POLITEKNIK MELAKA

PORTABLE DIGITAL MEASUREMENT USING MICROCONTROLLER FOR BOULES GAME

NAME	REGISTRATION NO
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This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electronic Engineering (Control)

JABATAN KEJURUTERAAN ELEKTRIK

AUGUST 2024

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"I acknowledge this work is my own work except the excerpts I have already explained to our source"

1. Signature :

Name : **TENGKU ISMA HAIZUL BIN TENGKU HANAFI**

Registration Number : **11DJK22F1003**

Date :

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : PORTABLE DIGITAL MEASUREMENT USING MICROCONTROLLER FOR BOULES GAME

SESSION: JUNE 2024

1. I, **1. TENGKU ISMA HAIZUL BIN TENGKU HANAFI 11DJK22F1003**

   is a final year student of **Diploma in Electronic Engineering (Control), Department of Electrical, Politeknik Melaka**, which is located at **No 2 Jalan PPM 10, Plaza Pandan Malim , 75250, Melaka**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electronic Engineering (Control)** to me.

Made and in truth that is recognized by;

a)) . .....

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In front of me,) .....

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As a project supervisor, on the date:

ACKNOWLEDGEMENTS

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to En. Saifful Bahari Bin Omar for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

I would like to express my gratitude towards my parents & member of (Organization Name) for their kind co-operation and encouragement which help me in completion of this project. I would like to express my special gratitude and thanks to industry persons for giving me such attention and time.

My thanks and appreciations also go to my colleague in developing the project and people who have willingly helped me out with their abilities.

ABSTRACT

Petanque is played with hollow steel balls known as boules, and a small wooden target ball or jack. Games can be played as either two individual players, each with 3 boules or two teams of two players, with 3 boules per player and two teams of three players, with 2 boules per player. From that point on, the team with the boule that is closest to the jack is said to "have the point". The team that does not have the point throws the next boule. That team continues to throw boules until it either gains the point, or runs out of boules. If at any point the closest boules from each team are equidistant from the jack, then the team that threw the last boule throws again. ESP32 microcontroller is used with HC SR04 ultrasonic sensor is to measure distance between jack and boules. In the boules competition, the distance between jack and boules is measured by using measurement tape. The accuracy of measurement tape is nearly to 0.1cm and the tail at measurement tape must be placed correctly at the jack. One at the problem during the measurement is, player or arbiter is misplaced the tail measurement tape or the position eyes during reading. To encounter this problem, a new digital measurement prototype is proposed to get a better accuracy and reduce jack or boules movement during measurement. The prototype are able to measure up to 400cm and displayed on organic light emitting diode (OLED).

ABSTRAK

Petanque dimainkan dengan bola keluli berongga yang dikenali sebagai boule, dan bola sasaran kayu kecil atau bicu. Permainan boleh dimainkan sebagai dua pemain individu, setiap satu dengan 3 boule atau dua pasukan dua pemain, dengan 3 boule setiap pemain dan dua pasukan tiga pemain, dengan 2 boule setiap pemain.Sejak itu, pasukan yang mempunyai boule yang paling hampir dengan bicu dikatakan "mempunyai mata". Pasukan yang tidak mempunyai mata melontar boule seterusnya. Pasukan itu terus membaling bola sehingga sama ada mendapat mata, atau kehabisan bola. Jika pada bila-bila masa bola yang paling hampir dari setiap pasukan adalah sama jarak dari bicu, maka pasukan yang melontar bola terakhir membuat balingan semula.Mikropengawal ESP32 digunakan dengan sensor ultrasonik HC SR04 adalah untuk mengukur jarak antara bicu dan boule. Dalam pertandingan boule, jarak antara jack dan boule diukur dengan menggunakan pita ukuran. Ketepatan pita ukuran adalah hampir 0.1cm dan ekor pada pita ukuran mesti diletakkan dengan betul pada bicu. Salah satu masalah semasa pengukuran ialah, pemain atau pengadil tersalah letak pita ukuran ekor atau kedudukan mata semasa membaca. Untuk menghadapi masalah ini, prototaip pengukuran digital baharu dicadangkan untuk mendapatkan ketepatan yang lebih baik dan mengurangkan pergerakan bicu atau boule semasa pengukuran. Prototaip ini mampu mengukur sehingga 400cm dan dipaparkan pada diod pemancar cahaya organik (OLED).

