THE GEORGE WASHINGTON UNIVERSITY'S **3RD ANNUAL MEDICAL HACKATHON**

JANUARY 25TH-26TH, 2020

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EVENT SUMMARY

On the morning of January 25th, university students filled the B1 Level of the Science and Engineering Hall for the Third Annual George Hacks Medical Solutions Hackathon. Undergraduates and graduates signed up for the promise of an intellectual challenge, a chance to showcase their skills, and of course, free food. George Hacks is a student-run organization that organizes medical hackathons with a focus on social impact. This year, students divided into 18 teams to tackle real-world challenges from an expanded network of healthcare organizations. George Hacks partnered with the GW Hospital, GW School of Medicine & Health Sciences, Children's National Hospital, and others who presented students with problems ranging from infection prevention in hospitals to prosthetic modification for veterans. Teams utilized mentors' expertise, technical supplies, and workshops at their disposal and then presented their solutions in two rounds of judging to evaluate technical qualifications and market fit. GW President Thomas LeBlanc, who delivered closing remarks at the event, said that George Hacks supports the university's growing commitment to STEM and gives students the opportunity to develop skills they will need to address issues across all fields.

SCHEDULE

SATURDAY, JANUARY 25TH

09:00 - Registration: Grab your swag, and get some coffee & a light breakfast! SEH B1

09:00 - Network with Tabling Organizations SEH B1

10:00 – Opening Ceremonies & Pitches Lehman Auditorium (SEH B1)

11:00 – Team Formation & Pitch Selection Lehman Auditorium and SEH B1

12:00 – Start Hacking! SEH B1

13:00 – Arduino Workshop by GW Innovation Center SEH 1st Floor Studio Labs (Room 1450)

13:00 – Mentor Sessions Begin SEH B1

13:30 - Lunch, thank you Tonic!



15:00 – Raspberry Pi Workshop by SEAS Computing SEH 1st Floor Studio Labs (Room 1450)

17:30 – 3D Modeling with Fusion 360 by GW Innovation Center SEH 1st Floor Studio Labs (Room 1450)

18:00 - Dinner!



19:00 – App-Making Workshop SEH 1st Floor Studio Labs (Room 1450)

22:00 – Nerf Tournament & Light Snack Lehman Auditorium (SEH B1)

SUNDAY, JANUARY 26TH

00:00 – Midnight Snack & Energy Drink



07:00 – Peet's Coffee & Light Snack

07:00 – Yoga & Meditation by GW Health & Wellness Lehman Auditorium (SEH B1)

08:00 – How to Pitch Your Idea Workshop SEH 1st Floor Studio Labs (Room 1450)

08:30 - Panera & Coffee

11:00 - HACKING ENDS!

11:00 – Demo Round Judging begins SEH B1

12:00 - Lunch!



13:30 – Pitch Round Judging begins Lehman Auditorium (SEH B1)

15:00 - Pitch Round Judging ends

15:30 – Awards & Closing Ceremony Lehman Auditorium (SEH B1)

OUR TEAM



Caitlyn Pratt, Director & Co-Founder

Meet the director of George Hacks. A junior studying Biomedical Engineering, Caitlyn is the team's enthusiast for innovation in aging and accessibility. Her experience in entrepreneurship stems from starting her own company, Takin' it Easy, which developed a smart pill dispenser to alleviate the burdens placed on caregivers. She is currently a Product Engineer intern at Otolith Labs.



Matt Taylor, Technical Director

Initially recruited from New Zealand to play Water Polo for GW, Matt now serves as a graduate teaching assistant in the ECE department. Last year, he competed in Medical Solutions 2019 where his team won "Best Pitch" Award for their variable length prosthesis. The team has enjoyed working with Matt's background in Electrical Engineering as well as his passion for entrepreneurship.



Jinbi Tian, Event Operations

Meet Jinbi, a sophomore studying Biomedical Engineering. Her interest in social impact innovation and the intersection of business and technology brought her to join the George Hacks Event Operations Committee. Jinbi currently assists with nanofabrication of optoelectronic systems in Dr. Lu's Lab.

