

LOW-COST LOW-POWER
DATA ACQUISITION SYSTEM

BY

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This thesis is my original work and has not been presented for a degree in any other University.



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This thesis has been submitted for examination with our approval as University supervisors.



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ABSTRACT

LOW-COST LOW-POWER DATA ACQUISITION SYSTEM

Data loggers are used for data acquisition and storage. This project was undertaken with the objective of constructing a low-power low-cost battery operated data acquisition system (data logger) for use in remote areas. It is a dedicated system for measuring temperatures using thermistors as temperature sensors. The system was constructed using KIM-1 microcomputer as an evaluation system. It uses an 8-bit Analog-to-Digital Converter, ADC 0816 which can take up to 16 channel inputs. By the nature of the resolution of the ADC 0816 the system can read temperatures to an accuracy of $\pm 0.5^{\circ}\text{C}$

The system has been calibrated to measure temperatures between 10°C to 40°C . In its prototype form, it has been evaluated against a standard mercury thermometer and a thermohydrograph for measurement of air temperature as well as monitoring temperature variations in the growth of beans as a field test for the system. The results obtained by the system are in close agreement with those obtained by the standard instruments, hence

reliable.

The major component of the system are 2-CMOS RAM, the ADC 0816 the 555 timer and the 6502 microprocessor. The temperatures are read on point basis at a specified time interval set on the 555 timer and at the end of reading, power is switched off from the system except on the 555 timer and the CMOS-RAMS by the application program. The system can log data between 29 and 50 hours for the lowest and maximum settings of 555 timer respectively under hardware configuration. But it can also work for 10. days if sampling rate is set for 30 minutes interval under software configuration. It takes 256 sample points for each channel when the program is fully executed. It is comparatively cheap and easy to operate. The overall cost of the system is KSh 4,000 (Appendix A2).