

# Sanjit Singh

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I am a highly organized and motivated student of computer science with a passion for technology. I am experienced in AR & VR cross platform applications development (Android, IOS). I have the skills and experience to conceptualize, build, test, and deliver. I am seeking an employment opportunity to increase my knowledge and skills level while contributing to the goals of an organization.

## **SKILLS**

**Programming Languages:** Java, C#, XML, HTML, CSS, Python, JSON, Swift, JavaScript, C/C++, MATLAB

**Hardware:** Arduino, Oculus Rift, Oculus Quest, Leap Motion, Microsoft Kinect, Smart Glasses, Microsoft HoloLens

**Platforms:** Unity3D, Eclipse, Android Studio, Android of Things, Visual Studio, Arduino IDE, Oculus, Jupyter Lab, Jupyter Notebook

**Tools/Technologies:** Augmented Reality, Virtual Reality, Vuforia, OpenCV, Game Development, Game Design, MRTK, XR Interaction Toolkit

## **EDUCATION**

Rutgers University, New Brunswick, NJ

September 2020 – December 2021

Bachelor of Science in Computer Science

New Jersey Institute of Technology, Newark, NJ

September 2019 – May 2020

Transferred to Rutgers University - New Brunswick.

Mercer County Community College, West Windsor, NJ

Graduated May 2019

Associates of Science in Computer Science

Recognized in school article: [http://www.mccc.edu/news/2019/general/Olu\\_Sanjit\\_Internships.shtm](http://www.mccc.edu/news/2019/general/Olu_Sanjit_Internships.shtm)

## **WORK EXPERIENCE**

Johns Hopkins University

August 2021 – Present

*Research Collaborator*

NASA SUITS Augmented Reality Challenge

December 2022 – April 2023

*XR Mentor*

Served this year to University of Washington, Team Astrohuskies as an XR mentor to NASA SUITS challenge of the 2022-2023 year.

Hoth Intelligence

August 2022 – December 2022

*XR Contractor*

- Worked on developing next-generation of medical technologies for real-time procedures in skull surgery using Augmented Reality in Unity3D for Microsoft HoloLens 2.

- Utilized Unity's Barracuda Neural Network framework for overlaying accurate face mesh tracking and live streaming that face mesh overlay from the desktop camera application/Azure Kinect DK directly to HoloLens device using Holo-Lights ISAR SDK.
- Worked on improving AR overlay tracking of the catheter through QRcode with Vuforia SDK combined with MRTK deployed onto HoloLens & test out tracking efficiency of catheter overlaid on QRcode images
- Developed C# scripts for increasing or decreasing the size of catheter approximation through the UI button assets provided by MRTK & QRcode Detection

#### UMD Applied Research Lab for Intelligence & Security

June 2022 – August 2022

##### *RISC Intern*

- Worked on Modeling Distributed Analysis with Software Instrumentation
- Installing and configuring Apache server through docker in order to active superset server in order for python code to communicate for data processing
- Utilized open-source instrumentation libraries such as Prophet for forecasting prediction of dataset models in Python using JupyterLabs
- Utilized NumPy, PANDAS & matplotlib libraries for visualizing graphs of CSV data files for predicting population rates of different countries
- Implemented KMean clustering in Python for sorting out the data within proper groups and neighbors through graphs

#### MIT

Jan 2022 – July 2022

##### *Catalyst Fellow*

- Catalyst brings together multidisciplinary experts to work together in an iterative process to identify and validate unmet medical and health-related needs, discover new project opportunities, and develop action plans.
- The most promising projects continue to execution while still supported by the Catalyst iterative and multidisciplinary framework, and eventually graduate Catalyst to traditional academic, clinical, or business settings at an advanced stage of readiness
- Was the very first undergraduate student accepted into this fellowship

#### NASA @ Johnson Space Center

Jan 2022 – May 2022

##### *S.U.I.T.S Intern*

The Spacesuit User Interface Technologies for Students (S.U.I.T.S.) project is an Artemis Student Challenge that challenges higher education students to create spacesuit user interface designs within augmented reality environments. Learning from these ideas and turning them into an even more productive fourth year of SUITS is the focus of the internship.

Some of these responsibilities involve:

- Supporting the continued development of technical challenges for future activity cycles & the development of future K-12 SUITS component activity challenges
- Supporting an efficient promotional campaign, including social media and traditional method
- Assisting with the day-to-day tasks of the NASA SUITS challenge
- Long term goal is to have a marked increase in the efficiency and productivity of the S.U.I.T.S. project and OSTEM priorities. S.U.I.T.S. program also involves incorporating the Microsoft HoloLens & Magic Leap device within Unity game engine on experimenting with technical designs and challenges to assure no

issues in technical development occur and documenting any problem that were to occur when developing, testing & deploying HUD into HoloLens or Magic Leap devices.