OUR TEAM



Giavanna Corazza, Event Operations

Meet Giavanna, a sophomore studying biomedical engineering. A competitor in the 2019 Medical Solutions Hackathon, Giavanna and her team of three other freshmen designed a wheelchair accessory and went on to win \$5,000 in the final round of GW's New Venture Competition. We were honored to have her this year as part of the Event Operations Committee.



Abiha Jafri, Event Operations

A senior studying biomedical engineering, Abiha serves as a research assistant in the OB/GYN Dept at the GW MFA. She also works with Dr. Loew in his Medical Imaging Lab. As a former competitor in the Medical Solutions Hackathon, we have been grateful to have had her on the team this year as part of the Event Operations Committee.



Libby Schiller, Marketing Lead

Meet Libby, a senior studying Political Communication and Spanish and our very own Marketing Lead. We are thrilled to be consulting her experience and interest in the intersection of communications and technology to keep the George Hacks community up-to-date. She is currently a Product Marketing Intern at Higher Logic, an online community software company.

OUR TEAM



Christianne Chua, Social Media Chair & Graphic Designer

A senior studying biomedical engineering, Christianne researches in Dr. Entcheva's Lab, where her work on a novel cell-based structure for all-optical pacing of heart tissue has earned her national recognition as a Barry Goldwater Scholar. Christianne was also a participant in the 2019 Medical Solutions Hackathon and has a passion for impact-driven healthcare innovation.



Petter Andreasen, Finance Chair

A senior studying Finance, Petter was tasked with keeping an eye on the books. His Scandinavian roots ensured operations ran smoothly and within budget. Most of Petter's family works within the field of medicine, and we were delighted to welcome his perspective to the team! As a former GW rower, he isn't new to teamwork, and is excited to see where the organization is headed from here.



Will Desautels, Outreach Chair

Meet Will, a senior studying International Business and Sociology. A former Course Assistant for "Summer at GW," Will is passionate about connecting people with diverse skill sets to produce greater outcomes. He has served as the George Hacks Outreach Chair, a role designed to facilitate George Hacks engagement outside of SEAS.



GEORGE HACKS IS PROUD TO CALL



THE GEORGE WASHINGTON UNIVERSITY **HOSPITAL**



GW School of Medicine & Health Sciences

EVENT SPONSORS

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KEYNOTE SPEAKER

ROB JONES

U.S. Marine Corps Veteran

Rob joined the Marine Corps Reserves as a combat engineer at Bravo Company, 4th Combat Engineer Battalion in Roanoke, VA. He joined the reserves in his junior year at Virginia Tech. In the Marine Corps, his primary role was the use of explosives and the detection of buried IEDs and weapons caches. Rob graduated from Virginia Tech in 2007.

He was first deployed in 2008 to Habbaniyah, Iraq. In 2010, he was sent to Delaram/Sangin, Afghanistan, where he was tasked with clearing an area that likely contained IEDs. It was in this capacity that he was wounded in action by a landmine.

Rob was eventually sent to Walter Reed where he was fitted with prosthetics and began his rehabilitation. He worked hard to learn how to walk with two bionic knees. He also learned how to cycle, run, and row. He decided to train for the 2012 Paralympics, where he and his rowing partner won the bronze medal. In 2013, Rob began a solo supported bike ride across the United States. The ride began in Bar Harbor, Maine and ended in Camp Pendleton, California.





In the fall of 2014, he began training for triathlons with the goal of competing in the 2016 Paralympic Games. Unfortunately, he did not qualify. In 2017, Rob ran 31 marathons in 31 days in 31 different cities. His team raised over \$200,000 for the Coalition to Salute America's Heroes, the Injured Marine Semper Fi Fund, and the Stephen Siller Tunnel to Towers Foundation.

