



CliniSim

Disease Diagnosis & Patient Interaction Simulator

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Molecular biology & basic cellular physiology
Ethics, innovative research, businesses & IPR

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PRESENTATION LAYOUT

- Introduction
- Problem Statement
- Objectives
- Key Ethical concerns and IPR terms
- Methodology
- Computational Aspects
- Software Overview
- Cited Literature and Patents
- Conclusion



INTRODUCTION

“Learning by doing, peer-to-peer teaching, and computer simulation are all part of the same equation.”

- Nicholas Negroponte

A survey conducted on third and fourth year med students of College of Medicine, Saudi Arabia suggests that 98% of 185 students think that patient simulators are a great addition alongside handling real time patients. 85% students favored the idea of working more on training based simulator, whereas 77% of them believe they were able to apply what they have learnt, using simulation models, to real life.

PROBLEM STATEMENT

How can we develop an **interactive user interface** that can help doctors to practice on simulation for dealing with real-world patients while brushing their clinical as well as patient handling skills?



OBJECTIVES

1

To make an **interactive user interface** that can simulate clinical conditions for the medical students to practice before their clinical postings.

2

To add up cases of **different genetic diseases** and allowing user to proceed with the tentative treatment for the particular disease, as per his/her knowledge.

3

To **provide feedback**, after the clinical simulation session is over, upon the accuracy of selected procedures and drugs.

KEY ETHICAL CONCERNS

1



Consent & Autonomy

Virtual patients shall be designed using anonymized or synthetic data with which real patients' privacy will not be violated.

2



Non-Maleficence

The simulator should supply trainees with accurate, evidence-based information and should not mislead them.

3



Equal Access and Justice

The same tools need to be available to trainees in various parts of the world and institutions regardless of resources.

4

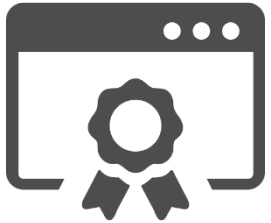


Data Ownership and Usage Rights

It's unclear who owns the training data generated by the simulator & it cannot be misused commercially.

KEY TERMS IN IPR

1



Software Licensing

Deciding whether the tool will be open-source (freely available) or proprietary (commercially licensed).

2



Data Protection

The patient data used in training is anonymized and complies with regulations such as GDPR or HIPAA.

3



Software Patenting

In India, software can be patented if it is part of an invention that is new, useful, non-obvious, and has a technical improvement.

4



Copyright & Trademark

Copyrights protect the creative elements of the software itself while trademarks protect the brand identifiers, like the institution behind it.

METHODOLOGY

Included Genetic Disorders

- The cases taken here are **genetic disorders**. There is no permanent cure for genetic disorders rather they can be managed and suppressed.
- This calls for the need of extreme care and experience while dealing with such patients.
- There are **five default cases** included in the software for simulation, namely:
 - Marfan Syndrome
 - Turner Syndrome
 - Down Syndrome
 - Fragile-X Syndrome
 - Angelman Syndrome

BUILT-IN RESOURCES

Included drugs

- In order to perform an accurate diagnosis, an array of **21 commonly prescribed drugs** to suppress genetic disorders are included in the software.

Acamprosate	Bosentan	Cannabidiol
Carbamazepine	Citalopram	Clonazepam
Donepezil	Enalapril	Estrogen
Irbesartan	Levothyroxine	Losartan
Lovastatin	Metformin	Minocycline
Oxymetholone	Paracetamol	Propranolol
Sertraline	Sildenafil	Valproic acid

- A **short description** for each of these drugs is displayed in the application while choosing a specific dosage and a dosing interval, to accompany the learning experience.

