THE GEORGE WASHINGTON UNIVERSITY'S 3RD ANNUAL MEDICAL HACKATHON

JANUARY 25TH-26TH, 2020

#WHATWILLYOUCHANGE?

georgehacks.org  @GeorgeHacksDC @george.hacks
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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.
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 CONTINUED

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.
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

&

School of Medicine & Health Sciences

EVENT SPONSORS
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

CONTINUED

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
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
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.

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
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 home-grown 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.

**TEAM:**
Huma Ilyas, GWU Mechanical Engineering ‘22
Waqas Haque, JHU Public Health ‘20
Aqsha Nur, JHU Public Health ‘20
WINNING TEAMS
CONTINUED

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

CONTINUED

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.

TEAM:
Michael Degaga, GWU Biomedical Engineering ‘21
Ibraheem Farooq, GWU Biomedical Engineering ‘21
Donivyn Cruz, GWU Biomedical Engineering ‘21
WINNING TEAMS
CONTINUED

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.

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 ALAFRANGY
Space Exploration Program Lead, Mosaic ATM

SUSAN APGOOD
President & CEO, News Generation, Inc.

MARTIN BURVILL
Retired President, Verizon Business Market

DR. KEVIN CLEARY
Bioengineering Scientific Lead, Children's National Hospital

LAUREN DECORTE
Software Engineer, Dynex Technologies

MOLLY DELANEY
Patent Examiner, U.S. Patent & Trademark Offices

CHRISTINA DZINGALA
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 MCCUSKER
Director, GW Office of Innovation & Entrepreneurship

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MITCH NARINS
Principal Consultant/Owner, Strategic Synergies, LLC
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HOWARD OFFIT President & COO, Braden Real Estate

CHARLES POLINGER Retired Deputy Director, U.S. General Services Administration

FATEMEH RAJOUYAN 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

ANAMARIA TANNON Director, GW Innovation Center

CARY TOOR Principal, T-Ventures Corporation

TEZITA WATTS Patent Examiner, U.S. Patent & Trademark Office
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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
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FOUR HEWES  Four Hewes Design
RONAN KELLY  SilverCloud Health
DR. DAVID LEE  GW Department of Biomedical Engineering
DR. CHARLES MACRI  GW Medical Faculty Associates
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DAVE MCCARTHY

JUSTIN OPFERMANN

ROSEMARY SALAK

DR. SHAWN SARIN

DR. MITCHELL SMITH

DR. BARB SPRINGER

TIM STREBEL

JENNIFER WALSH

AccelerateDC

Children's National Health System

Quality of Life Plus

GW Medical Faculty Associates

Quality of Life Plus

VA Medical Center

GW School of Nursing
GRADUATE STUDENT MENTORS

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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
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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
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J’aime Drayton | GW Department of Biomedical Engineering
Raoul Gabiam | GW SEAS Computing Facility
MVPs
CONTINUED

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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."