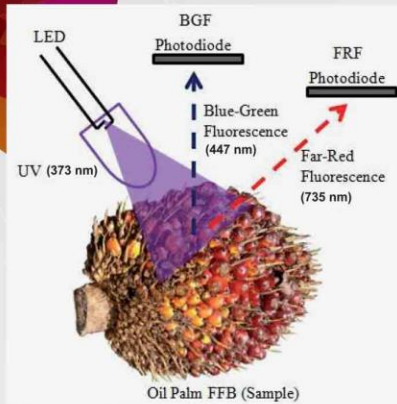


# OIL PALM BUNCHES RIPENESS DETECTION

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## INTRODUCTION

Classification of oil palm Fresh Fruit Bunches (FFB) into its actual correct ripeness category is a critical factor that dictates efficiency of oil palm milling operations. This study investigates the fluorescence sensor to determine which excitation LEDs are suitable in discriminating between the different ripeness categories. We successfully identified the critical signals using the fluorescence approach to classify oil palm FFB into three ripeness categories; under ripe, ripe and over ripe. The classification method is based on Blue-to-Red Fluorescence Ratio (BRR\_FRF) as a predictor. BRR\_FRF was obtained from blue-green and far-red emission signal by using UV light emitting diode as excitation light source. This method will help the user to easily differentiate between the oil palm FFB categories. This will lead to higher oil extraction rate and benefit the user and the industry.

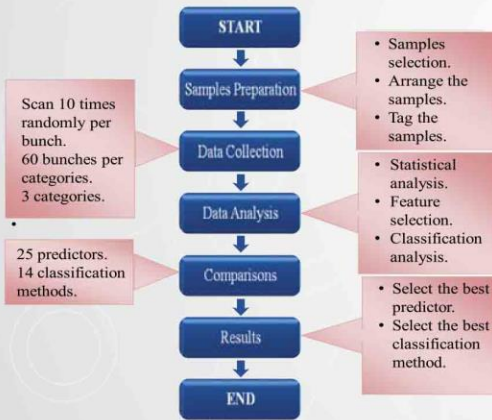
## METHODOLOGY



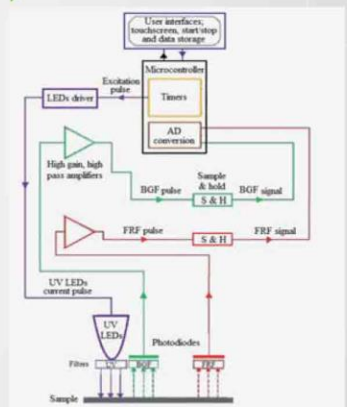
## ANALYSIS & RESULTS



## BLOCK DIAGRAM



Predictors	Overall Percent (%) of Correct Classification Based on Different Methods				
	SPSS Classification on Tree™ (QUEST)	Machine Learning (Naïve Bayes Classifier)	STATISTICA Stochastic Gradient Boosting Trees	SPSS Classification Tree™ (CRT)	SPSS Discriminant Analysis (Enter independent together)
BRR_FRF	88.0*	88.6*	89.1*	88.4*	83.4*
ANTH	80.5	80.0	80.0	80.0	77.7
FERARI	78.4	71.7	82.0	79.6	77.8
RF_R	76.0	72.9	75.0	76.3	70.7
FER_RG	78.5	76.9	83.0	80.8	76.2
FRF_R	71.0	72.9	80.0	76.3	69.7
FRF_UV	75.9	74.8	84.0	80.3	72.0
RF_B	64.8	73.4	79.0	76.1	68.8



## UNIQUENESS

- The maturity determination is based on the reflection from mesocarp of the oil palm fruit.
- We developed a novel method of analysis using BRR\_FRF ratio.
- This method is independent of external light sources, very useful for outdoor use because it is free of environmental conditions.

## ADVANTAGES

- Non-destructive & non-contact.
- Real-time basis.
- Reduce manpower requirement.
- Fast determination & easy to operate.

## MARKET POTENTIAL

- Oil palm players and industry.
- Local and world wide.

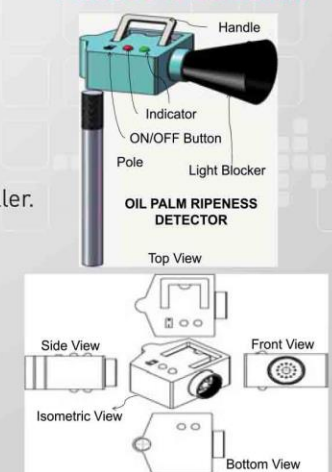
## BENEFITS

- Reduce waste product.
- Increase income.
- Can solve argument between buyer and seller.
- Increase oil extraction rate.
- Process only quality product.

## CONCLUSION

- Successfully developed the procedural and technical steps for the ripeness detection using fluorescence approach.
- The accuracy achieved from this test is 89%.

## PROTOTYPE DESIGN



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