AI-Powered Multi-Spectral Intelligent Robotic System for Search and Rescue

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Military and rescue teams work in dangerous environments during disasters. My goal is to develop an intelligent search and rescue system based on multi-spectral sensing to operate in dangerous environments for safer and accessible rescue operations. I have built a prototype that has a) Search and inspection multi-spectral drone module, b) AI powered intelligent base station module, and c) rescue system based on robotic crawler and hand. The search module has 4 types of sensors mounted on a F100 drone i.e. gas sensor to evaluate the environment, thermal camera to detect hidden objects, a GPS sensor from iPhone4S, a visual camera and wireless communication. The gas sensor was demonstrated to monitor high and low smoke situations (threshold of 200) while the thermal camera was demonstrated to detect objects hidden from visual view. AI algorithm imagenet was used to identify dog breeds with 60-95% confidence, while another AI algorithm detectnet was used to localize the dog. The target image and GPS location were transmitted to robotic rescue system. The robotic crawler was demonstrated to operate in 5.5–6.8V and carry loads of 2 kg. It compares the GPS location of the target with current GPS location to move towards the target for retrieval. The prototype has met engineering goals of the project to build an AI powered multi-spectral intelligent robotic search and rescue system. Key challenges faced were in integration and software development. In the future, I will integrate obstacle avoidance algorithms and guidance capabilities using sensors integrated in robotic crawler.

Awards Won: