1. **INTRODUCTION**

- **Societal problem**
  - # of Undergraduates transitioning to Graduate program
  - Outdated delivery methods
  - Lost/forgotten emails
  - Miscommunication and misunderstanding
  - Lack of notifications/reminders
  - Missed opportunities
  - Lack of a public venue to advertise student and departmental successes in research

- **Describe customer**
  - ODU
    - Interested in improving ranking & enrollments
  - External agencies
    - Opportunities
      - Internships
      - Scholarships
      - Skill Camps
    - Recruit and retain talent

- **Needed solution characteristics**
  - Distribute opportunities appropriately
  - Reminders
  - Direct communication
  - Trending
  - Sharing of successes with the public & prospective students

- **Introduce “ResearchLink” as solution**
  - Provide hub for opportunities
  - Removes middleman
  - Intuitive reminders
  - Recruitment/enticement of future Undergraduates
2. RESEARCHLINK PRODUCT DESCRIPTION

● Summary
  ○ Live stream, up-to-date research news components for both public (on product launch page) and university community
  ○ Convenient
  ○ Intuitive
  ○ Consolidation
  ○ Link research companies to grad students
  ○ Promote research/co-op positions.

● Goals
  ○ Up-to-date information
  ○ Highlight department and student successes
  ○ Intuitive organization or process
  ○ Promotion of communication
  ○ Enhance opportunity exposure

● Objectives
  ○ Increase research program affinity
  ○ Attract more Undergraduate & Graduate students to ODU
  ○ Increase ODU Undergraduate transition to Graduate program

2.1. Key Product Features and Capabilities

● Sharing information/making opportunities available
  ○ Administrative
    ■ Account creation
    ■ Opportunity creation
    ■ User login
    ■ Archival of old opportunities
  ○ Faculty
    ■ Profile creation/update
    ■ Departmental profiles
    ■ Filtered search options for student qualifications
    ■ Sharing of research opportunities participated in
  ○ Student
    ■ Profile creation/update
    ■ Filtered search options for research opportunities
- Selection of interests
- Sharing of completed courses and GPA
- Sharing of research opportunities participated in

**Pushing information**
- Faculty
  - Departmental interests
  - Reminders for recurring opportunities
- Student
  - Receipt of categorical notifications/filtering
  - Receipt of opportunity deadline notifications

**Reputation / public presence/ recruitment/ student highlights**
- Faculty
  - Add/view/update information about departmental successes
  - Add/view/update information about student successes
- Student
  - View departmental successes
  - View student successes

**Accessibility**
- Web interface
- Mobile interface

### 2.2. **Major Components (Hardware/Software)**

- **Hardware**
  - SQL Database Server
  - Web Server
- **Software (LAMP Structure)**
  - Linux
  - Apache
  - MySQL
  - PHP

### 3. **IDENTIFICATION OF CASE STUDY**

- **Description of Issue**
  - Effects on Undergraduate research
  - Current solutions
    - Pivot
University developed databases
  ● Harvard, Penn State, etc...
○ Description of current research problems
  ■ Undergraduate Participation
    ● Unprepared Graduate students
    ● Undiscovered interest in research
      ○ Loss of potential graduate students
● Problem Evidence
  ○ Cited Problems
    ■ Degraded communication
      ● Sub-optimal amount of candidates
    ■ Limited knowledge of opportunities
      ● Poor advertisement
    ■ Objective evidence
  ○ Statistical Evidence
    ■ Undergraduate research participation
    ■ Undergraduate research / graduate education correlation
● Prospective Users
  ○ Universities
    ■ Old Dominion University
      ● Computer Science Department
  ○ Research organizations

4. RESEARCHLINK PRODUCT PROTOTYPE DESCRIPTION
● Proof of concept:
  ○ Faculty:
    ■ Simulate yearly reminders for recurring opportunities
    ■ Creation of opportunity
    ■ Search for students based on courses completed and GPA
  ○ Student:
    ■ Filterable searches for research opportunities
    ■ Notifications from new opportunities within specific category
    ■ Notifications of deadlines approaching
● Risk Mitigation:
  ○ Helpful guides/tutorials
    ■ Underutilized System
Transition to new system

Simulation

○ Use of multiple PCs to bring up ResearchLink during simulation
  ■ Administrative account
  ■ Faculty account
  ■ Student account
  ○ Can be simulated remotely and on-site

4.1. Prototype Architecture (Hardware/Software)

● Prototype MFCD breakdown
● Hardware
  ○ CS Virtual Machine
● Software
  ○ Apache2 Server
  ○ MySQL Database
    ■ Simulated student/faculty Banner information
  ○ PHP 7.0
  ○ Laravel Framework 5.2
  ○ Composer

4.2. Prototype Features and Capabilities

● Features
  ○ Customizable alerts
  ○ Research opportunity creation
  ○ Live news feed (public and internal to ResearchLink)
    ■ Departmental successes
    ■ Student successes
  ○ Student/faculty profile creation/update
● Capabilities
  ○ Archival of expired opportunities
  ○ Calendar based reminders for faculty for recurring opportunities

4.3. Prototype Development Challenges

<Challenges expected while completing the objectives of the prototype – ie knowledge missing, capability missing, supporting technology issues.>

● Integration with existing systems
  ○ Banner
  ○ My ODU
● Web design/development skill set deficiencies
  ○ Knowledge of HTML, CSS, JavaScript, PHP, Laravel Framework
  ○ Web application security
  ○ Testing
  ○ Deployment
Glossary

**Banner:** Old Dominion University’s Administration System that provides controlled access to financial, student and personnel data. This system is only available to Faculty and Staff.

**Laravel Framework:** A powerful MVC PHP framework, designed for developers who need a simple and elegant toolkit to create full-featured web applications.

**PHP:** Server scripting language for making dynamic and interactive Web pages.

**HTML:** HyperText Markup Language is the standard language for creating web pages and applications.

**CSS:** Cascading Style Sheets is a style sheet language used for describing the presentation of a document written in a markup language.

**MySQL:** Open-source relational database management system.

**Apache2 Server:** Web server software.

**NSF:** National Science Foundation (NSF); Offers funded research opportunities through Research Experiences for Undergraduates (REU).

**NASA:** National Aeronautics and Space Administration; Offers Undergraduate Research Fellowships and internships.
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)