

# Capstone in Software Engineering: Initial Proposal

SENG 701 – Fall 2025

**Initial Submission – Work in Progress**

Under the guidance of

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MPS Software Engineering

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## **Section 1: Project Data**

### **Student Information**

- 1) Student Name: Satwik Alla
- 2) Contact Phone Number: 410-905-4899
- 3) UMBC Email Address: [satwika1@umbc.edu](mailto:satwika1@umbc.edu)
- 4) Semester and Year of Capstone experience: Fall 2025
- 5) Expected graduation date: 17 December 2025

### **Capstone Course Information**

- 1) Capstone faculty: Dr. Mohammad Samarah
- 2) Capstone Advisor: To be determined based on final project domain selection

### **Sponsor Client Information**

- 1) Client contact name: In Progress - Currently evaluating multiple potential sponsors
- 2) Client contact title: To be determined upon sponsor confirmation
- 3) Client contact phone number: Pending sponsor selection
- 4) Client contact email address: Pending sponsor selection
- 5) Client organization name: Multiple organizations under consideration (see Section 3)
- 6) Client organization other stakeholders: To be identified during discovery phase

## **Section 2: Project Information**

### **Project Title**

Working Title: "Digital Solutions for Organizational Efficiency Enhancement"

*Note: Final title will be refined based on confirmed sponsor's specific needs*

### **Problem Statement**

Current Status: Exploring multiple problem domains through active sponsor outreach.

Based on initial conversations with potential sponsors, several high-impact problem areas have been identified:

1. Healthcare Operations Optimization: Digital solutions to streamline patient care workflows and reduce administrative burden
2. Educational Technology Enhancement: Platforms to improve student engagement and learning outcomes in K-12 or higher education settings
3. Non-Profit Resource Management: Systems to optimize volunteer coordination, donor management, or service delivery
4. Community Service Digitization: Applications to bridge digital divides or improve access to essential services

The final problem statement will be clearly defined once a sponsor is confirmed, ensuring it meets the handbook criteria for addressing a real-world problem with significant impact potential.

### **Project History and Evolution**

#### Timeline of Development:

- Week 1: Reviewed course-provided sponsor resources and identified potential organizations
- Week 2: Initiated contact with 8+ organizations across healthcare, education, and non-profit sectors
- Current Status:
  - 3 organizations have declined due to timing/capacity constraints
  - 4 organizations are reviewing proposals and will respond within 1-2 weeks
  - 2 organizations have expressed preliminary interest and requested follow-up meetings
  - Continuing outreach to additional organizations as backup options

## Section 3: Project Background

### Client and Organization Assessment

#### Organizations under Consideration

While specific details are confidential pending final selection, the candidate organizations fall into these categories:

- 1) Healthcare Sector Partners
  - a. Regional medical centers with patient flow optimization needs
  - b. Healthcare technology companies seeking workflow automation
- 2) Educational Institution Partners
  - a. Local school districts with technology integration challenges
  - b. Educational non-profits focused on STEM engagement
- 3) Community Service Organizations
  - a. Non-profits serving underrepresented communities
  - b. Government agencies modernizing citizen services

#### Selection Criteria Applied

- 1) Established for 12+ months with 3+ employees
- 2) Clear software engineering problem identification
- 3) Willingness to provide necessary access and collaboration
- 4) Alignment with university mission and values
- 5) Physical presence in tri-state area (DC-VA-MD)

#### Stakeholder Expectations Framework

*To be completed upon sponsor confirmation*

#### Anticipated Stakeholder Categories

- 1) Primary sponsor contact
- 2) End users of the proposed solution
- 3) Technical staff for integration considerations
- 4) Management stakeholders for strategic alignment

### Required Resources and Access

#### Anticipated Resource Needs

- 1) Regular access to sponsor personnel for requirements gathering
- 2) Organizational documentation and process workflows
- 3) Technical specifications of existing systems
- 4) User feedback sessions during development phases
- 5) Testing environment or sandbox access

## **Anticipated Challenges, Risks, and Mitigation Strategies**

### Challenge 1: Sponsor Identification and Commitment

- 1) Current risk: Multiple rejections could delay project start
- 2) Mitigation: Maintaining active pipeline of 6+ potential sponsors, prepared to expand outreach if needed
- 3) Timeline Impact: Built 1 week buffer into proposal development schedule

### Challenge 2: Requirements Complexity Management

- Anticipated Risk: Scope creep or unclear requirements from sponsor
- Mitigation: Structured requirements engineering approach with clear documentation and regular validation checkpoints

## **Section 4: Proposed Solution Framework**

### **Requirements Engineering Methods**

The following comprehensive approach will be employed to understand and analyze sponsor's requirements:

#### **Primary Methods:**

- 1) Literature Review and Market Analysis
  - a. Comprehensive analysis of existing solutions in the problem domain
  - b. Industry best practices research
  - c. Competitive landscape assessment
- 2) Direct Data Collection
  - a. Structured stakeholder interviews with key personnel
  - b. Focus groups with end users
  - c. Surveys for broader organizational input
- 3) Indirect Data Collection
  - a. On-site observation of current workflows
  - b. Document analysis of existing processes
  - c. Workflow documentation and mapping
- 4) Multi-Level Analysis
  - a. Best practices identification
  - b. Market trends analysis
  - c. Technology feasibility assessment

### **Development Methodology and Implementation Approach**

#### **Software Engineering Framework**

- 1) Process Management: Agile development with 2-week sprints
- 2) Architecture: Modular, scalable design following clean architecture principles
- 3) Quality Assurance: Test-driven development with comprehensive unit and integration testing
- 4) Version Control: Git/GitHub with continuous integration practices
- 5) Documentation : Comprehensive technical and user documentation

#### **Technologies and Tools (Preliminary)**

- 1) Modern web frameworks (React/Vue.js for frontend, Node.js/Python for backend)
- 2) Cloud deployment (AWS for scalability)
- 3) Database management (PostgreSQL/MongoDB based on requirements)
- 4) Security implementations following industry standards

### **Data Management and Analysis Plan**

### Data Handling Strategy

- 1) Comprehensive data collection protocols
- 2) Security and privacy compliance (GDPR/HIPAA as applicable)
- 3) Secure storage and backup strategies
- 4) Data visualization and analytics dashboards
- 5) Actionable insights generation for end users

### **Expected Benefits and Outcomes**

#### Measurable Impact Goals

- 1) Operational Efficiency: Quantifiable improvement in sponsor's key performance metrics
- 2) User Experience: Enhanced usability and satisfaction scores
- 3) Technical Achievement: Demonstration of advanced software engineering principles
- 4) Academic Learning: Integration of multiple software engineering subfields
- 5) Future Scalability: Foundation for continued development post-capstone

### **Preliminary User Stories Framework**

As a (Role), I want to (feature), so that (benefit)

This is the structure for user stories. Rephrase your requirements within the role, feature and benefit sections to represent core and non-core functionality. The number of user stories usually represents the number of requirements, hence as per capstone handbook, 15 unique user stories are to be created.

