Journal of science, education a
Volume 2 Number 1

April 2009
ISSN 1596-9770

Design and Construction of a Fruit Transducer for the Measurement of Impact Bruises on Fruits

Ibrahim, A. G.
Department of Physics, Federal University of Technology, Minna.

Absract
Fruit bruises has always been overlooked and its measurement left to human judgement which is prone to variability. Here, a fruit transducer which permits the measurement of bruise parameters such as bruise voltage, bruise drop height and bruise energy was designed and constructed. The device consists of a power supply, filter, preamplifier and amplifier circuit. Testing carried out in Benue State, Nigeria shows the device is perfectly workable with bruise parameters such as damaging drop height, damaging bruise energy and damaging bruise voltage for *Citrus cinensis* measured as 160cm, 2.24J and 11.9V respectively.

Introduction

Impact bruise on fruit refers to a knock or blow on the body of a fruit such that the skin is not broken (Hornby, 1988). It is inflicted on fruits mainly during harvesting with negative effect as fruit softening, change in taste, change in colour and sometimes injury on affected portions (Ibrahim, 2006). The aim of this work is to design a standalone, battery operated impact sensing instrument with greater ease of use, sensitivity, accuracy and reliability which will help identify damaging drop height, damaging bruise energy and the corresponding voltage responsible for damaging impact. The said device is a transducer, that is, a device that converts one form of signal into another (Sa, 1990). In this case, it converts sound pressure during fruit impact into an equivalent electrical signal. This work is an application of electronics in agriculture.

Design Consideration

The major parts of this work are explained below.

1. **Power supply circuit:** This is the unit capable of supplying dc voltage and current to the electronic circuit under test (Grobs and Mitchel, 2003). An 18V dc battery was used. The succeeding stage requires a voltage of ±15V which necessitated the use of regulators TA7815 and LPC7915. The design is furnished with a light emitting diode to indicate on, off and low battery and capacitors C2 and C3 of 10μF each to smoothen the regulators output. The diagram of the power supply circuit is shown in figure 1.