Inspired by the ingenuity that enabled his prosthetics to permit solo bike riding, Rob Jones presented a personal problem statement last year at the 2019 George Hacks Medical Solutions Hackathon. He challenged participants to design and build a solution that would allow him to hike on uneven terrain without losing his balance. The project was then picked up by this year's GW Biomedical Engineering Department Senior Capstone and is currently being worked on by two senior BME teams. Rob Jones continues to inspire innovation that enables individuals to achieve their own goals, and we are thrilled to have him involved in George Hacks.

PITCH PRESENTERS

Members of various DMV healthcare organizations devised and presented innovation challenges to hackathon participants. What makes George Hacks unique is the opportunity to hear directly from end-users and those in the use-environment. We believe this level of communication is crucial to developing effective solutions, so we are incredibly grateful to the people listed below who took the time to share pressing issues with the next generation of problem solvers.



PATIENT-DOCTOR COMMUNICATION PLATFORM Presented by Shawn Sarin, M.D. GW MFA



VIRTUAL HOME SAFETY ASSESSMENT Presented by Leslie Davidson, PhD - Occupational Therapist GW MFA



FAMILY HISTORY AND GENETICS MOBILE APPLICATION Presented by Charles Macri, M.D. GW MFA



OPTIMIZED SCHEDULING PROCESS FOR CHEMOTHERAPY INFUSION ROOM Presented by Mitchell Smith, M.D. GW MFA



PITCH PRESENTERS



WATER- AND SAND-PROOF COVER FOR PROSTHETIC LEG Presented by Rosemary Salak, U.S. Army retired Quality of Life Plus



MEDICATION ADHERENCE IN ADOLESCENT POPULATION Presented by Prof. Jennifer Walsh GW School of Nursing



TRAUMATIC BRAIN INJURY (TBI) INTERVENTION COMPLIANCE Presented by George Chewning V.A. Medical Center



ALL MY DOCTORS: A PLATFORM FOR PRIMARY CARE ACCESS TO SPECIALIST Presented by Elizabeth Bluhm, M.D. GW MFA



VINTAGE MUSIC STATION FOR TECHNOLOGY-TIMID SENIORS Makers Making Change





PITCH PRESENTERS



HEIGHT-ADJUSTABLE STEP FOR SURGEONS

Benny Lee, M.D. and Sheena Chen, M.D. GW Hospital



HAND WASH ALERT DEVICE

GW Cancer Center



ELECTRODE SECURING SYSTEM

Keith Cole, PT, DPT, PhD, MbiomedE, OCS GW SMHS, Physical Therapy



WINNING TEAMS

1ST PLACE: HEYO SOLUTIONS

PITCH: Hand Wash Alert Device provided by GW Cancer Center



CHALLENGE: Cancer treatment weakens the immune system of patients, making them more susceptible to infections easily contracted in a hospital environment.

PROPOSED SOLUTION: SecuFoam is a product designed to increase the frequency of hand sanitization in hospitals/medical centers. Our system accomplishes this by providing all visitors, patients, and other personnel with RFID-enabled wristbands at Check-In and a system of speed-gate style turnstiles placed at strategic positions in the hospital/medical center. When a person with a wristband approaches one of these stations, they will put their hand under a hand sanitizer dispenser connected to the turnstile as their wristband is scanned by the system. After the automated device is done dispensing the sanitizer, the gate will open and let them through. The whole process takes less than 10 seconds. By forcing hand washing with this non-invasive and fast method, the spread of disease and infection to the hospital from outside visitors and from parts of the hospital to other parts of the hospital would be decreased. This has the effect of reducing re-admittance frequency, hospital stay length, number of sick days for medical staff, and many other positives for quality of patient care and cost saving for the hospital.