*Note: As the project has not been finalized, so couldn't come up with user stories.*

### **User Interface and Experience Design**

#### Prototype Development Plan

- 1) Discovery Phase: Low-fidelity wireframes for concept validation
- 2) Design Phase: High-fidelity interactive prototypes
- 3) Implementation: Cohesive start-to-finish user experience
- 4) Focus Areas: Core functionality demonstration, minimal emphasis on standard features (authentication, basic CRUD operations)

### **Section 5: Git Repository Link**

Repository Status: Will be created upon project approval and sponsor confirmation

Planned URL: [GitHub repository to be established]



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## **Project Timeline and Deliverable Schedule**

### **Phase 0: Proposal Finalization**

- 1) Target Completion: September 22, 2025
- 2) Key Milestones:
  - a. Sponsor confirmation: September 15, 2025
  - b. Requirements engineering completion: September 20, 2025
  - c. Final proposal submission: September 22, 2025

### **Phase 1: Alpha Checkpoint**

- 1) Target Date: October 13, 2025
- 2) Functionality Goal: 50-70% of core features implemented
- 3) Quality Standard: Non-production ready with known gaps
- 4) Deliverables: All 13 items per handbook requirements

### **Phase 2: Beta Checkpoint**

- 1) Target Date: November 10, 2025
- 2) Functionality Goal: 70-90% of features with all core functions
- 3) Quality Standard: Limited production use capability
- 4) Focus: Performance optimization and defect reduction

### **Phase 3: Final Deliverable**

- 1) Target Date: December 7, 2025
- 2) Deliverable Type: Fully Functional Prototype (FFP) or Minimum Viable Product (MVP)
- 3) Quality Standards: Production-ready or near-production quality
- 4) Final Submission: Complete project package with all documentation

## **Conclusion and Next Steps**

This initial proposal demonstrates the foundational planning and preparation for a comprehensive capstone project. The structured approach to sponsor identification, requirements engineering, and technical implementation positions the project for success across all evaluation criteria.

### **Immediate Next Steps (Week of September 8-15, 2025):**

- 1) Follow-up Communications: Continue professional engagement with bwtech@UMBC and pursue Maryland Nonprofits member connections
- 2) Expand Outreach: Leverage additional university networks and external community organizations
- 3) Requirements Preparation: Develop detailed requirements engineering plan based on sponsor type confirmed
- 4) Technical Planning: Begin preliminary technical architecture planning for identified problem domains

### **Final Proposal Preparation (September 15-22, 2025):**

- 1) Sponsor Confirmation: Finalize partnership agreement and consent forms
- 2) Requirements Deep Dive: Complete comprehensive stakeholder interviews and needs analysis
- 3) Project Specification: Develop detailed user stories, technical specifications, and project timeline
- 4) Documentation: Complete all handbook-required sections with sponsor-specific details

## Appendix

### Sponsor Outreach Documentation

#### Evidence of Active Partnership Development Efforts

#### Documentation Purpose

This appendix provides evidence of systematic sponsor outreach efforts conducted during the initial capstone proposal phase. All personal identifying information and sensitive organizational details have been redacted to maintain confidentiality while demonstrating professional engagement and project development progress.

#### Outreach Summary Table

No	Organization Type	Organization	Contact Date	Status	Response type	Next Steps
1	Non-Profit Association	Maryland Nonprofits	Sept 4, 2025	Positive	Network facilitation	Community posting
2	Research/Tech Park	Bwtech@UMBC	Sept 5, 2025	Active Interest	Information provided	Follow-up meeting
3	Academic Library	UMBC Library	Sept 4, 2025	Declined	Capacity constraints	Alternative sourcing
4	Community Services	Organization of Hope	Sept 4, 2025	Pending	No response yet	Follow-up planned
5	Academic Department	UMBC CAHSS	Sept 4, 2025	Pending	No response yet	Follow-up planned
6	Student Services	UMBC OPP	Sept 5, 2025	Referred	Directed to Instructor	Course guidance
7	Entrepreneurship	Alex Brown Center	Sept 4, 2025	Pending	No response yet	Follow-up planned
8	IT Department	DoIT	Sept 4, 2025	Positive	Network Facilitation	Follow-up meeting
9	Non-profit association	Maryland food bank	Sept 4, 2025	pending	No response yet	Follow-up with volunteers

