**Abstract**

Machine vision systems for quality inspection of processing and production lines are associated with increases in productivity, cost savings, and quality control consistency, having

become common place in many industries including agriculture. However, automated strawberry quality control has historically been a challenge due to the delicate nature of the fruit’s

flesh, making it more prone to damage, bruising, discolouration, and softening than other

fruits and vegetables.

This thesis outlines the research, design, experimentation, and development of an Strawberry

Quality Assurance (SQA) vision system which is capable of grading full punnets of strawberries after they have been packed. Fruit is picked from the field, and packaged into containers,

before being loaded into the SQA vision system and finally, a heat-seal machine which seals the punnets with tamper-proof plastic film.

Good performance has been found using Resnet-50 pre-trained network in order to extract a feature vector for each image, which is then evaluated by each of the binary classification models. Area Under ROC (AUROC) curves are greater than 80% for both under ripe and foreign object models, whilst the over ripe class score is lower at 58%. The system has entered it’s fifth season as production-ready having already imaged and assessed 290,888 punnets of which 50,270 were rejected, resulting in 17.28% failure rate in total, helping to ensure the consistent quality assurance of production.