

SecuriBot: Autonomous Security Robot

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Abstract

This is the second iteration of the SecuriBot project at Northern Illinois University's College of Engineering and Engineering Technology. The goal of the SecuriBot project is to develop a reasonably priced autonomous system for monitoring a number of safety, security, and environmental related conditions in an indoor setting. This design for SecuriBot has focused on using well documented components together with software in order to ensure that troubleshooting and any future development can both go smoothly.

Introduction

The SecuriBot robot is designed to be able to monitor an indoor space for changes in temperature, humidity, and barometric pressure. SecuriBot is also capable of detecting motion within the area that it patrols. Any detection of irregular environmental conditions or motion while on patrol can then be sent via email to a specified individual so that the situation can be rectified immediately.



Figure 1: The iRobot Create 2

Methods and Materials

SecuriBot's mobility system is based on the iRobot Create 2, a well documented robotics platform based on the Roomba autonomous vacuum. This platform was modified to provide power to the added electrical components and to support the 3-D printed elevated sensor section.

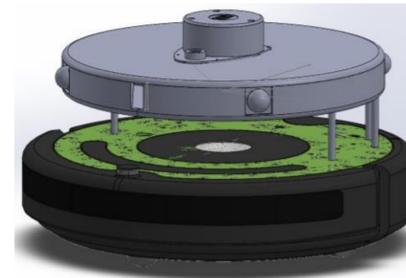


Figure 2: SecuriBot prototype using SolidWorks

A Raspberry Pi Zero W is used to run a PYTHON script which handles navigation and communication. An Arduino Mega is used to communicate with the processor on the Create 2 as well as the Raspberry Pi, this Arduino also handles the sensor inputs. SecuriBot includes sensors to measure ambient temperature, humidity, barometric pressure, and hazardous gasses. These sensors are monitored by the system, even when docked to ensure the safety of the environment. SecuriBot also uses sensors to detect any movement in the area during patrols. In the event of a detection, SecuriBot is programmed to email the owner to inform them of the issue.

Discussion and Results

While significant progress was made towards developing the functional prototype of SecuriBot, some issues were encountered in polling certain sensors included in the Create 2 which reduced the navigational accuracy of the system.

Conclusions

While some logistical issues and a global health crisis reduced the amount of trouble shooting time that was available to the group, the primary functions of SecuriBot are functional. Some parts of the original design have not been implemented yet, but the parts are available for future development.

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