

DEVELOPMENT OF AN NIR SORTING MACHINE FOR DETECTING  
INTERNAL DISORDER AND QUALITY OF APPLE FRUIT

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This project report is dedicated to my beloved mother and family including my wife and children including my son Saud and my daughters Sama and Aseel

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## ABSTRACT

The quality level for fresh fruits is very important for the fruit industries. In presents study an automatic online sorting system according to the internal disorder for fresh apple fruit has developed by using near infrared (NIR) spectroscopic technology. The automatic conveyer belts system along with sorting mechanism was constructed. To check the internal quality of the apple fruit, apple was exposed to the NIR radiations in the range 650-1300nm and the data were collected in form of absorption spectra. The collected data were compared to the reference (data of known sample) analyzed and an electronic signal was pass to the sorting system. The sorting system was separate the apple fruit samples according to electronic signal passed to the system. It is found that absorption of NIR radiation in the range 930-950nm was higher in the internally defected samples as compared to healthy samples. On the base of this high absorption of NIR radiation in 930-950nm region the online sorting system was constructed

## **ABSTRAK**

Tingkat kualiti daripada kesegaran buah adalah sangat penting untuk industri buah. Dalam kajian ini, sistem pengasingan automatik menuruti talian gangguan dalaman pada epal segar telah dibangunkan dengan penggunaan teknologi spektroskopi near infrared (NIR). Sistem Sabuk konveyor automatik vbersamaan dengan mekanisme pengasingan telah dibina. Untuk menyemak kualitas dalaman daripada buah epal, epal tersebut dipapar dengan radiasi pada kisaran 650-1300nm dan data telah dikumpul dalam bentuk serapan spektrum. Data yang telah diperoleh selanjutnya dibandingkan dengan analisa rujukan (data sampel yang diketahui) dan satu isyarat elektronik diloloskan ke sistem pengasingan. Sistem pengasingan itu memisahkan sampel buah epal sesuai dengan isyarat elektronik yang dihantarkan kepada sistem. Kajian ini telah mendapati bahawa penyerapan sinaran NIR pada kisaran 930-950nm adalah lebih tinggi untuk sampel yang buruk berbanding dengan sampel yang sihat. Sistem pengasingan ini telah dibina terhadap dasar penyerapan radiai yang tinggi daripada NIR di kawasan 930-950nm.