JavaScript, and CSS
- PHP
Algorithms
Login

Start

Credentials Input

Login Button Pressed

Valid Email Address?

Yes

Email exists?

Yes

Password Correct?

End

No

Error Message

User taken to homepage

Yes

No

No
Create Profile

Start → Create Profile Button Clicked → Load Interface → Template Filled out → Submit Button Clicked → User Input Allowed?

Error Message

Identical email or profile exists?

Yes → Profile added to database

No → Indicate Illegal Characters

Authentication Email Sent → End
Create Research Opportunity

Start

Create Research Opportunity Button Clicked

Load Interface

Template Filled out

Error Message

Yes

No

Opportunity added to database

Identical posting exists?

Yes

Posting Added Message

End

No

Post Button Clicked
Filter Database

Start

Search blocked filled out

Search button Pressed

Valid Input?

No

Yes

Create query with SQL Input

Convert user input to SQL

Return query Results

End

Error Message
Site Map

Login Page
- Student Home
  - Filters
  - Recommended Opportunities
  - Application History
  - Opportunity Search (Student)
  - Opportunity Listing Information
- Profile Creation
  - Help
  - Profile Settings
  - About Us
  - Log Out
- Faculty Home
  - Opportunity Search (Faculty)
  - Student Search
  - Create Opportunity
  - Company Search
  - Company Contact

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## Risk Matrix

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C1: Customer Dissatisfaction

The customer is not happy with the product and refuses to implement its usage.

[Probability: 3, Impact: 5]

Mitigation Strategy:

Mentor involvement during development and use customer complaints as a template for future updates.
C2: Underutilized System

The customer is unaware of the products’ existence or difficulty level of use.

Mitigation Strategy:

Advertise the product and ensure ease of use.
C3: Transition to New System

The customer has issues with using the new system.

Mitigation Strategy:

Provide helpful guides and tutorials for users.
T1: Security/Data Protection

The software solution is not protected from data breaches and other malicious attacks.

Mitigation Strategy:

Follow best practices for information security.
T2: Efficiency of Searches

Searches are inefficient and non-customizable.

Mitigation Strategy:

User result tracking & various search filter options.
T3: Storage

Storage space for related data becomes an issue.

Mitigation Strategy:

Management of old opportunities to clear out unnecessary data.
T4: System Failure

The system is down and not accessible to the customer.

Mitigation Strategy:

Regularly scheduled system backups.
T5: System Upgrades

System upgrades disable the functionality of the product for an undetermined amount of time.

[Probability: 2, Impact: 3]

Mitigation Strategy:

Testing prior to making upgrades live and future proof design.
T6: Integration of Data

Software solution is not compatible with current technologies used.

Mitigation Strategy:

Ensure compatibility between databases utilized for transfer of data.
How Does the Student Benefit?

• Always Informed
  • Automated notifications of new opportunities via email
  • Emails include links to immediately apply for research position
  • Alerts specific to student’s major
  • Opportunities are updated and sent out in real time

• Centralized Location
  • Application process is no longer scattered
  • One website to learn about and apply for undergraduate research
How does the University Benefit?

- Helps put the University on the map
  - There’s a reason big name Universities like Harvard, UCLA, and Yale all have large portions of their website dedicated to undergraduate research
  - ResearchLink will consolidate the school’s existing opportunities into an easy to understand portal
  - This makes potential graduate students far more likely to apply.
Rapid Prototypes
Profile Information

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Create Opportunity

- Department:
- Category:
- Search Tags: List keywords separated by comma
- Application Deadline:
- Start Date:
- End Date:
- Description:
- Course Prerequisites:
- Minimum GPA:
- Organization:
- Contact Name:
- Contact Email:

Add Cancel
Conclusion

• The Problem
• The Solution
• Design Approach
• Development Approach
• Risk Analysis
References

• Computer Science Undergraduate Degree Program. *Old Dominion University Computer Science Department.*
• Vieyra, M., Carlson, A., Leaver, E., & Timmerman, B. Undergraduate Research: I Am Not Sure What It Is, But I Don’t Have Time to Do It Anyway.. *Council on Undergraduate Research Quarterly,* (Spring 2013, Volume 33, Number 3)