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TEAM:

Evan Lindeman, GWU Biomedical Engineering '23 Yahya Aliyu, GWU Biomedical Engineering '23 Huzeyfa Telha, GWU Computer Science '23 Oscar Southwell, GWU Mechanical Engineering '23



WINNING TEAMS

2ND PLACE: INSTAFUSION



PITCH: Enhanced Chemotherapy Infusion Room Scheduling Process provided by GW Medical Faculty Associates

CHALLENGE: Clinicians often have to delay starting new treatments due to lack of availability which is not optimal for cancer patients and adds unnecessary stress. The current scheduling mode is a homegrown spreadsheet. The precise usage cannot be tracked, but there are unused times due to inefficient scheduling and not using max capacity at early and late times of day.

PROPOSED SOLUTION: The proposed solution aims to optimize infusion center scheduling by creating an algorithm that incentivizes patients to schedule early-morning or later-afternoon infusions while creating space for patients with same-day clinic visits and minimizing nurse burn-out throughout the day. This will be supplemented with a front-end app for patients inputting a range of available appointment times and software for data analytics of the infusions. As a result, patient waiting times should go down and infusion center revenues should increase significantly without having to hire additional staff or installing more chairs.

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TEAM:

Huma Ilyas, GWU Mechanical Engineering '22 Waqas Haque, JHU Public Health '20 Aqsha Nur, JHU Public Health '20





WINNING TEAMS

3RD PLACE: SMART STOOL



PITCH: Height-Adjustable Step for Surgeons provided by GW Hospital

CHALLENGE: In order to maintain an optimal angle, surgeons rely on OR staff to stack and remove stepping stools in a crowded OR space, which is distracting and hazardous.

PROPOSED SOLUTION: The proposed solution was an ergonomic step stool that could be adjustable to fit the individual surgeon's height needs. The design featured two lifting mechanisms, a scissor lift and four hydraulic cylinders that could withstand 300 pounds of downward force. The scissor lift was powered by four stepper motors with 75 pounds of torque. The entire device will be powered by a lead-acid battery. It will be on four wheels with a passive braking system. The step will be able to go from five inches to fifteen inches. The step will be made of two steel shells measuring 18"x24"x2.5". There will be an ergonomic mat on top and in order to keep it clean, there will be a silicone covering around the sides. The vertical motion will be voice-activated by a raspberry pi with simple commands such as "step up", "step down", or "stop". The entire device would weigh about 50 pounds so it could be easily rolled out of the way for an emergency.

TEAM:

Yasser Althuwaini, GWU Mechanical Engineering '23 Jonathon Lee, GWU Computer Science '23 Phoenix Price, GWU Mechanical Engineering '23 Cordelia Scales, GWU Biomedical Engineering '23



WINNING TEAMS

SPOT PRIZE | BEST IMPLEMENTATION OF HARDWARE: TECHSTEP



PITCH: Height-Adjustable Step for Surgeons provided by GW Hospital

CHALLENGE: When surgeons are in the operating room, they will often need stools to adjust their height to have better access to the operation. Currently, stools are stacked to adjust their height, however this can be both unsanitary, distracting, and hazardous.

PROPOSED SOLUTION: The proposed product, the TechStep, is an electronically operated adjustable stool. The stool is controlled by foot pedals (up and down) allowing for the device to be operated hands free as well as giving the surgeon ownership of their own stool height. The device raises and lowers between the heights of one to two of the current "stacked" stools using four motors which allows for full control of the height letting the user reach very precise height increments. It would be made of lightweight stainless steel for durability and would include a rechargeable battery to prevent clutter in the operating room. The proposed product is a much-needed update to the inefficient, imprecise, and unclean method used currently as it provides a quick, easy to use, and hygienic alternative.

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TEAM:

Michael Degaga, GWU Biomedical Engineering '21 Ibraheem Farooq, GWU Biomedical Engineering '21 Donivyn Cruz, GWU Biomedical Engineering '21





WINNING TEAMS

SPOT PRIZE | BEST PITCH: JACE



PITCH: Adolescent Medication Adherence provided by GW School of Nursing

CHALLENGE: An estimated 25-50% of patients worldwide do not take their medications as prescribed. In the US, this is said to account for 125,000 deaths, 10% of all hospitalizations, and \$289 billion in health care costs annually (Bosworth, 2018). During adolescence, patients are encouraged to take ownership of their medication management. Consistent, long-term adherence to medications is a frequent and substantial challenge in the adolescent population.