CHAPTER 1

INTRODUCTION

1.1 Introduction

The game of boules, also known as petanque, is a popular recreational activity that involves players throwing metal balls as close as possible to a target ball. Traditionally, measuring the distance between balls and the target has been a manual and subjective process, often leading to disputes and inaccuracies in scoring. Measuring the distance between balls and the objective in boules games has always been a difficult task. This procedure has historically relied on manual measurements with callipers or measuring tapes, which might result in disagreements and subjective assessments between participants. This manual method is prone to errors, particularly in highly competitive games when accurate measurements are essential for scoring and settling close calls. These difficulties emphasise the requirement for a boules game measurement system that is more dependable, effective, and impartial. The goal of this project is to improve boules players' entire experience by incorporating digital measurement through the use of microcontroller technology, which will ensure accurate scoring and fair play. The HC-SR04 ultrasonic sensor uses sonar to determine the distance to an object. This sensor reads from 2cm to 400cm (0.8inch to 157inch) with an accuracy of 0.3cm (0.1inches), which is good for most hobbyist projects. In addition, this particular module comes with ultrasonic transmitter and receiver modules. Esp32 microcontroller is used with HC SR04 ultrasonic sensor is to measure distance between jack and boules.

1.2 Background Research

In the boules competition , the distance between jack and boules is measured by using measurement tape. The accuracy of measurement tape is nearly to 0.1cm and the tail at measurement tape must be placed correctly at the jack. One at the problem during the measurement is , player or arbiter is misplaced the tail measurement tape or the position eyes during reading. To encounter this problem , a new digital measurement prototype is proposed to get a better accuracy and reduce jack or boules movement during measurement. The prototype are able to measure up to 400cm and displayed on organic light emitting diode (oled).

1.3 Problem Statement

I. During measurement is , player or arbiter is misplaced the tail measurement tape or the position eyes during reading.
II. Take the time for millimeter unit readings on the tape measure.
III. This repeated measurement causes a waste of time and shortens the duration of the match.
IV. Teams that measure the distance between the boules ball and the jack too quickly use cause the opponent is not satisfied and has to measure a second time.

1.4 Research Objectives

I. Design a prototype to measure the distance of jacks and boules using ESP 32 microcontroller and HC SR04 ultrasonic sensor.
II. Displays measurement results on an OLED display of 128x68 pixels.

1.5 Scope of Research

I. Using ESP32 microcontroller Dual-Core 32-bit LX6 microprocessor with Bluetooth Classic protocol and Wifi (150.0 Mbps data rate with HT40) capability.
II. Prototype design size dimension 6cm x 10cm x 3cm using PLA filament.
III. Using HC SR04 (4 pin) sensor ultrasonic capable measure up to 400cm maximum range and 2cm for minimum range.
IV. Using lipo 3.7V battery and charger module TP4056 to power up circuit.
V. Using OLED I2C 128x160 TFT LCD Breakout - ST7735.

1.6 Project Significance

The development of a portable digital measurement system for boules games holds significant importance in enhancing the accuracy, efficiency, and fairness of the gameplay experience. Boules, a popular outdoor game with roots in ancient Greece, involves players tossing or rolling metal balls (boules) towards a target ball (the jack) with the aim of landing them as close as possible. Traditionally, measuring the distance between boules and the jack has relied on manual methods, introducing subjectivity and potential disputes into the game. However, by leveraging modern technology and project management principles, we can revolutionize the way boules games are played and officiated.

1.7 Chapter Summary

The first chapter will generally address the project's introduction, background information, problem description, objective, scope, and significance. The first chapter provides an overview of the project and highlights the primary goals and study areas. Included are a scope description for the project and an explanation of the significance of the research. Each research project needs to include an introduction that sets the stage for the rest of the work and makes the reader aware of the significance and research challenge.