



BUSITEMA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING
FINAL YEAR PROJECT REPORT

**AUTOMATIC MULTIPLE CHOICE ANSWER SHEET MARKING MOBILE
APPLICATION**

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May the almighty GOD bless you richly and exceedingly!

Thanks.

DECLARATION

I, Nyago Alex do hereby declare that this Project Report is original and has not been submitted for any other degree award to any other University before.

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APPROVAL

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LIST OF ACRONYMS

ACT	-	American College Test
ANPR	-	Automatic Number Plate Recognition
CV	-	Computer Vision
ICR	-	Intelligent Character Recognition
IDE	-	Integrated Development Environment
MCQ	-	Multiple Choice Question
NDK	-	Natural Development Kit
OCR	-	Optical Character Recognition
OMR	-	Optical Mark Recognition
SAT	-	Scholastic Aptitude Test
SDK	-	Software Development kit

ABSTRACT

Multiple-choice questions are a widely-preferred tool used to evaluate learner's academic performances in education institutions all over the world. However, in situations when the number of individuals is large, this exercise becomes a monotonous, tedious, and time-consuming piece of work that is susceptible to errors. Due to the mistakes committed by instructors while marking, students are awarded wrong grades.

This project was therefore aimed at developing a mobile application that would solve the above problem by enabling instructors scan the reference/ key (marking guide) answer sheet once which is stored in the database and then take pictures of students' handwritten-on answer sheets which are used to extract characters, process and recognize them by the OCR and OCR engines. These extracted characters are cross referenced by the marking algorithm to mark the students' performance hence saving lecturers' valuable instruction time.

The work is arranged mainly in six chapters, chapter one includes the introduction of automatic multiple-choice answer sheet marking mobile application. Chapter two discusses the literature related to the system, chapter three illustrates the methodologies used in coming up with the working prototype of the system, chapter four includes system design and analysis, chapter five contains the implementation and testing of the system and chapter six contains the summary of the work, challenges, critical analysis, proposals and recommendations

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CHAPTER ONE: INTRODUCTION

1.0 Background

Multiple-choice questions have become an integral part of the educational system all over the world. Multiple choice standardized tests are the main marking tools used to grade students' academic performances in a test [1], particularly when the number of individuals is large, rendering other kinds of tests impractical.

According to Bush [2], a traditional multiple-choice question (MCQ) is one in which a student chooses one answer from a number of choices supplied (normally four choices based on A, B, C and D). Basically, MCQ consists of the question (stem), the choices provided after the stem (options), the correct answer in the list of options (key) and distracters which are the incorrect answers in the list of options [3]. Recent studies [4] [5] [6] show some of the main advantages and characteristics of the multiple-choice questions are. Marked quickly, sometimes using automatic scanners, marked by markers with minimal training or preparation, highly reliable in that results are consistent from student to student and over time, an efficient and effective way of assessing factual knowledge, and effectively used for quick perception checks during lectures and for systematic revision

Every year millions of students take standardized tests and they have to answer various questions asked by darkening bubbles in (*Optical Mark Recognition*) OMR sheets, circling or writing down the option they deem best [4]. Current solutions for marking the OMR sheets are expensive, they need dedicated scanner to capture their images, an OMR software to recognize and extract the correct answers, and buying customized OMR sheets [5]. So, small organizations, institutes, individual teachers and tutors cannot use this convenient method of marking without spending lot of money so they resort to manually marking answer sheets. According to Nithin & Gautam 2015 [7], to grade standardized test responses of a student takes 10 minutes on an average which is tedious, monotonous, tiresome and time-consuming work that is prone to errors.

Using a technique known as *Optical Mark Recognition* [8] it is now possible to acquire discrete data contained in predefined forms and, with an image *scanner*, detect the presence of marks in the reserved spaces. This technique often employs OMR specific scanners or image scanners, in which case software does the processing, sacrificing performance to the advantage of lower costs and flexibility when employing custom forms [9] [10]. These examples would be hard to implement in

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