PROPOSED SOLUTION: To encourage adolescents to take ownership of their medication management, JACE designed a two-pronged solution: a discreet wallet or bag in which they can carry their medication and an app to alert the child to take it. The app will both dismiss the alarm and track adherence over time via sensors within the wallet or bag's zippered opening. This discrete system will hopefully reduce memory lapses and undesired visibility in daily administration of medications.

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TEAM:

Claire Allison, GWU Biomedical Engineering '23 Jenna Kahwash, GWU Biomedical Engineering '23 Abby Klink, GWU Biomedical Engineering '23 Emilie LeMieux, GWU Biomedical Engineering '20





JUDGES

MOUNIR ALAFRA	NGY Space Exploration Program Lead, Mosaic ATM
SUSAN APGOOD	President & CEO, News Generation, Inc.
MARTIN BURVILL	Retired President, Verizon Business Market
DR. KEVIN CLEAR	Y Bioengineering Scientific Lead, Children's National Hospital
LAUREN DECORT	E Software Engineer, Dynex Technologies
MOLLY DELANEY	Patent Examiner, U.S. Patent & Trademark Offices
CHRISTINA DZINO	GALA Manager, Customer Value Partners
DR. BILL EDISON	Retired Senior Fellow/Director, Lockheed Martin
BOB FINE	Executive Director, International Virtual Reality and Healthcare Association
RODNEY LAKE	Director, GW Investment Institute
BRIAN LANG	Vice President, iVision Consulting
DR. LEX MCCUSK	ER Director, GW Office of Innovation & Entrepreneurship
BILL MURPHY	Senior Biomedical Engineer, BioMarker Strategies, LLC
MITCH NARINS	Principal Consultant/Owner, Strategic Synergies, LLC

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JUDGES continued

DICK NORMAN	Retired Project Manager, SRA International, Inc.
HOWARD OFFIT	President & COO, Braden Real Estate
CHARLES POLINGER	Retired Deputy Director, U.S. General Services Administration
FATEMEH RAZJOUYAN	Director of Regulatory Policy, Becton Dickinson
DR. GUY SAVAGE	Senior Director, Inmarsat Government Services
DR. JONATHAN SHERMAN	Professor of Neurosurgery, GW Medical Faculty Associates
DR. CANDICE SILVESTRE	Alumni, GW School of Medicine & Health Sciences
LILY SOOKLAL	R&D Systems Engineer, Becton Dickinson
JONATHAN STEFKOVICH	Business Development Manager, Schneider Electric
SCOTT STEIN	Associate Director, GW Office of Innovation & Entrepreneurship
ANNAMARIA TANNON	Director, GW Innovation Center
CARY TOOR	Principal, T-Ventures Corporation
TEZITA WATTS	Patent Examiner, U.S. Patent & Trademark Office



MENTORS

DR. SHAHROKH AHMADI	GW Department of Electrical & Computer Engineering
JON AKERS	Otolith Labs
DR. AMIR ASLANI	GW Department of Electrical & Computer Engineering
TAMMY BARLET	The American Legion
DR. ELIZABETH BLUHM	GW Medical Faculty Associates
GEORGE CHEWNING	U.S. Department of Veterans Affairs
DR. LESLIE DAVIDSON	GW Medical Faculty Associates
GREG DAVIS	GW School of Medicine & Health Sciences
MAUREEN ELIAS	
DR. REBECCA GOTTLIEB	Medtronic Diabetes
FOUR HEWES	Four Hewes Design
RONAN KELLY	SilverCloud Health
DR. DAVID LEE	GW Department of Biomedical Engineering
DR. CHARLES MACRI	GW Medical Faculty Associates