### MPLEX

August 2021 – Jan 2022

#### *Mixed Reality Developer*

- Worked on AR Spectator app features that allow users to replay gameplay events in real time
- Modified bugs & features for app such as collision, laser hit detection, main menu options & UI in Unity3D
- Contributed to Epic Game Mega Grant proposal on more about product & games being developed, estimated budget & grants company is seeking and doing revisions to make sure all information on grant application is accurate
- Integrated Twitch API into Unity for live chat streaming through the AR app

### Rutgers University @ Computational Biomedicine Imaging and Modeling Center

August 2021 – Dec 2021

#### *Research Assistant @ The Intelligent Visual Interface Laboratory*

Conducted Computer Graphics & AI research on Developing AI models for multi-agent soccer simulation using Unity3D.

### The University of Auckland

May 2021 – September 2021

#### *Research Intern @ Empathic Computing Lab*

- Conducted research on Eye-gaze, inter-brain synchrony (hyperscanning), and collaborative VR in conjunction with online counseling during the COVID-19 period
- Worked on data & EEG analysis using Python. Utilized HyPyP and MNE for brain hyperscanning and interconnection between communication.
- Worked with SciPy library to calculate average data of eye-tracking for x and y coordinate and then computing average result into a correlation using Kendall tau function (method built into SciPy)
- Focused majority of my efforts on eye gazing analysis using NumPy & Pandas Library for analyzing eye contact degrees through eye Fovea for odd and even pairs to calculate if their coordinates of eye contacts are within range of fovea to understand accurately if there is a direct communication going in between test subject pairs
- Overall goal is to conduct python analysis to get more information on brain synchronization and eye gaze communication to better understand inter-personal communication between 2 or more users which would help understand more about human communication/emotions in real-world scenarios vs the virtual world. With that information accordingly we would use that analysis to develop realistic virtual worlds in Virtual Reality to help understand more about brain hyperscanning and interpersonal communication through VR
- Published Paper to ISMAR workshop conference

### National Security Innovation Network

June 2021 – August 2021

#### *X-Force Fellow – Software Engineering Intern*

The X-Force Fellowship program is an opportunity for technologists and entrepreneurs to serve their country by solving real-world national security problems in collaboration with the U.S. military.

Responsibilities:

- Utilized storyboarding techniques to showcase future technologies in a video/VR format.
- Designed scenarios for warfighter jet training, combat simulation training, and for planning out future battle strategies using Unreal Engine 4.
- Worked blueprint scripting language in unreal on virtual characters, HUD, and AI agents

- Goal is to support the assertion that money should be invested into different storytelling tools rather than staying in the past and using PowerPoint. In addition, this project has other application use as well such as helping soldiers in planning situations, training through wargaming concepts, and more.
- Work done towards the project; all intellectual property is owned by participants. The next goals are too commercial this product by forming a startup and applying through the NSIN program known as Vector.

### NASA SUITS Augmented Reality Challenge

September 2020 – May 2021

#### *Project Team Leader*

- Participating in NASA SUITS Augmented Reality competition to develop AR systems for HoloLens 2 to help astronauts going on lunar exploration by 2024.
- Utilizing Microsoft Mixed Reality Toolkit (MRTK) to develop UI Components and gesture recognition features along with voice commands for Heads Up Display (HUD)
- Developed geology sampling documentation UI for astronauts to have an accurate idea of what to collect as they navigate the moon.
- Currently working on implementing navigation component that can help astronauts plan out wayfinding points from one location to another.
- Long term goal is to publish paper to a research conference. More Progress on project coming soon!
- Project is now being developed by students from the University of Washington Reality Lab where we will be applying to the NASA SUITS challenge this upcoming year (2022-2023).

### XBoost

#### *Co-founder & Vice President*

February 2020 – April 2021

Early-stage biotechnology startup funded by National Science Foundation Innovation-Corps (I-Corps) program.

Managed a cross-disciplined team of computer scientists, software engineers, hardware engineers, mechanical & biomedical engineers, designers & medical clinicians.

Worked on developing rehabilitative assistive robotic exoskeleton devices and VR/AR Interactive environment for patients with strokes, musculoskeletal conditions, orthopedic rehabilitation & more.

The startup was expected to bring in pending collaboration with Mount Sinai Hospital & the University of Pennsylvania Robotics Rehabilitation Lab.

Due to COVID-19, XBoost was unable to secure funds.

### New Jersey Institute of Technology

August 2019 – September 2020

#### *Research Assistant @ Biodynamics & MIXR Lab*

##### *Biodynamics Lab*

- Conducted research in the Department of Biomedical Engineering towards Virtual Rehabilitation Therapy
- Utilized Arduino Micro-controller, IMU sensors and myoware sensor devices all towards robotic exoskeleton arm for neurological patients with Cerebral Palsy that require neuromuscular support.
- Interfaced robotic arm through Arduino to Unity3D to serve as a wearable controller for video games.