BUILT-IN RESOURCES

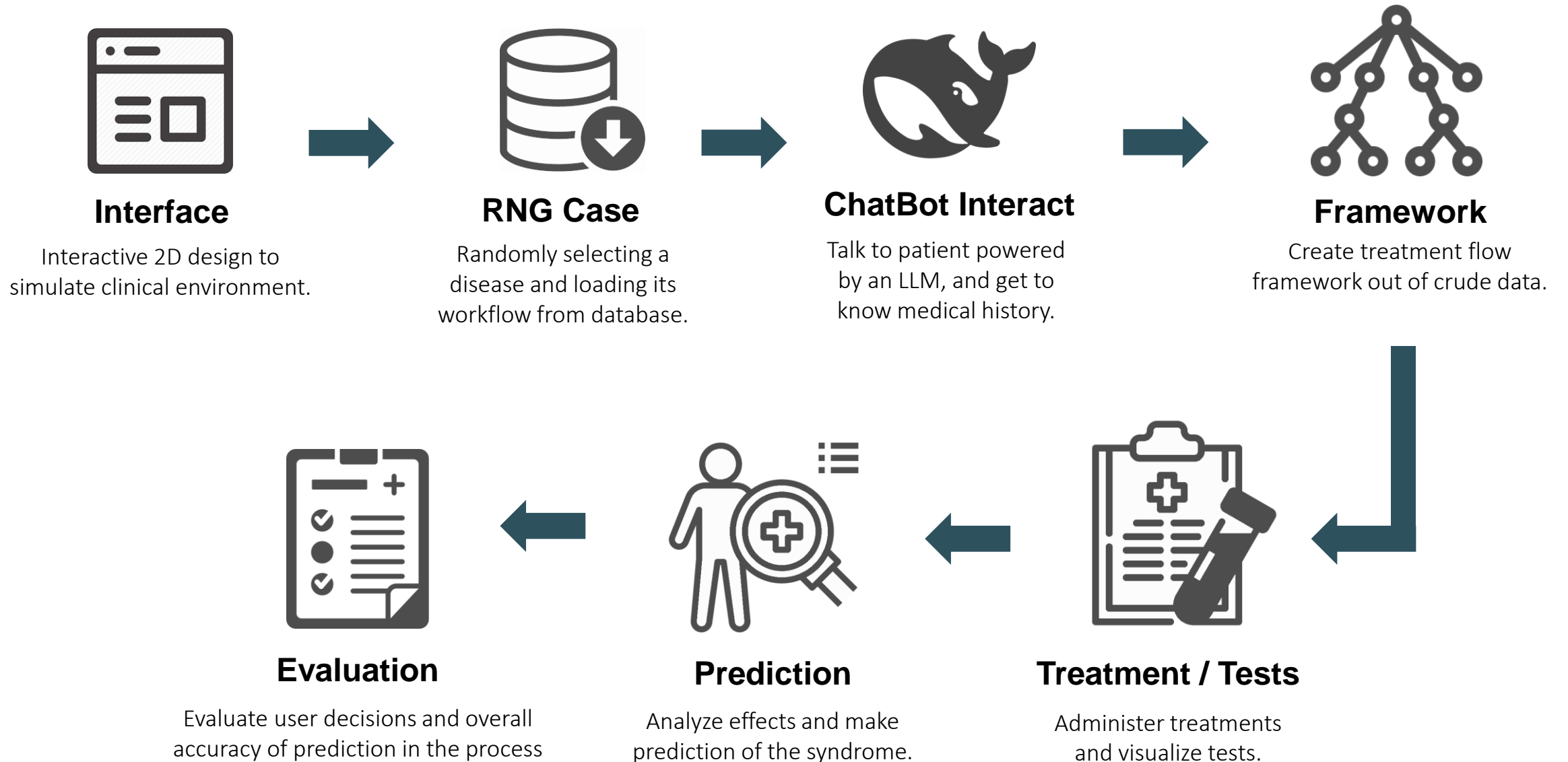
Included tests and scans

- Since diagnosis is a process that requires absolute certainty, it is often assisted with various **lab tests**, **imaging** or **scans**.
- To account for this, CliniSim has a range of **9 available imaging scans** that can be performed on a patient.
- The diagnosis can be further accompanied by the **6 built-in lab tests** to solidify deductive reasoning.

Tests		
Karyotyping	FBN1 Mutation	Cytogenetic analysis
FRAXE Analysis	Thyroid function	CRP Test

Imaging		
Echocardiogram	MRA	Bimicroscopy
Tonometry	X-Ray	Electroencephalogram
Computed Tomography	Digital Radiography	Ultrasound

COMPUTATIONAL ASPECTS



RESULTS

Simulation Window

Patient
Profile Tab

Details &
History
Taking

Patient
Interaction
through LLM

Chat entry

The simulation window displays a patient profile for John Doe, a 13-year-old male. The case history mentions acute gastroenteritis and developmental delays. The patient's chat history shows a conversation about balance issues and seizures. The central 3D model shows a patient with a bruise on the face. A biomicroscopy image of the right eye is shown, with an attached note stating 'Slit-lamp biomicroscopy of the right eye.' The sidebar on the right contains sections for Actions (Physical Assessment, Vitals Check), Drugs (Bosentan, Acamprosate, Cannabidiol, Carbamazepine, Citalopram), Description (Bosentan), Lab Tests (Echocardiogram, MRA, Biomicroscopy, Tonometry, X-Ray), and a Diagnose... button.

PROFILE

John Doe
Age 13
Gender Male

Case A history of acute gastroenteritis and marked gross motor and speech developmental delay.

[View Full Profile](#)
[View Action History](#)

You can leave notes here or clip a chat...

Patient Interaction

What seems to be issue?

I have difficulty with balance, sleep disturbances, and sometimes experience seizures, which can be triggered by stress or excitement.

Do you know what disease you have?

No, I don't know what's wrong with me. Everything feels a bit...off.

What sort of seizures do you experience?

