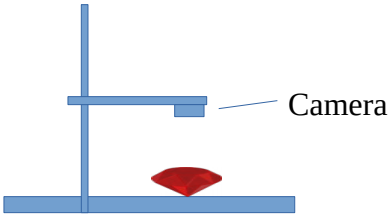
ENGR 101
Mini-project 2: The Red Panther

In this project you will use a camera to detect the theft of a valuable red ruby called the red panther. The skills you develop in this mini-project, and perhaps some of the actual code, can be used in the AVC project.

A diagram of the surveillance system is shown below. A camera is pointed at the ruby, which is printed on a sheet of paper.



Your job is to develop code from scratch that detects whether the ruby has been stolen. There are two key behaviours that are required (see details under marking):

(1) Your system should detect a theft, for example when one of the tutors removes the ruby perhaps while sliding another, fake ruby into the field of view to confuse your system.

(2) Your system should not give false alarms when the room lights are brightened or dimmed, or when a shadow is cast, for example when someone walks past the system blocking part of the light.

You should work with the same setup each lab session and you should work in the same location in the room.

Schedule:
Friday 5 April: Introduction in lecture

Week of 8 April: Project work in Lab A and Lab B
Friday 12 April: Review lecture

Week of 29 April: Project work in Lab A, testing and marking in Lab B
Friday 3 May: Review lecture for Test 1.

Marking:
This is open-ended. You could continue to improve your system, reducing false alarms and reducing the chances of missing a theft, until the project is due. The marking works as follows:

CORE 40%
Your code must compile and run, and the system must detect whether the ruby is present in full room lights when your system starts up. The system must post a message stating whether the ruby is present at start up and must continuously display a video image of the ruby.

Core will be marked in Lab B, 1 May – 3 May.

COMPLETION 20%
Your code should detect a brazen theft in which the ruby is stolen and not replaced in varying levels of light, with the room lights partly dimmed. Your system should not give a false alarm when a shadow is cast. Your code is not expected to work in the dark. The completion mark will be based on four tests:

Theft
1) The ruby will be removed. The system must display a message noting the theft within two seconds.

False Alarms
The system must not give a false alarm in these tests:
2) An A4 sheet will be used to cover the apparatus by placing it on top of the stand.
3) The set of room lights nearest your station will be turned off but the other lights will be left on.
4) A person will walk past the Red Panther, casting a shadow.

Completion will be marked in Lab B, 1 May – 3 May.

CHALLENGE 10%
A tutor will try to replace the ruby with a fake one under varying lighting conditions using varying techniques. If the tutor fails to take the ruby without setting off your alarm, you win. The tutor can make up to three attempts.

Challenge will be marked in Lab B, 1 May – 3 May.

REFLECTION 30%
The reflection should explain the strategies you used to detect the presence and theft of the Red Panther and how you implemented these strategies in code. The reflection should also discuss how well your system worked and suggest improvements. Due 10 May.