#### Communication Evidence

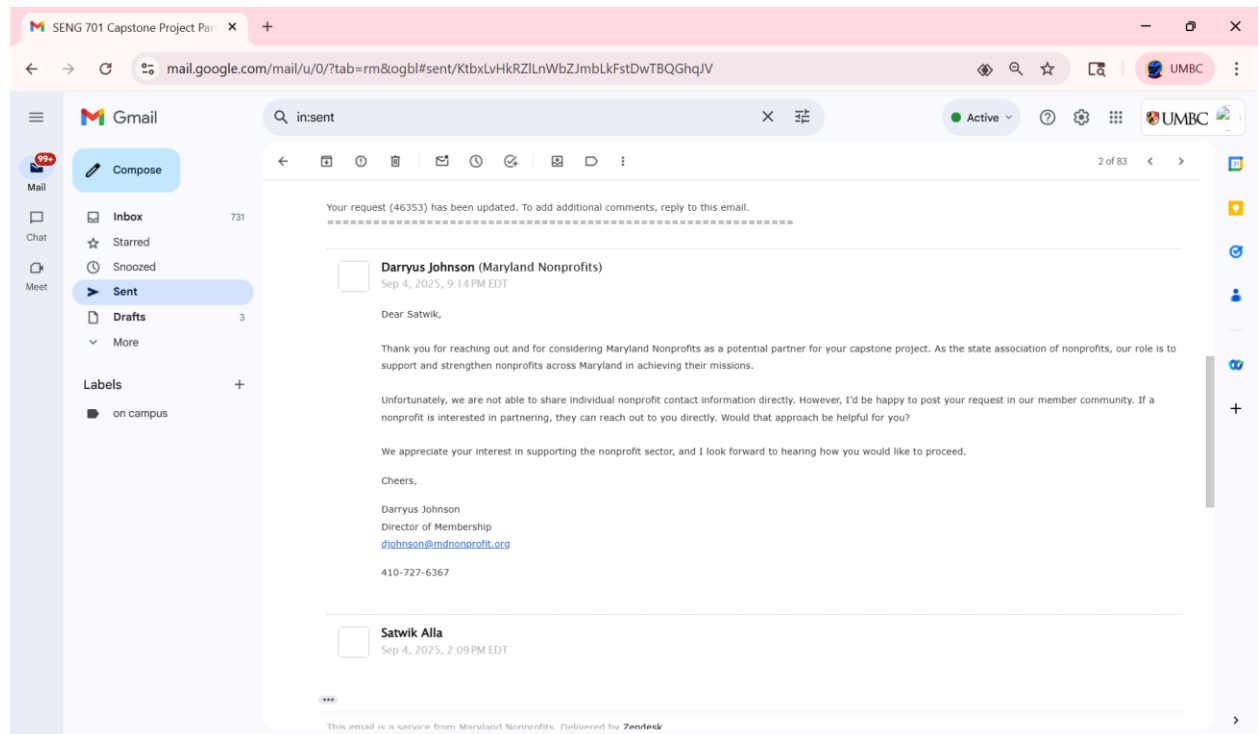
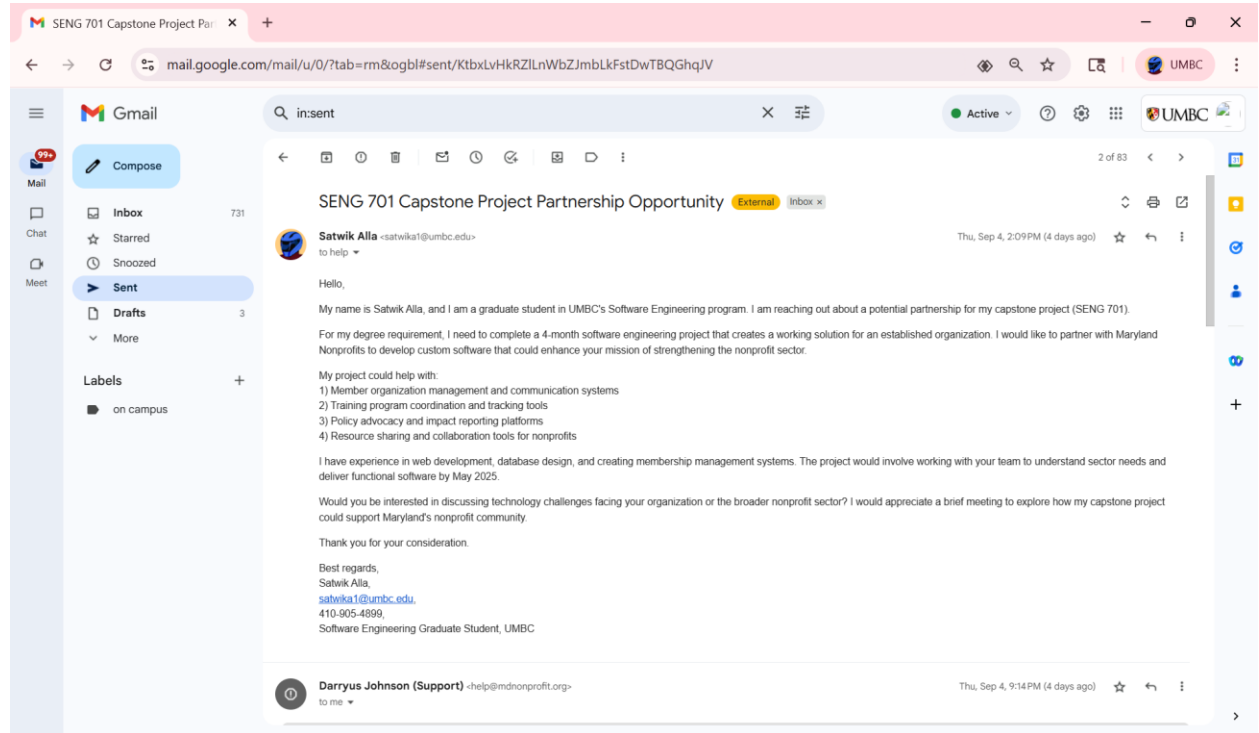
#### Positive Engagement Examples

