

## 2018 ENGINEERING PSYCHIATRY RESEARCH PROGRAM

### [ ENGINEERING IN MENTAL HEALTH ]

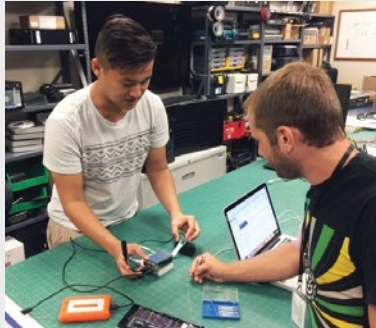
The Department of Psychiatry in the School of Medicine and the Jacobs School of Engineering recently partnered to launch the UC San Diego Center for Mental Health Technology (MHTech Center), which will include a new internship program for undergraduate and graduate engineering students this spring. This new program, called the Engineering and Psychiatry Research Program (EPRP), was developed out of a need for technological solutions to address mental health challenges.

According to the World Health Organization, mental disorders (depression, bipolar disorder, schizophrenia, alcohol and drug use disorders) are the leading cause of disability worldwide, but less than 50 percent of people with mental disorders are identified and treated. In this program, psychiatry faculty mentor ECE student interns in developing an engineering solution to a mental health problem.

In Spring 2018, 23 engineering students enrolled in the EPRP program to work on 14 unique projects. 57 percent of the students enrolled in the EPRP for four units, while the other 43 percent enrolled for two units.

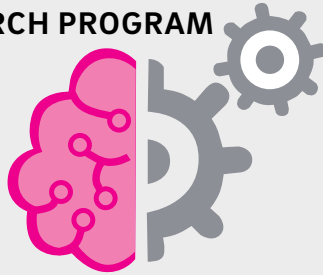
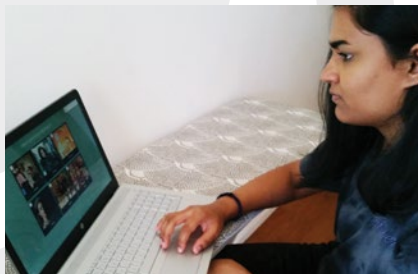
#### AT-HOME COGNITIVE REHABILITATION

The GoCog project, led by Raeanne Moore, a faculty member in the Psychiatry Department, uses Google Home as a two-way communication rehabilitation device. It prompts the patient to talk to Google Home to complete cognitive exercises, improve calendar usage, monitor daily routines, and participant in relaxation strategies. Two undergraduate ECE students, Victor Miranda and Yihui Yang, programmed a Raspberry Pi microcontroller with an LCD touch screen to recognize a patient's voice and trigger customized rehabilitation sessions. This project holds potential to increase the efficiency and affordability of cognitive rehabilitation programs.



#### ENGAGING FACEBOOK TO REDUCE SOCIAL ISOLATION

ECE student Meena Kaliswamy created a platform on Facebook to increase social engagement among older persons living with HIV. "Older persons living with HIV are particularly vulnerable to socially isolating behaviors, which can have downstream negative mental and physical health consequences," says Moore. "We know many of these older adults are using Facebook, so the aim of this project is to utilize this framework and increase social activity in a fun and personalized way." Kaliswamy has created a quiz-like platform on Facebook that, based on the user's interests, suggests activities, such as local comedy plays, exercise groups, and volunteer events, in an effort to decrease social isolation.



23 STUDENTS

7 FEMALE

16 MALE

19 BS STUDENTS

5 FEMALE

14 MALE

4 MS STUDENTS

2 FEMALE

2 MALE

**"EPRP GIVES ME A VALUABLE OPPORTUNITY TO UNDERSTAND THE IMPORTANCE OF APPLYING MY ENGINEERING KNOWLEDGE TO REAL-WORLD APPLICATIONS AND EXPANDS MY VISION OF BEING AN ELECTRICAL ENGINEER."**

**—YIHUI YANG,  
ECE UNDERGRADUATE STUDENT**

#### AUTOMATED PSYCHOTHERAPY FIDELITY RATINGS

Four ECE students, Wenyu Zhang, Nikhil Dutt, Daniel Coronado, Think Le, and two faculty mentors, Eric Granholm in Psychiatry and Hari Garudadri at the Qualcomm Institute, are working to create an automated psychotherapy session fidelity rating system. By using automated speech recognition, natural language processing, machine learning and neural network modeling, automated fidelity rating of psychotherapy sessions is possible. This could impact public health enormously by dramatically increasing the availability and quality of evidence-based psychotherapy treatments for people with mental illness.

#### COGNITIVE BRAIN COMPUTER INTERFACE (COGBCI) PROJECT

Led by Jyoti Mishra, the CogBCI Project evaluated how people learn to self-modulate brain signals that are important for paying attention. ECE students Yihan Hu and Sovanarung Seng conducted signal processing analytics on a recently acquired CogBCI dataset. They developed objective metrics to demarcate successful versus unsuccessful neuromodulation. Hu's research discovered that individuals who learn to successfully modulate their brain signals also show benefits in other unlearned tasks requiring attentive discrimination. The results of this project have important implications towards the engineering and translation of scalable CogBCIs as next-generation technology therapeutics for diverse mental health disorders.

#### MARIJUANA TREATMENT APP

Led by Kara Bagot, students worked on developing components of an app-based intervention for teens to reduce or stop marijuana use as an adjunct to traditional behavioral therapy. Students worked to "game-ify" cognitive tasks and develop an augmented reality task based on GPS to ensure/incentivize adherence to juvenile justice/court/medical/treatment appointments and school attendance.