IBEHS Capstone Project Approval Form

(Please Submit this form as a PDF on Avenue to Learn)

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| Proposed Project Title: |
| *Your project title should be concise yet descriptive.*  *\*\*\*If this is an existing project, the project title is defined for you by your stakeholder* |
| AI-Powered Dental Health Assistant with Portable Imaging Device |

Please specify (with an [X]) whether this is a self-developed project or an existing project:

[X] Self-developed project

[ ] Existing project

Please specify (with an [X]) the disciplinary composition of the team members:

[X] The team is comprised of students from one discipline

[ ] The team is comprised of students from more than one discipline

Project Team Composition

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| --- | --- | --- | --- |
| Name: | Student Number: | MacID: | Program (e.g., Chem&BME) |
| Jasmine Wang | 400294807 | Wangj500 | Software&BME |
| Ruidi Liu | 400296859 | liu127 | Software&BME |
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If you haven’t done so already, we ask that one team member submit the [Team Formation MS Form](https://forms.office.com/r/U9yRm5WSgi) complete with the above details.

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| **Project Summary** (in approximately 150 to 350 words)**:**  *Explain the problem you are trying to solve and the motivation behind the problem.*  ***\*\*\*****If this is an* ***existing project****, the summary should already be defined for you by your stakeholder.* |
| Access to affordable and timely dental care remains a significant challenge, particularly for students and individuals from low- to middle-income backgrounds. The high cost of professional dental services, the time commitment required for appointments, and the general lack of awareness surrounding oral health often discourage people from seeking preventive care. As a result, many individuals only visit a dentist when issues become severe, leading to higher costs and poorer health outcomes.  Our project aims to address this gap by developing an accessible, low-cost solution that empowers users to monitor and learn about their dental health from home. We want to build a mobile application supported by an inexpensive, easy-to-use imaging device designed to capture clear pictures of the inside of a user’s mouth. Leveraging machine learning, the app will analyze these images to provide insights on potential dental issues such as plaque buildup, gum inflammation, or early signs of cavities. In the future we may even extend the system to orthodontics where we could track tooth movement, monitor the effectiveness of braces or aligners, and help users stay on top of treatment progress between in-person visits. Alongside the diagnostic component, the platform will also offer educational resources to increase awareness of oral health and preventative practices.  This solution is designed with accessibility in mind: it is self-serve, time-efficient, and more affordable compared to routine dental check-ups. While not intended to replace dentists, by combining technology with education, we want to reduce barriers to dental care, encourage proactive oral hygiene, and ultimately improve health outcomes for populations who may not have consistent access to professional services. |

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| Project Scope (in approximately 50 to 150 words):  *Briefly describe what you envision the design process to be over the course of your capstone. This is meant to be a very high-level overview to ensure there is appropriate complexity and rigor for final year capstone. Please describe in the context of your project, rather than generic design process terms. (i.e., concept generation, concept selection, etc.)* |
| * Define problem space: stakeholders, client personas, requirements (functional & non-functional) * Research: existing dental/orthodontic technology, gold standards, gaps * System architecture: business events, diagrams (UML, class), data flow * Software prototype:   + Backend → ML model, database, security/encryption   + Frontend → UI/UX, user testing, education features * Hardware prototype: low-cost oral imaging device (scope/periscope-style) * Integration: connect hardware image capture to app analysis * Testing: iterative refinement of both software + hardware * Economic/feasibility analysis: cost, accessibility, market fit * Deliverables: functional prototype, documentation, final presentation/pitch |

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| Disciplinary Areas of Focus (in approximately 50 to 150 words):  *Briefly describe how each team member(s) will apply the knowledge and skills from their home discipline towards completing project objectives. This is meant to be high level and you will be expected to provide further justification later.* |
| The project will be divided into two main development sections:  Backend (Jasmine):   * Train/test ML models for dental & orthodontic image analysis * Backend integration (model + database) * Data handling, encryption, security   Frontend (Ruidi):   * Design/prototype mobile app interface (UI/UX) * User analysis & testing for accessibility * Display results + educational content   Both members:   * Conduct research (existing tech, dental/orthodontic needs, gaps) * Define design elements (needs, functional/nonfunctional requirements, design inputs/outputs etc.) * Contribute to hardware prototyping (low-cost imaging device) * System integration & iterative testing * Documentation, economic analysis, final presentation |

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| Project Client/Stakeholder:  *For a* ***self-developed project****, the project/stakeholder is an actual or potential person/entity/or group for whom the project design is being developed.*  *For an* ***existing project****, be sure to include all stakeholder names that were provided in the project description.* |
| The primary clients for this project are students and low- to middle-income individuals who often face financial and accessibility barriers to dental care. Secondary stakeholders include universities and community health organizations that may adopt the tool to support preventative health initiatives. Dentists and orthodontists are also important stakeholders, as the system could complement professional care by encouraging earlier visits and improving patient awareness. |

Instructors and Stakeholders

*Provide the name and contact information for all instructors and stakeholders in the table below.*

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| Lead Instructor |  |
| Name: | Email: |
| Dr. Leung |  |
| Dr. Quenneville |  |
| Dr. Shirani |  |
| Co-Instructor(s) |  |
| Name: | Email: |
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|  |  |
| Stakeholder(s) |  |
| Name: | Email: |
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