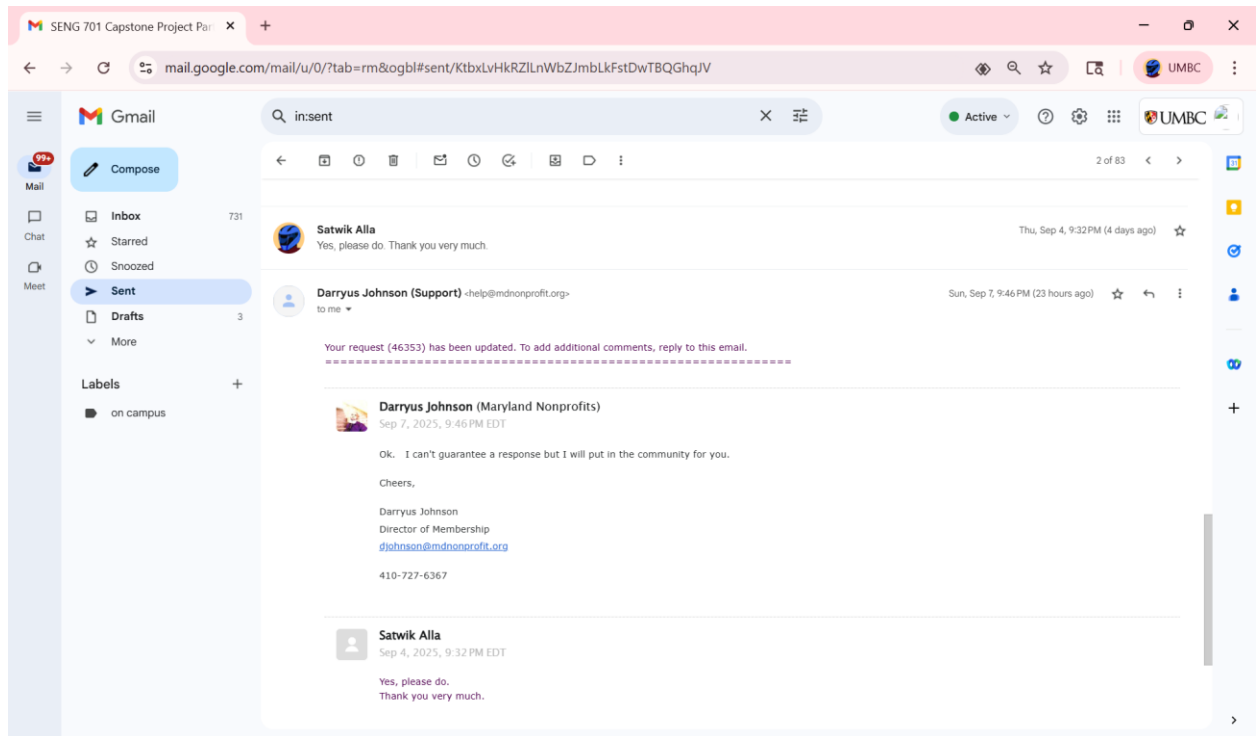
## 1) Maryland Nonprofits Response

Date: September 4, 2025

Status: Positive – Network facilitation Offered

Screenshot:



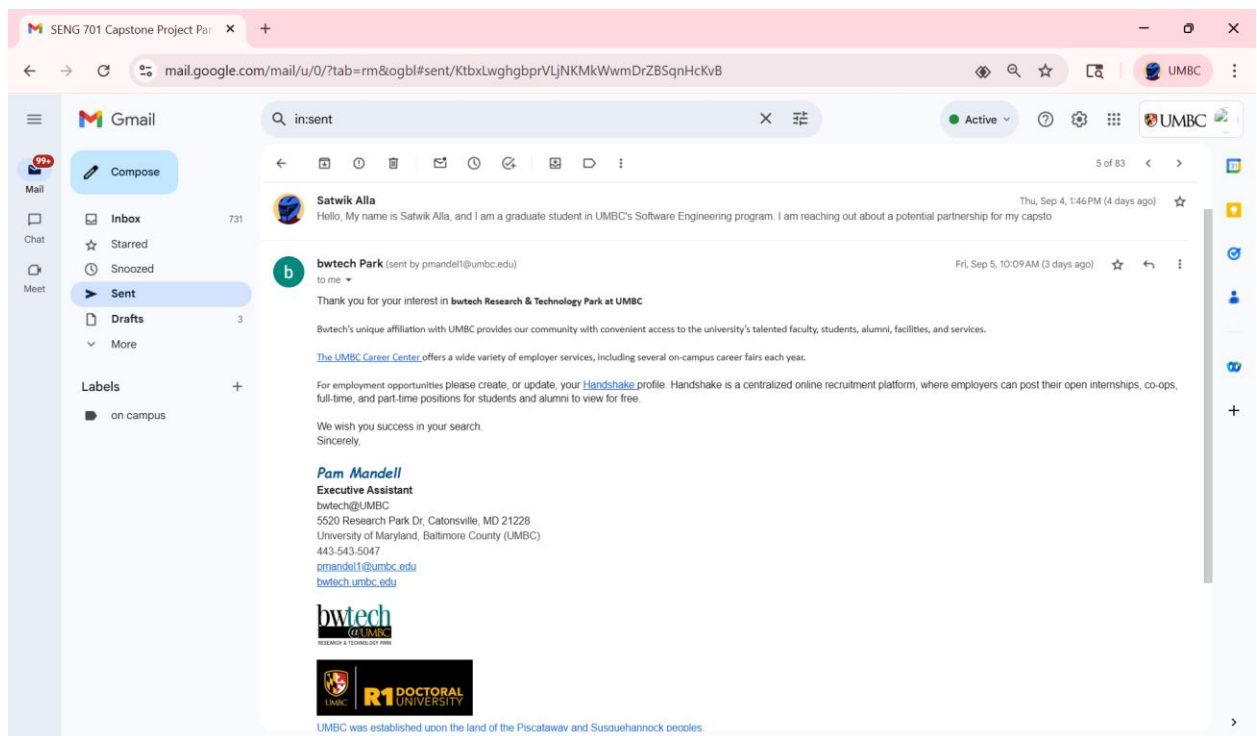
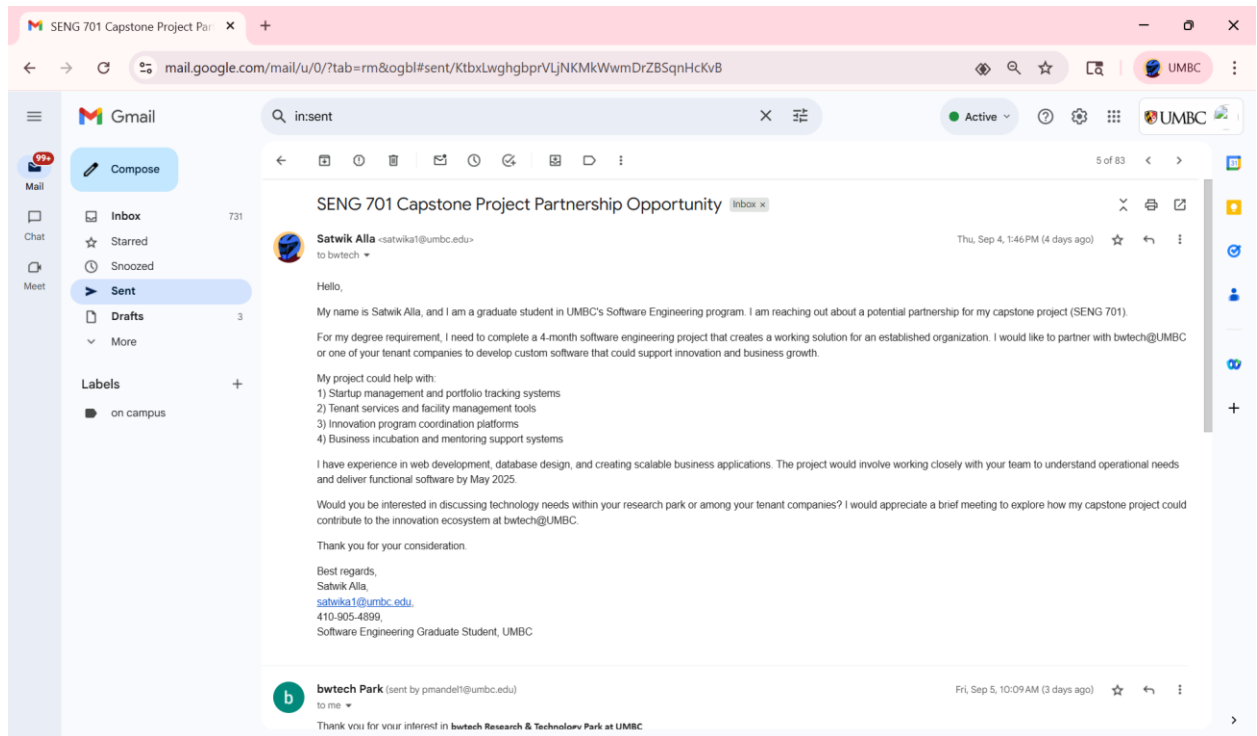


