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Robotics with Humanoid Robot NAO and Hexapod (Robotic Spider)¹ CARLOS GALINDO, MUHAMMAD SALEEM, AKHTAR MAHMOOD, Bellarmine University — Robotics is an exciting field. Various types of robotics devices are being used in many sectors of the industry, in NASA's Mars missions, hospitals and movies, among others. Since robotics technology has witnessed a remarkable growth, there is a need to educate the next-generation undergraduate STEM students in robotics. We have been conducting research in fully-autonomous robotics with our Humanoid-Robot NAO and in semi-autonomous robotics with Hexapod in our Robotics Lab. We have programmed a humanoid robot, called NAO that has the ability to detect the surroundings and can hear, communicate, carry out conversations with humans and can even sense/detect being touched. We have programmed NAO in Python to become fully-autonomous. NAO has 25 degrees of freedom and has multiple touch sensors, and hence is able to carry out specific tasks in the lab and can work alongside with students. NAO is controlled by a specialized Linux-based Operating System, called NAOqi, which allows NAO to interpret and understand data received by its sensors. NAOqi powers the robot's hardware, which includes four microphones (for voice recognition and sound localization), two speakers (for multilingual text-to-speech synthesis) and two HD cameras (for vision, including facial and shape recognition). Natural and human-created disasters often leave search-and-rescue missions reliant on human efforts in dangerous scenarios. We have experimented with applying semi-autonomous functionality by building a Hexapod robot using a PlayStation-2 controller that can be used to aid human operators in search-and-rescue operations. Using this controller, we are able to investigate the movements of the hexapod and understand its physical capabilities, which is necessary to determine whether a hexapod could function in diverse environments. We will highlight the advantages of implementing semi-autonomous human-operated robotics

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