The Biodynamics Lab was selected by NSF I-Corps program with a funding of \$2,000 to conduct research & development that could be potentially commercialized into a startup that develops core technologies, robotic devices & interactive games for therapeutic clinics. Taking all the work conducted in the research lab to XBoost.

## MIXR Lab

August 2019 – January 2020

- Conducted research in the Department of Computer Science & Informatics towards military medicine.
- Utilized Machine Learning & Computer Vision Library into Unity3D to detect accurate pose estimation.
- Utilized Azure Kinect DK for motion tracking, calculating body joints, 3D mesh scanning and point cloud visualizations.
- Goal was establishing a tool for Microsoft HoloLens 2 that can help paramedics & surgeons treat Injured soldiers shot on the ground-based off accurate pose position, mesh scanning through point cloud visualizations and overlaying holographic projection of 3D human muscle skeleton model onto a human body of injured soldier.

## Enable Games / Drexel University Spin off startup@ Replay Laboratory

May 2018 – June 2020

### *Game Developer & Researcher*

- Developed projects using Unity3D to enhance physical therapy for patients who have Cerebral Palsy, Parkinson's, and other neurological conditions.
- Built custom asset library to integrate the use of Xbox Kinect to enable motion tracking in the use of physical therapy activities.
- Implemented use of Stykz, a motion capture studio software to take real life motions and turn them into animations into games and further exporting all movements and motion tracking input into RAW data using JSON.
- Reviewed roles in clinical trials for usability purposes with patients. Analyzing inputs and gathering more clinical data between interaction of the patients through the games and recording their progress through our platform.

## Weill Cornell Medicine / Cornell Medical School

April 2019 – June 2019

### *Research Assistant*

- Worked in engineering sub-team researching the integration between 3D segmented heart models derived from CAT scans and fluoroscopic images.
- Utilizing 3D models & AR Visualizations to minimize error on syncing both CAT scans and fluoroscopic images for catheter approximation during cardiovascular Interventions.
- Worked on improving thickening of blood volume of 3D Segmented CAD Models using Rhino 3D & Geomagic Wrap to test into Microsoft HoloLens for visualizing detection of catheter accuracy to better assist Interventional cardiologist.

## **HACKATHON PROJECTS**

### OperatAR

Dec 2017 - Present

An app that teaches users how to perform surgery and how to give clear directions in an operation room through Augmented Reality. The app was built using Unity3D, C#, Vuforia and Android Studio integrated through Google Cloud using speech to text API.

### CerebralPalsyVR

Nov 2017 – Nov 2017

A series of VR-based games that help rehabilitate cerebral palsy patients who are partially able to move their feet and/or hands. The patient uses an Oculus Rift headset with Arduino sensors attached to their legs and hands. I worked extensively on the implementation of the main menu, UI, VR input. Also helped develop certain movements that our VR game could use to help cerebral palsy patients. Worked on backend with Android Studio to use the gyroscope tool for our balance measurements with mobile Android devices serving as the sensors of physical motion.

## **AWARDS/HONOR**

### **MIT LinQ Catalyst Fellowship**

MIT linQ Fall 2021

Selected as a Catalyst fellow for the 2022 cohort. Catalyst brings together multidisciplinary experts to work together in an iterative process to identify and validate unmet medical and health-related needs, discover new project opportunities, and develop action plans.

### **Amazon Web Services - Best Use of AWS**

HackRU Fall 2017

Developed a machine learning program that can diagnose Diabetes based on the information that patients provide to Amazon Alexa through a series of questions.

### **Top 30 Hack**

PennApps Fall 2018

Developed a social media app using Facial Recognition to help others get to know each person faster. The app scans their face and through the datasets display their name and stores the exact day, time, and location where they met.

### **NSF I-Corps Grant Recipient**

National Science Foundation Innovation Corps Spring 2020

\$2,000 grant awarded to "teams interested in exploring the commercial viability of their ideas for products and businesses that are based on their own inventions.

### **MIT COVID-19 Challenge Winner**

MIT COVID-19 Challenge Spring 2020

Came up with a program that can-do questionnaire testing and then based on answers get a sample test kit sent home. Once that test kit is sent back to clinical labs, they can use Machine Learning Algorithms to conduct antibody testing to accurately diagnose if the patient has Coronavirus or not.

## **Publications**

### **[Eye-Gaze, Inter-Brain Synchrony, and Collaborative VR in Conjunction with online Counselling: A Pilot Study](#)**

Ihshan Gumilar, Amit Barde, Ashkan F. Hayat, Mark Billingham, & Sanjit Singh

### **[Inter-brain Synchrony and Eye Gaze Direction During Collaboration in VR](#)**

Ihshan Gumilar, Amit Barde, Prasanth Sasikumar, Mark Billingham, Ashkan F. Hayati, Gun Lee, Yuda Munarko, Sanjit Singh, Abdul Momin