They're often short and unpredictable, with jerky limb movements, and sometimes accompanied by loud laughter or smiling without reason.

Attached Note
Slit-lamp biomicroscopy of the right eye.

Do you infer anything from this result?

Timestamp: 2025-04-19 22:34:27.166012 [Discard](#) [Save](#)

ACTIONS

[Physical Assessment](#)
[Vitals Check](#)

Drugs

Bosentan

[All](#) [Search Results](#)

[Acamprosate](#)
[Bosentan](#)
[Cannabidiol](#)
[Carbamazepine](#)
[Citalopram](#)

Description

Bosentan
Dual endothelin receptor antagonist reducing pulmonary vascular resistance by blocking ET-A and ET-B receptors.

[Prescribe](#)

Lab Tests

[Imaging](#) [Tests](#)

[Echocardiogram](#)
[MRA](#)
[Biomicroscopy](#)
[Tonometry](#)
[X-Ray](#)

[Diagnose...](#)

Assessment

Array of
available
medicine

Description
and prescribe

Tests and
Imaging Tab

Disease entry

CITED LITERATURE ON ETHICS AND IPR

- i. **ViTAWiN- Interprofessional Medical Mixed Reality Training for Paramedics and Emergency Nurses**
 - Provides a mixed VR and mannequin practice for the paramedics and nurse trainees.
- ii. **Ethical Challenges and Frameworks in AI-Driven Software Development and Testing**
 - Briefs about the ethical practices related to AI, stating AI as dual edged.
- iii. **Revolutionizing Rural Healthcare in India: AI Powered Chatbots for Affordable Symptom Analysis and Medical Guidance**
 - Proposes a chatbot that can be used as a pre-diagnostic tool and can help you check for symptoms for a disease or vice versa.
- iv. **Evaluation of Interprofessional Learning Among Medical and Pharmacy Students Using a Virtual Patient Simulation**
 - Gives the VR platform to practice on the diagnosed disease taken as a case, provided quiz related to diagnosed disease.

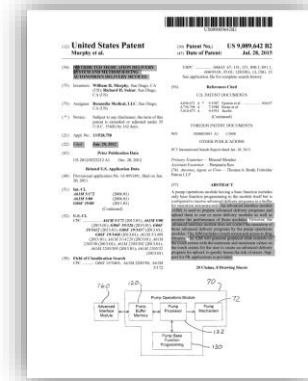
CITED PATENTS FOR IPR

1. Distributed medication delivery system and method having autonomous delivery devices.

Inventors: W. H. Murphy, et al.
(San Diego, USA)

- Patented on: **JUL 28, 2015**

- Patent status: **ACTIVE**

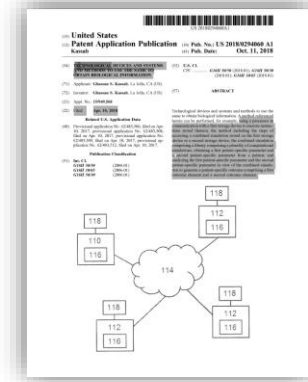


2. Technological devices and systems and methods to use the same to obtain biological information.

Inventor: G. S. Kassab
(California, USA)

- Patented on: **OCT 11, 2018**

- Patent status: **ACTIVE**



CONCLUSION

- In summary, we have successfully developed a software that can provide **simulation based training** to medical students/practitioners.
- Our tool enables learners to engage with **realistic patient scenarios**, refine their diagnostic skills and put their clinical skills to the test.
- The primary goal, is to enhance medical education by integrating a **virtual environment** to bridge the gap between traditional and case based learning.
- All case simulations are **fully controlled**, ensuring all ethical boundaries and respected while maintaining similar levels of interactivity as real life.

REFERENCES

- 1 — Haut, Kurtis, et al. "Validating a virtual human and automated feedback system for training doctor-patient communication skills." 2023 11th International Conference on Affective Computing and Intelligent Interaction (ACII). IEEE, 2023. – [\[Link\]](#)
- 2 — Ali, Mohammad Rafayet, et al. "Novel computational linguistic measures, dialogue system and the development of sophie: Standardized online patient for healthcare interaction education." IEEE Transactions on Affective Computing 14.1 (2021): 223-235. – [\[Link\]](#)
- 3 — Webb, Katie, et al. "Can a mobile app improve the quality of patient care provided by trainee doctors? Analysis of trainees' case reports." BMJ open 6.9 (2016): e013075. – [\[Link\]](#)
- 4 — Ziv, Amitai, et al. "Simulation-based medical education: an ethical imperative." Simulation in Healthcare 1.4 (2006): 252-256. – [\[Link\]](#)
- 5 — Polivka, Barbara J., et al. "Efficacy and usability of a virtual simulation training system for health and safety hazards encountered by healthcare workers." Games for health journal 8.2 (2019): 121-128. – [\[Link\]](#)



Thank You