

Bryan Pratte

Electrical Engineering

Year in School: Senior

Hometown: Columbia, Mo.

Faculty Mentor: Dr. Tina Smilkstein, Electrical & Computer Engineering

Processing brainwaves for hand-free control of devices

Bryan Pratte, Kevin MacDonald, & Tina Smilkstein

We have built a system to observe and analyze brainwaves for use in controlling devices such as wheelchairs and electronic prosthetics bypassing a need for the user to have use of their hands and/or other limbs. The system senses brain activity through traditional electrodes placed on the head. The signal is amplified as much as 1000 times by a circuit on a custom printed circuit board developed for this project and then processed in a programmable hardware device. Various electrode positions and analysis algorithms are tested for ease in controlling the driven device, which is the electric wheelchair in this presentation. Not only was there a need to design the amplification and analysis circuitry for this project, we also had to reverse engineer the wheelchair to determine how to best link the circuitry to the wheelchair. This work is also preliminary work to acquire data for a new sensory prosthetic project in the Electrical Engineering department.