

## ABSTRACT

In industrial area, food packaging plastics have been sorted by eight types: PET (Polyethylene terephthalate), HDPE (High Density polyethylene), PVC (Polyvinyl chloride), LDPE (Low Density Polyethylene), PP (Polypropylene), PS (Polystyrene), OTHER (e.g. Polycarbonate), and MF (Melamine-formaldehyde). Every plastic has their own identification by number codes: one until seven that printed in the middle of triangle recycle symbol, except MF that unrecyclable.

This undergraduate thesis has a purpose to build a prototype design of sorting those plastics types with problem constraints only PET, HDPE, PP, and PS types. The prototype would be comprise of microcontroller ATmega 8535 for controlling the light of LED (Light Emitting Diode), camera for getting image that would be processed, computer for processing the image received, and Backpropagation Artificial Neural Network (BPANN) as a method for getting the appropriate value to decide the categorization of plastics. The prototype would be working into this scenario. At the first time, plastic that would be examined is put in to black box, in stand up position, for bounding lights surroundings. On the bottom of the box would be established a light that originated from LED Ultraspot. The light would give different refraction depend on the plastic types that could be penetrated. Meanwhile, the camera on top of box would capture the light refraction. BPANN would decide the categorized type of plastic based on the captured image of the light refraction. In the upper ends of prototype would be established LED that lighting based on the command of microcontroller which gets data serial from computer, for differentiating the plastic that has been separated by types.

For real time, the system is too sensitive in changing location of plastic and refraction of light per second responses. So that it would change the histogram of image and needs to be train more in order to get a high precision value. The precision level achieved for unreal time was 95.05% for training data and 90.66% for testing data within average computational time in 1.5008 seconds and the LED that could differentiate plastics in the appropriate light.

**Keywords:** Sorting food packaging plastics, Back Propagation Artificial Neural Network (BPANN)