



Project Proposal

24AIM112 & 24AIM115

Molecular biology and basic cellular physiology

Ethics, innovative research, businesses & IPR

Team Members

Group 7

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Title:

CliniSim: A Disease Diagnosis Simulator

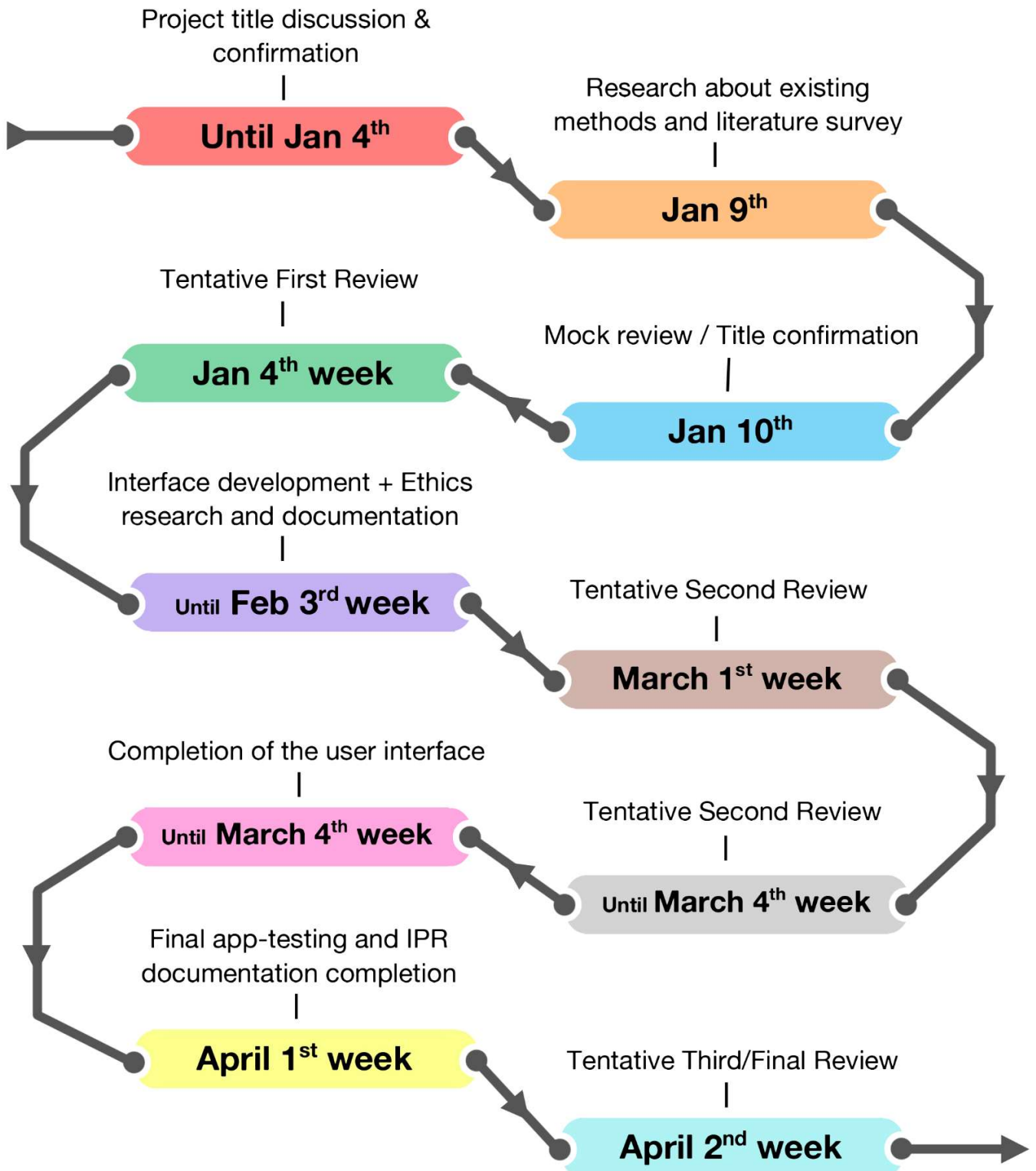
Introduction:

The project aims to develop a simulative interface that can help improve doctor-patient interactions. It can help doctors practice the diagnostic measures to be taken, when dealing with the real patients. Taking a note of symptoms and then getting to the diagnosis of ailment, is what the doctors have been practicing. This requires tremendous training and hands-on training. To develop a platform where doctors can exercise their knowledge and brush up their skills, is what defines the prime objective of our project. For the ease and simplicity, initially, the project incorporates the diagnosis of genetic disorders, which deals with the cellular physiology of this semester. In addition to that, the ethics and norms related to patient consent, patient autonomy, non-maleficence etc., would be dealt alongside. As the project grounds upon computational user interface and application making, entailed IPR(s) would also be discussed.

Objectives:

- i.** Create diverse patient profiles with different genetic disorders.
- ii.** To provide an aid for medical undergrads, for hands-on practice, before going to clinical sessions.
- iii.** Include diagnostic tests relevant to cellular physiology.
- iv.** Include a vast database for genetic disorders, mutations, etc.
- v.** Accurately evaluate diagnosis and treatment and provide feedback for incorrect decisions.
- vi.** Provide hints and explanations for complex cases.
- vii.** To put the ethics and legalities involved with patient dealing in limelight.