MENTORS continued

DAVE MCCARTHY	AccelerateDC
JUSTIN OPFERMANN	Children's National Health System
ROSEMARY SALAK	Quality of Life Plus
DR. SHAWN SARIN	GW Medical Faculty Associates
DR. MITCHELL SMITH	GW Medical Faculty Associates
DR. BARB SPRINGER	Quality of Life Plus
TIM STREBEL	VA Medical Center
JENNIFER WALSH	GW School of Nursing





GRADUATE STUDENT MENTORS

NEIL ALMEIDA	Medicine, M.D.
SAAHIL CHHABRIA	Cybersecurity, Masters
CORY DEFREITAS	Medicine, M.D.
PREET DERASARI	Computer Engineering, Ph.D.
SAMUEL DUFFY	Medicine, M.D.
DAVE FORAN	International Affairs, Masters
ANNA GAMS	Biomedical Engineering, Ph.D.
ALI GERAMI MATIN	Computational Mechanics, Ph.D.
NYSHIDHA GURIJALA	Medicine, M.D.
GEORGE HARDIGG	Systems Engineering, Masters
JEHSHUA KARUNAKARAN	Medicine, M.D.
PREETHI SANGEETHA KATHIRESAN	Biomedical Engineering, Masters
NIDHI KEDDA	Medicine, M.D.
ANDREA KLEIN	Medicine, M.D.

GRADUATE STUDENT MENTORS

AJMAL KUKKANGAI	Computer Science, Masters
AARON LYNCH	Biomedical Engineering, Masters
PAUL MARTINEZ	Medicine, M.D.
KHASHAYAR MOZAFFARI	Medicine, M.D.
ADAM MUNDAY	Medicine, M.D.
ANDREW PALOSAARI	Medicine, M.D.
NICHOLAS PRADHAN	Medicine, M.D.
RANDY RAY	Medicine, M.D.
AKSHAY REDDY	Medicine, M.D.
PRASHANT SAINI	Medicine, M.D.
SAMANTHA TERHAAR	Medicine, M.D.



MVPs

The George Hacks Team would like to thank the following people for their commitment of time, resources, and skills that made the event possible.

Dean John Lach | GW SEAS Christine Searight | GW Hospital Dean Bob Miller | GW SMHS Jonathan Sherman | GW MFA Murray Loew | GW Department of Biomedical Engineering Igor Efimov | GW Department of Biomedical Engineering Lex McCusker | GW Office of Innovation & Entrepreneurship Scott Stein | GW Office of Innovation & Entrepreneurship Michael Plesniak | GW Department of Mechanical and Aerospace Engineering Suresh Subramaniam | GW Department of Electrical and Computer Engineering Jack Daggitt | Otolith Labs Tom Hardart | Otolith Labs Kevin Cleary | CTSI - Children's National Hospital Rodney Lake | GW Investment Institute Jonathan Stefkovich | Schneider Electric Critical Systems Elma Levy | The Eldov Group, LLC Amir Aslani | GW Department of Electrical and Computer Engineering Jason Zara | GW Department of Biomedical Engineering David Lee | GW Department of Biomedical Engineering Sandra Little | GW SEASMichael Veedock | GW SEAS Aderonke Coker | GW Department of Biomedical Engineering J'aime Drayton | GW Department of Biomedical Engineering Raoul Gabiam | GW SEAS Computing Facility





MVPs continued

Jovial McSears | GW SEAS Computing Facility Brigitte Comer | GW SEAS Computing Facility Zach Day | GW SEAS Computing Facility Sarah Lyon | GW SEAS Development & Alumni Relations Durriyyah Jackson | GW SEAS Development & Alumni Relation



PRESIDENT LEBLANC

"Through your efforts with George Hacks, you are harnessing the strength of interdisciplinary teams to solve complex healthcare challenges. And by collaborating across disciplines, you are leading the way in the team-based approach that the field of innovation requires today. Breakthrough scientific discoveries and inventions always come from the synergy of people who work together."

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Office of Innovation

& Entrepreneurship



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