ELEC1601 - Prototype

**Description**

The product is a remotely controllable robot which is used to detect and survey areas believed to contain chemical and nuclear contamination.

The robot is attached with a Geiger counter to measure ionising radiation, a temperature sensor, an ambient light sensor and an air quality sensor. These sensors are used to detect and measure chemical and nuclear contamination, and infer whether the area is safe for human presence. An infrared light and detector is equipped to facilitate safe movement of the robot. In addition, the robot is equipped with a buzzer. During detection-phase, the buzzer will play a warning tone to alert any individuals who may be in the possibly-contaminated zone. Real-time controls, as well as automated sweeping programs will come pre-installed on the master control device. The master control device will also be equipped with an LED which will update in real-time to give a colour-coded expression of the contamination levels.

1. After nuclear disasters, such as the Fukushima Daiichi nuclear disaster of 2011, the radiation levels are often too high for humans to enter for investigation purposes, even with HAZMAT suits. As a result, robots are sent in to measure the radiation levels of the various sectors of the contaminated zone. This product can be used in such a situation. However, in a real-world situation, it would need to be equipped with shielding to prevent malfunction due to radiation.
2. Given the possibility of solar powered batteries, the robot could be adapted to be used to assist in scientific explorations. For example, the robot could be used in a situation similar to the Curiosity rover on Mars, measuring environmental conditions and transmitting back to base.
3. In chemical laboratories, the dangerous chemicals that are worked with pose a serious threat if leakage or spillage occurs. In this situation, the robot could be used to enter the contaminated zone to measure the possible contaminants in the air to notify the staff as to the nature and extent of the chemical contamination.

**Prototype**

The product will be prototyped utilising the Arduino architecture. A master Arduino controller and a slave Arduino Boe-bot will communicate via Bluetooth to allow bilateral data transmission. The Boe-bot will be equipped with all the sensors which will transmit their data back to the master Arduino. The controller will allow remote control of the Boe-bot. Feasibility will be tested rigorously by testing the product in various contaminated and non-contaminated conditions.