Timeline



Literature Survey:

1. Validating a virtual human and automated feedback system for training doctor-patient communication skills. – [\[Link\]](#)

Authors	Methodology	Result
<ul style="list-style-type: none">• Kurtis Haut• Caleb Wohn• Benjamin Kane• Tom Carrol• Catherine Guigno• Varun Kumar• Ron Epstein• Lenhart Schubert• Ehsan Hoque	<ul style="list-style-type: none">• The development of SOPHIE included creating virtual patient scenarios and an automated feedback system.• SOPHIE was validated by conducting an experiment with 30 participants	<ul style="list-style-type: none">• The participants using SOPHIE improved in communication skills and performed better than others.• The system's ability of providing real-time feedback was efficient and useful.• The most useful feedback metrics were the reading level, speaking rate, hedge words, transcript and turn-taking.• The least useful metrics were positive emotion, empathy words and personal pronouns.

2. Novel Computational Linguistic Measures, Dialogue System and the Development of SOPHIE: Standardized Online Patient for Healthcare Interaction Education. – [\[Link\]](#)

Authors	Methodology	Result
<ul style="list-style-type: none">• Mohammad Rafayet Ali• Taylan Sen• Benjamin Kane• Tom Carrol• Shagun Bose• Ron Epstein• Lenhart Schubert	<ul style="list-style-type: none">• Computational linguistic analysis of the transcripts of 383 patient-physician conversations from an essential office visit of last stage cancer patients with their oncologists.• SO Developed methods for the automatic detection of two behavioural paradigms,	<ul style="list-style-type: none">• Pilot study with nine practicing clinicians (fellows, residents, and nurse practitioners) from the University of Rochester Medical Centre were conducted.• Participants (seven out of eight) mentioned that the speech rate feedback was easy to understand and very

<ul style="list-style-type: none"> • Ehsan Hoque 	lecturing and positive language usage patterns.	useful to improve communication skills
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3. Can a mobile app improve the quality of patient care provided by trainee doctors? Analysis of trainee's case reports. – [\[Link\]](#)

Authors	Methodology	Result
<ul style="list-style-type: none"> • Katie Webb • Alison Bullock • Rebecca Dimond • Mark Stacey 	<ul style="list-style-type: none"> • Newly qualified doctors in Wales were offered access the iDoc app that could be downloaded on to their own personal smartphone. • Case reports were electronic forms completed by participants describing specific events or times when they used the iDoc app. • Exported data were imported into a qualitative data analysis computer software package. In total, 295 case reports were submitted in the period August 2012–July 2013 and 273 the following 12-month period. 	<ul style="list-style-type: none"> • In total, 568 case reports were submitted of which, 142 (25%) were 'complex' case reports submitted by 114 different doctors. The remaining 426 (75%) case reports, submitted by 242 different doctors, were classified as 'simple' cases. • These 'simple' cases represented diverse use of the iDoc app and included routine checks of which drugs or dosage to use, treatment or management information and general learning or revision. • Having iDoc and the ability to ascertain information at point-of care was described as facilitating immediate decision-making: for example, it helped to "make a quick decision on whether or not to send her for a compression ultrasound".

4. Simulation-Based Medical Education: An Ethical Imperative. – [\[Link\]](#)

Authors	Methodology	Result
<ul style="list-style-type: none"> • Amitai Ziv • Paul Root Wolpe • Stephen D. Small 	<ul style="list-style-type: none"> • Medical training must at some point use live patients to hone the skills of health professionals. But there is also an obligation to provide optimal treatment 	<ul style="list-style-type: none"> • SBME (Simulation Based Medical Education) improves trainee skills without exposing patients to harm, especially in critical or high-risk procedures,

<ul style="list-style-type: none"> Shimon Glick 	<p>and to ensure patients' safety and wellbeing.</p> <ul style="list-style-type: none"> SBME is proposed as a means to lighten ethical concerns by using various simulation tools, including AI models, virtual patients, to replicate real-life medical scenarios. SBME can be integrated into medical curricula, with a focus on its cost-effectiveness, ability to reduce reliance on live patients, and to standardize training across institutions. 	<p>principle of "first do no harm."</p> <ul style="list-style-type: none"> Simulation environments allow trainees to learn from mistakes without real world consequences, ensuring safety and accountability. SBME promotes justice by reducing the use of vulnerable patients for training.
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5. Efficacy and Usability of a Virtual Simulation Training System for Health and Safety Hazards Encountered by Healthcare Workers. – [\[Link\]](#)

Authors	Methodology	Result
<ul style="list-style-type: none"> Barbara J. Polivka Sarah Anderson Steve A. Lavender Carolyn M. Sommerich Celia E. Willis Amy R. Darragh 	<ul style="list-style-type: none"> Participants were randomly assigned to either the HH-VSTS group, completing three computer-based modules on hazard identification, rationale, and response, or the paper-based group, reviewing the same content in written format. Both groups completed an assessment module and provided demographic and usability feedback. Performance in hazard identification, rationale, and response was measured using in-system metrics. 	<ul style="list-style-type: none"> Participants (n = 74) were HHWs and students in health profession programs. There were no significant differences in participants' ability to correctly identify hazards, rationale, or how to address them. Participants identified over 90% of hazards, although fewer participants were able to correctly identify what makes an item a hazard or how to manage it. For those in the HH-VSTS group, over 83% found the HH-VSTS easy to use, over 94% agreed the HH-VSTS was useful, and over 80% liked it.

