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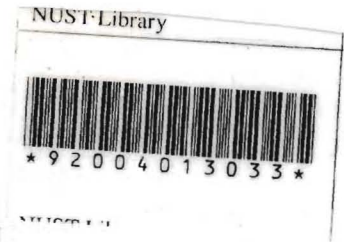
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THE DESIGNING AND CONSTRUCTION OF A TEMPERATURE SENSING AND CONTROL SYSTEM FOR A MICROWAVE HEATER IN AN OPEN FIELD ON A FARM, FOR CROP PROTECTION AGAINST FROST.

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*A research project submitted in partial fulfillment of the requirements of the Bachelor
Applied Science degree in Applied Physics*

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ABSTRACT

In order to improve agricultural productivity a low cost real time remote monitoring system is needed. Real-time monitoring provides reliable, timely information of crop and soil status, important in taking decisions for crop production and improvement of yields. Traditionally greenhouses are used for growing plants under controlled conditions; these structures range in size from small sheds to very large buildings but this system is expensive to operate on a very large scale. This research project was intended to cater for such large dimensions of fields. It introduces a 24 hour real time remote temperature monitoring and control for open fields on a farm. The aim of the project was to design and construct a temperature sensing and control system for open fields on a farm. The control circuit that was designed and constructed was intended to be used to control microwave heaters which will be used to raise the temperature in the field when temperatures fall to frost temperature. The circuit was designed and calibrated so that it would sense the air temperature during night time and activate a microwave heating system when temperature falls to frost temperatures, that is temperatures below 7 degrees Celsius and, switch off the heating when the temperature rises to 25 degrees Celsius. Since microwaves may cause undesired effects to humans or animals the design was incorporated with a proximity sensor that will detect the presence of humans or animals near the heating area. If there is a human being nearby, the heating should stop until the person is out of the sensing range. If a PIC micro-controller is used in place of the operational amplifiers the efficiency and effectiveness of this design can be greatly improved.