# The Emotional Flowerbed

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The Emotional Flower
Last academic year, a group of students in EDNS491/492 (Senior Capstone Design) created the *Emotional Flower*, a robotic art installation that visually and audibly represents the collective emotional state of its users. Visitors could interact with the installation by indicating their emotions through a user interface. With these emotions as inputs, the system generated dynamic visual and auditory displays, changing LED colors and sounds based on the collective mood of the community. Over time, the Emotional Flower was designed to evolve, reflecting campus-wide sentiment.

What made their design unique is its ability to promote empathy and awareness by providing a real-time representation of emotions in a shared space. The project integrated mechanical movement, electronic control systems, and interactive software, with the aim of creating a seamless and immersive experience. By merging engineering and art, the goal of the Emotional Flower was to foster an appreciation for the emotional connections within a community while demonstrating the creative possibilities of STEM-driven interactive installations. The Emotional Flower is an impressive feat of engineering and artistic effort. The final display at the Capstone Design Expo last April provided an opportunity for the team to show off their final working design and allowed the public to interact physically and emotionally with it. A video of the Emotional Flower in action can be found at: https://drive.google.com/file/d/1zxTWcTS45we-tVLe5XMq9nAminXbnl5I/view .
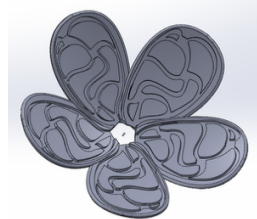
The original capstone design team consisted of mechanical, electrical, and design engineers, which provided them with key background knowledge for designing several parts of art installation, and while the project was a success, there were several features left unimplemented due to both time limitations and lack of software expertise. In particular, the team developed and integrated several pieces of code to control and drive the motors, sound, and lighting of the Emotional Flower, but not having a computer science major on the team limited some of the

software development in terms of its capabilities, features and robustness.

Project Summary:

The goal of this project is to modify the software (and some of the electronics) within the Emotional Flower to enhance existing features, improve operational robustness, and add new options for interacting with the art installation. Some examples include:

- Adding and interactive web interface: This may include a website allowing remote interaction with the display and tracking long-term data trends.
- LED-audio synchronization: To enhance the connection between the musical output and the lighting within the flowers, the LEDs can be programmed to generate a more complex sequence of lighting patterns that correspond better to the music and its corresponding emotion.
- Enhance the movement of the centerpiece flower: Currently the centerpiece flower is programmed to open and close at limited intervals. Expanded programming could allow the flower to open/close with more frequency and be better synchronized with the musical output.
- Improve power delivery to computer boards and add new software-controlled safety and debugging features: Bootup scripts and drivers need to be re-designed for improved ease of use and added robustness. Code for testing, troubleshooting, and verification need to be added so new developers can more easily maintain the art installation.

The team is also encouraged to expand the musical compositions, wooden display, and emotion dial wheel in ways that will enhance the user experience beyond what is mentioned above. Students with interest in robotics and human-computer interaction (HCI) may be especially interested in this project.

The students will be involved in every phase of the project from design through implementation. During the design phase, the students will interact with Prof. Bahar (and if available, members of the original Emotional Flower capstone design team) to better understand the current operation of the art installation and its hardware and software components. Extensive documentation written by the original team will be made available to the new field session team as well.

Desired Skills for Students:
- C++, Python coding
- Embedded system design
- Prior experience with robot motor control
- Prior experience with Arduino and Raspberry Pi use, and sensor/actuator interfacing.

Preferred Team Size: 4 students

Location of Work to be Performed:

The Emotional Flower is currently housed on the 2nd floor of CTLM (above the atrium). While some software can be developed and tested offsite, students are expected to spend significant time at the location in CTLM working directly on the art installation. Eventually, the Emotional Flower may be moved to an alternative location, depending on availability, and final working state.