## 2) Bwtech@UMBC Interest

Date: September 5, 2025

Status: Active Interest in the information provided

Screenshot:

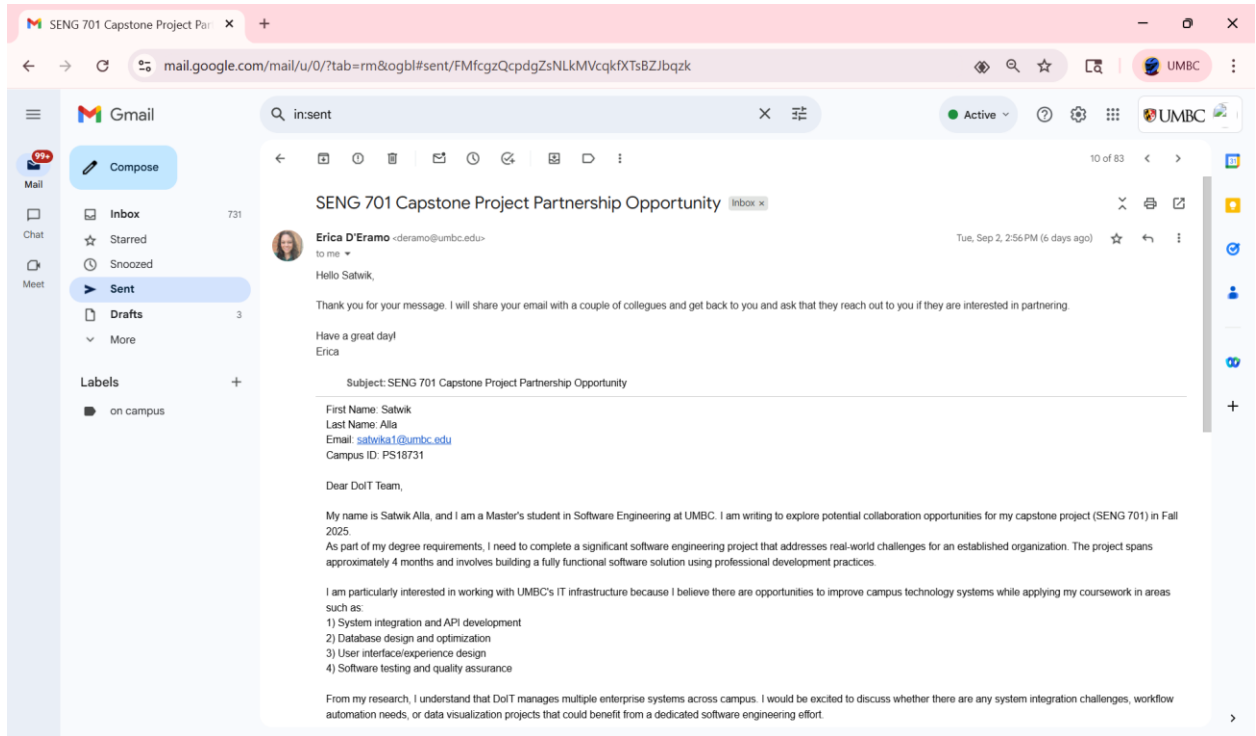


## 3) DoIT

Date: September 4, 2025

Status: Positive – Network facilitation Offered

Screenshot:



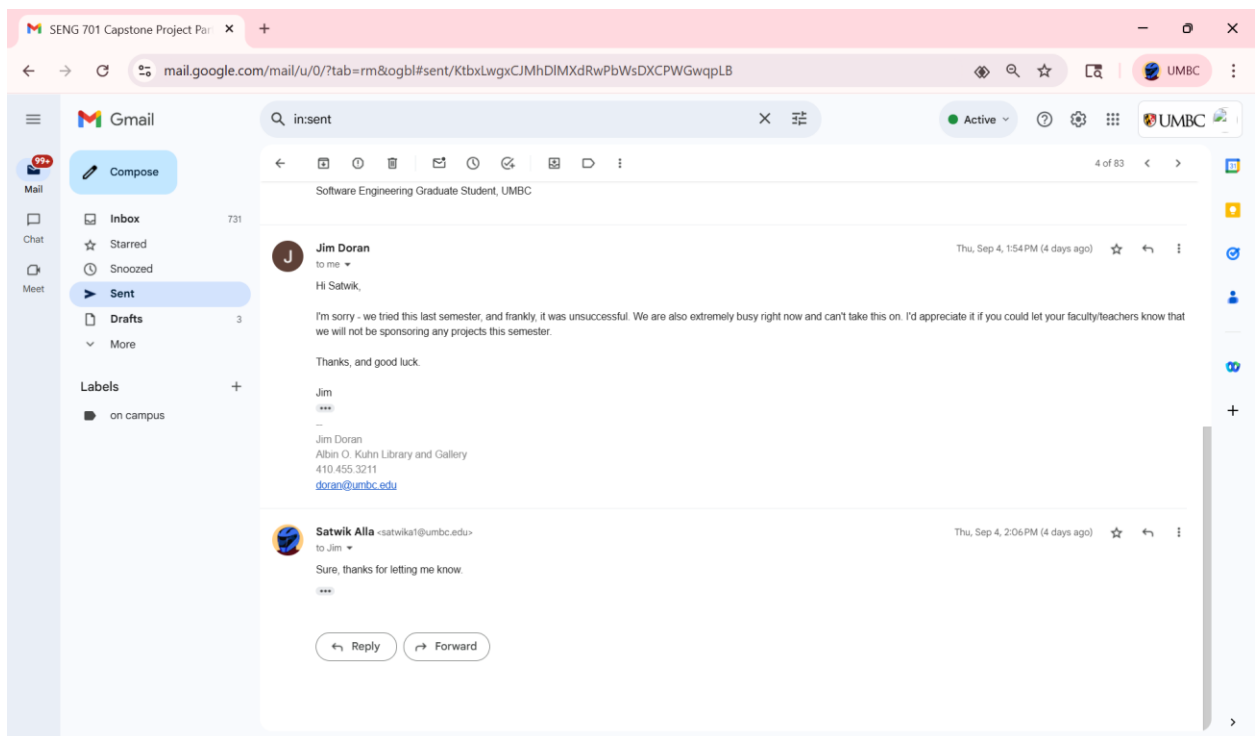
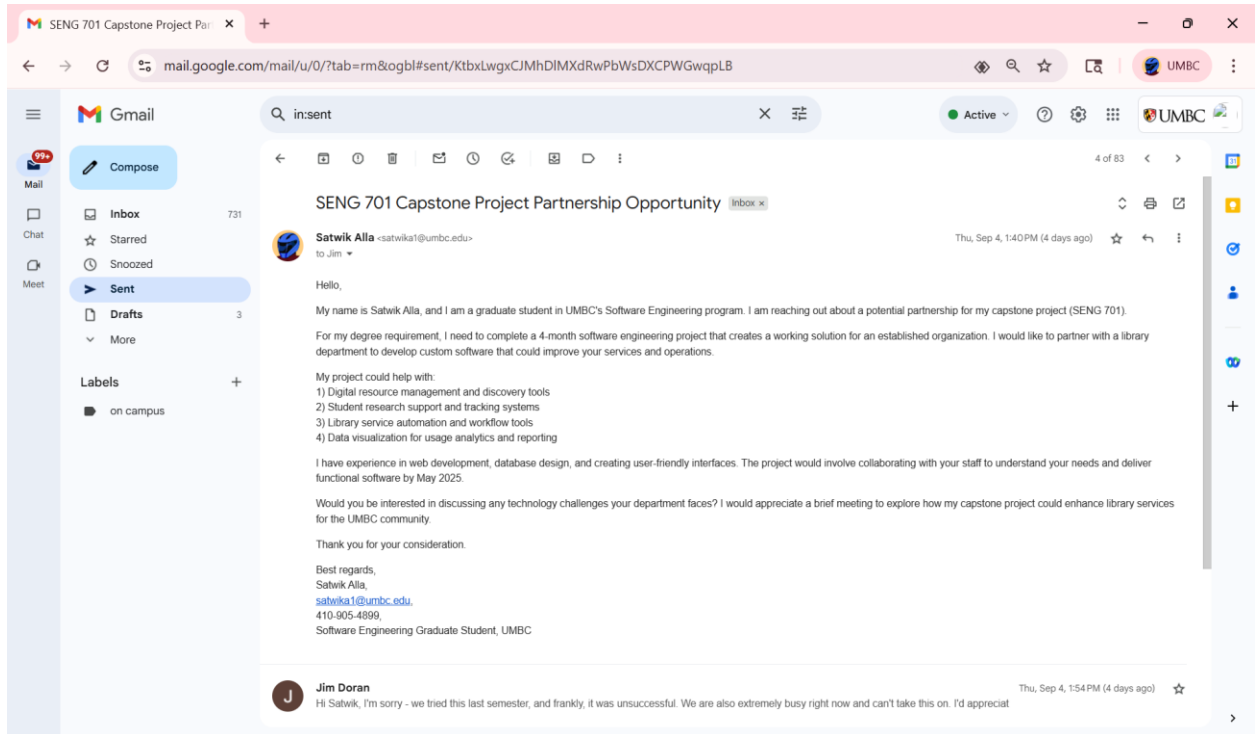
## Capacity Limitation Examples

### 1) UMBC Library Declination

Date: September 4, 2025

Status: Declined due to capacity and previous experience

Screenshot:



## Referral and Guidance Examples

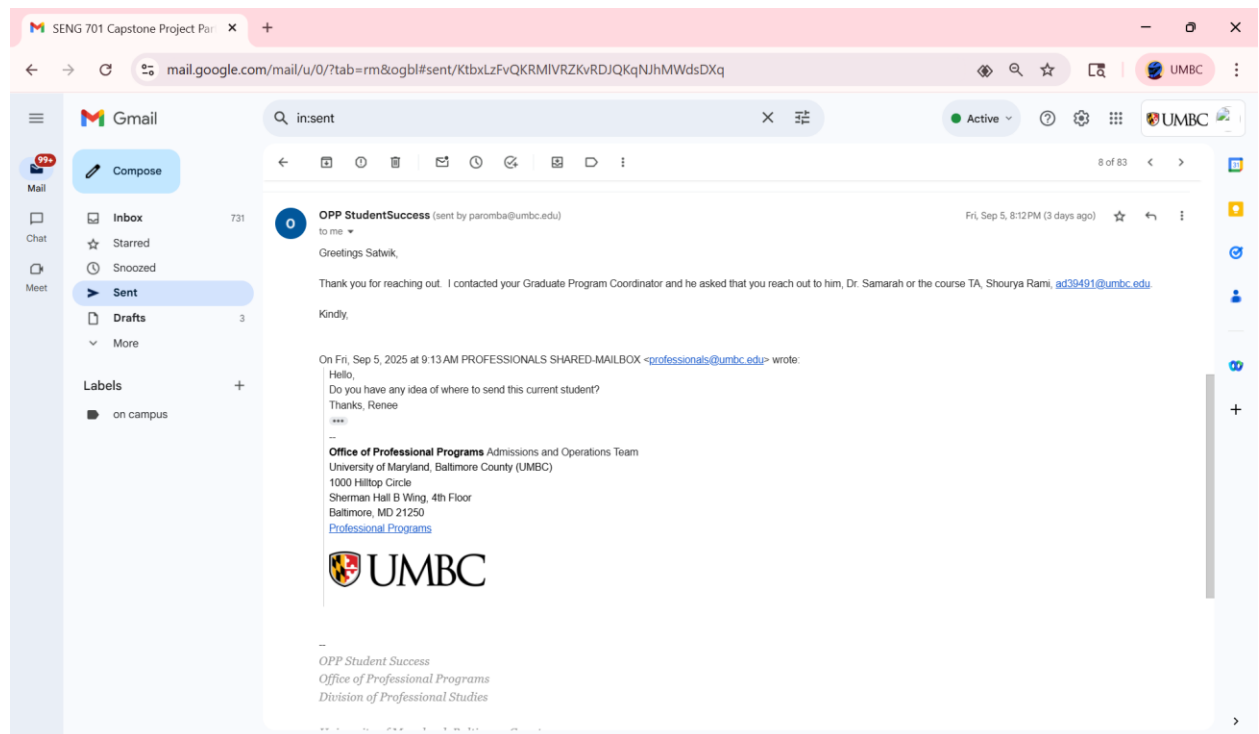
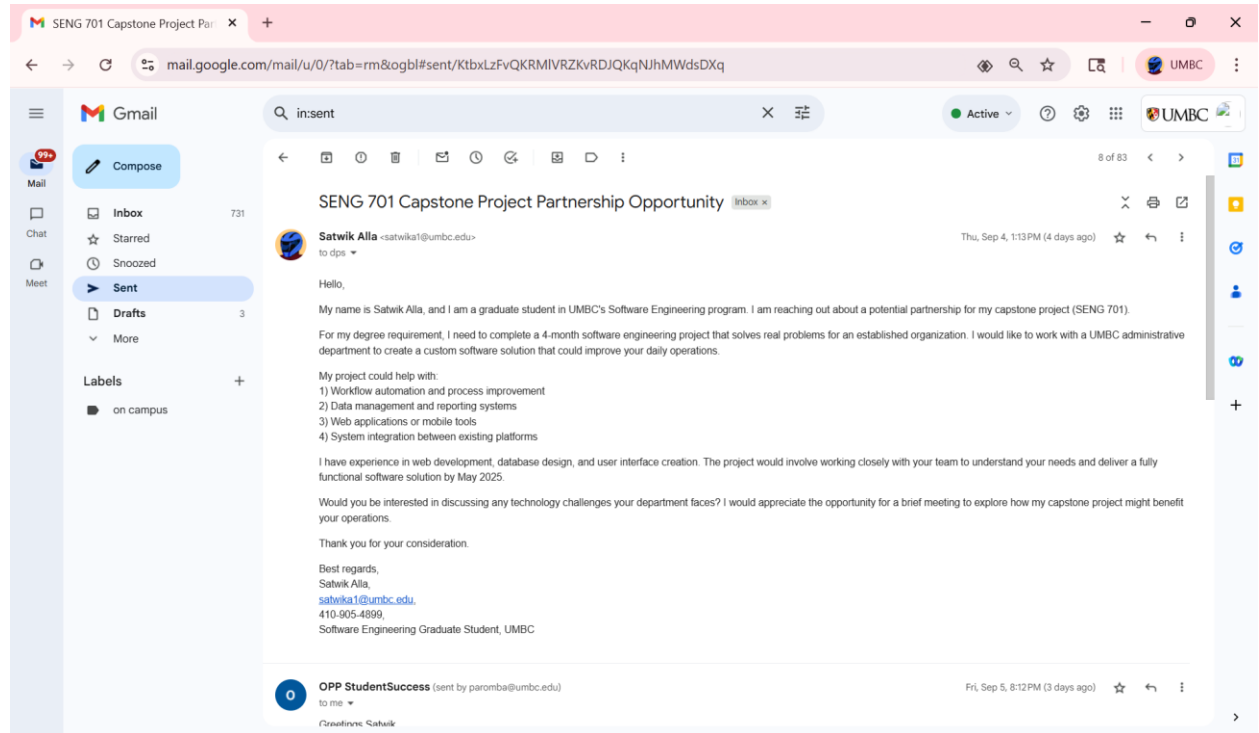
### 1) Student Success Office Referral



Date: September 5, 2025

Status: Referred to course Instructor

Screenshot:



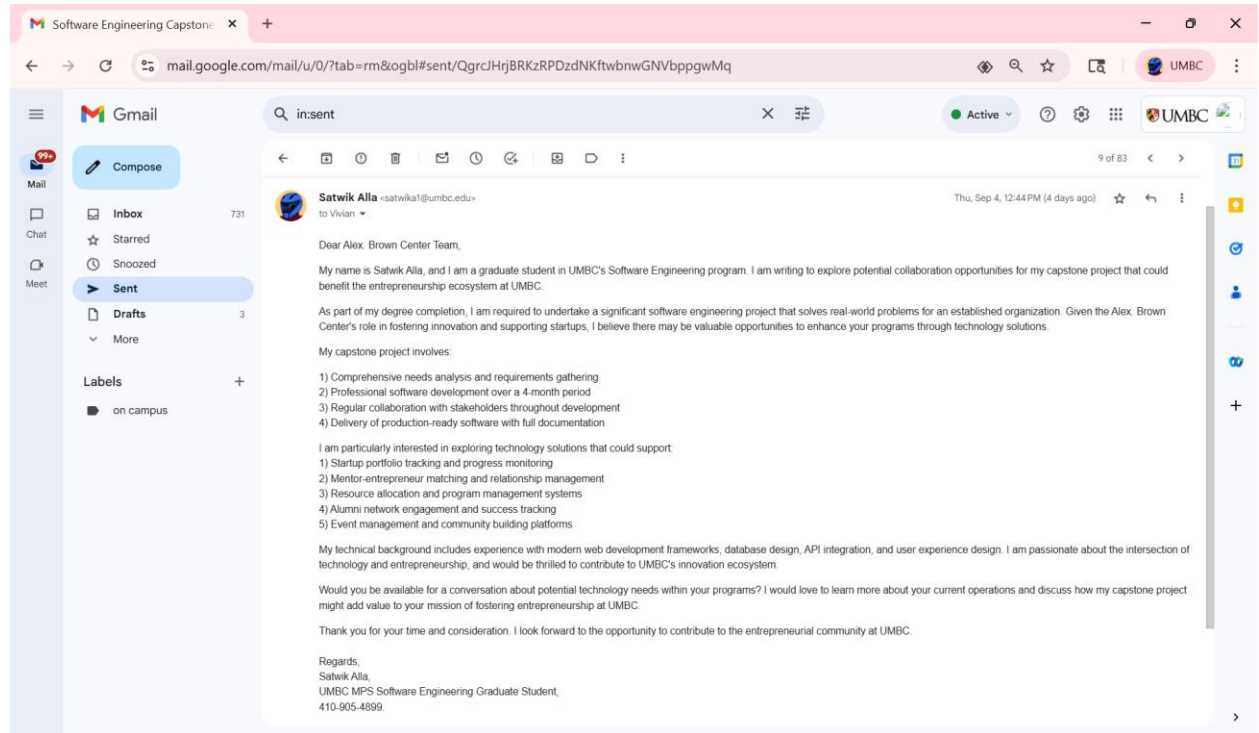
## Pending Examples

### 1) Alex Brown Entrepreneurship office

Date: September 4, 2025

Status: Pending

Screenshot:

