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DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

SMARTPHONE AGRO-IOT APPLICATION FOR SMALLHOLDER FARMERS

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A project implementation report submitted to the department of Electrical and Computer Engineering in partial fulfillment to the requirements for the award of a Bachelor's Degree in Computer Engineering at Busitema University.

DECLARATION

I, Inyangat Francis Xavier, Registration Number **BU/UG/2017/1857** do hereby declare that this project proposal report is original and has not been submitted to any other university before.

Sign.....

Date.....

Bachelor of Computer Engineering

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APPROVAL

This is to certify that the project proposal under the title “Smartphone Agro IoT Application for small holder farmers” has been done under my supervision and is submitted to the board of examiners with my approval.

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ABSTRACT

Smartphone Agro IoT Application for small holder farmers is an intelligent system designed purposely for small holder farmers to ease irrigation scheduling and monitoring of soil moisture conditions in the field based on remotely sensed soil conditions and meteorological weather data. Despite being the major contributor to the national GDP, the agriculture sector still grapples with challenges of droughts and inefficient irrigation scheduling methodologies such as drip, sprinkler and other blanket methods of irrigation. In the current age of global climate change and rising water resource scarcity, the agriculture industry is counting on technological advancements for efficient water resource management and crop monitoring. Taking into account the anomalies of the existing systems and the imminent climate change problem at hand, the smartphone Agro IoT application has been developed to leverage Machine learning models and Internet of things for predicting soil moisture and easing irrigation decisions for farmers. The different models employed extend over a wide range of machine-learning techniques starting from basic linear regression models through models based on decision tree learning, Random Forest classifiers, K-Nearest Neighbors (KNN) and recursive partitioning, to the modern nonlinear statistical data modeling tools like artificial neural networks.

The system was developed by deploying a network of sensors to collect field data, preprocessing and aggregating the data, modeling the data and passing the data using Wi-Fi module for visualization over the smartphone app. This is a fully automated system where devices communicate among themselves and apply the intelligence in irrigation scheduling decisions. This has been developed using low-cost embedded devices like Arduino Uno, WIFI communication module and software tools such as TensorFlow, Android studio and Flutter.

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LIST OF ACRONYMS

LCD	Liquid Crystal Display
SMC	Soil Moisture Sensor
FAO	Food and Agricultural Organization
ML	Machine Learning
SME	Square Mean Error
GPRS	General Packet Radio Service
RF	Random Forest
IoT	Internet of Things
AI	Artificial Intelligence
CNN	Convolutional Neural Networks
ANN	Artificial Neural Networks
K-NN	K-Nearest Neighbor
M2M	Machine to Machine
API	Application Programing Interface