**Department of Electrical and Computer Systems Engineering**

**Monash University**

**TRC3500 Sensors and Artificial Perception**

**Decoding an EAN-13 Barcode**

**Introduction**

In this exercise, you will expand the program you wrote for your Blob Statistics Project. Your program will grab an image of an EAN-13 barcode using a USB camera, convert the image to gray scale, and scan across the centre of the image to produce a binary scan of the barcode. Then, decode the characters and print them in a Windows terminal. Your program should be able to decode the barcode that is presented in any orientation (the camera could even be seeing the image upside down).

**Equipment and Software**

The tools that you will require are as follows:

* A USB camera
* C++ compiler suite including the OpenCV packages

**Theory**

The unit’s notes provide information about the structure of EAN-13 barcodes. Make sure that you are fully conversant with this material before you begin. Use the material on artificial perception to complete the report.

**Recommended Procedure**

1. Grab and display successive images from the USB camera to allow it to be focussed and positioned to get a clear image of the barcode.
2. When you are satisfied with the captured image, use a key press to store the image.
3. Convert the image to greyscale.
4. Work out a threshold for the image (one possibility is to choose a threshold value half-way between the maximum and minimum pixel values.
5. Scan across the middle of the barcode in the captured image, and convert to binary values. It would be a good idea to display the resulting binary image to ensure that the conversion is satisfactory.
6. Count the number of pixels in each successive bar (in the binary image of the centre scan) and store them in an array.
7. Now, decoding can begin. Remember that the barcode may be presented to the camera in any orientation, it could even be upside down.
8. Decode the entire barcode including both halves and the thirteenth character, print the results in a Windows Terminal. You will definitely need the class notes for this!
9. See if the checksum is correct and report this.

If you go to this Website: <https://barcode.tec-it.com/en/EAN13>, you can generate your own EAN-13 barcodes for testing purposes.