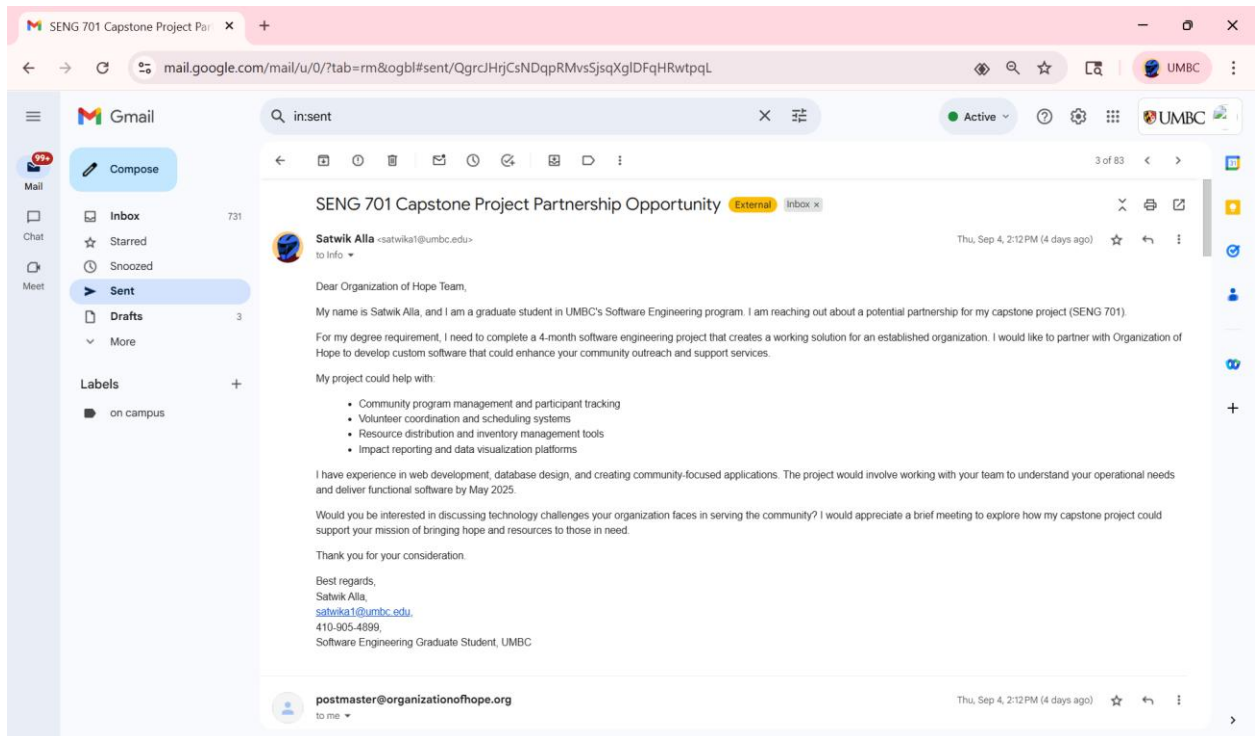


### 2) Organization of Hope

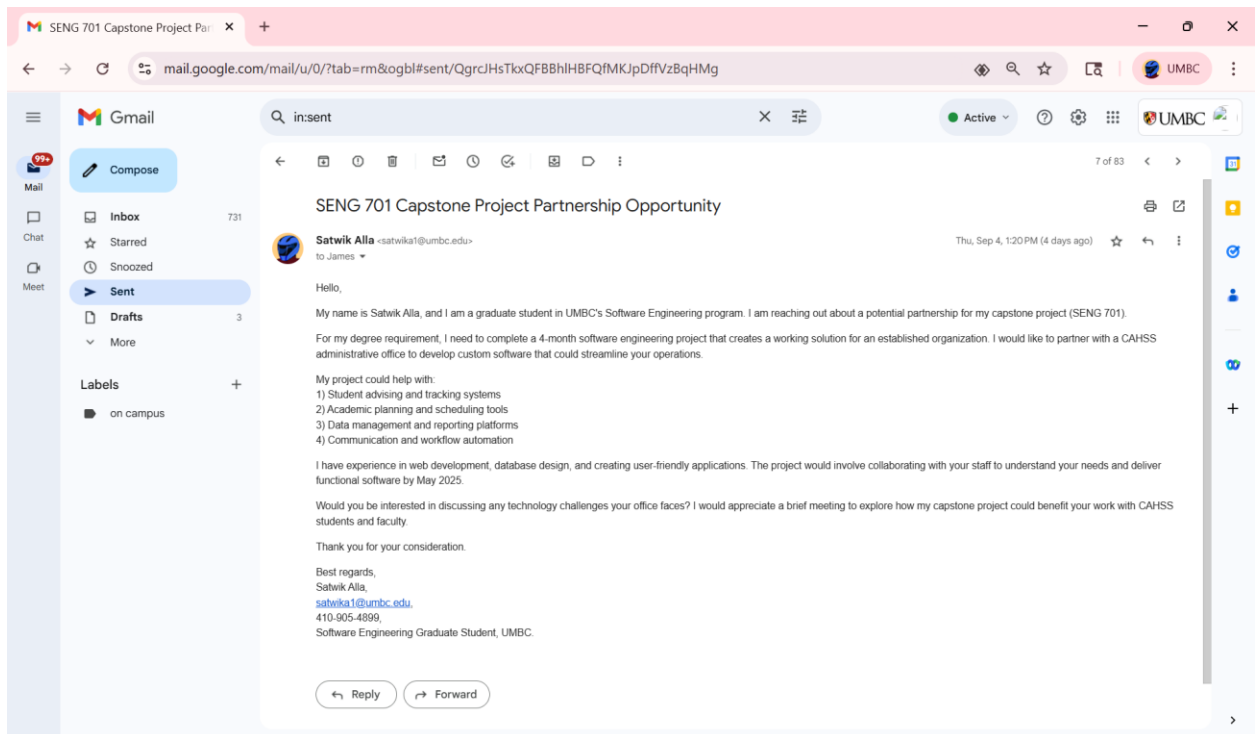
Date: September 5, 2025

Status: Pending

Screenshot:



3) Academic Department  
Date: September 5, 2025  
Status: Pending  
Screenshot:



4) Maryland Food Bank

Date: September 4, 2025

Status: pending

Filled google forms directly to media department. Not received any response from there on.