

# PROTOTYPE OF ELECTRONIC DARTBOARD

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## PROTOTAIP PAPAN DART ELEKTRONIK

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Laporan ini dikemukakan untuk memenuhi sebahagian daripada syarat penganugerahan Ijazah Sarjana Muda Kejuruteraan Elektronik (Kejuruteraan Komputer) Dengan Kepujian

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## ABSTRACT

This project discuss about prototype of electronic dartboard which was using tactile switch as sensor. This dart sensor method was firstly developed. Electronic dartboard solves the annoying manually scoring problem while play a dart game with normal dartboard. Flowchart was used to aid the process of programming code and implementing circuit. Result from integration hardware and software was obtained and same as expected result. This dartboard design gives another way to implement an electronic dartboard with simple circuit.

## ABSTRAK

Projek ini membincang tentang prototaip papan dart elektronik yang menggunakan suis sentuhan sebagai alat pengesan. Kaedah pengesan dart ini adalah baru dicipta. Papan dart elektronik menyelesaikan masalah pengiraan markah secara manual semasa permainan dart dijalankan. Carta aliran digunakan untuk membantu proses pengaturcaraan dan pengaplikasian litar. Hasil daripada gabungan antara perkakasan dan perisian didapati adalah sama dengan hasil. Rekaan papan dart ini memberikan cara lain untuk mengaplikasi papan dart elektronik dengan litar yang lebih senang.

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## LIST OF ABBREVIATIONS

AC	-	Alternating current
CCS	-	Custom Computer Services
CPU	-	Central Processing Unit
CRT	-	Cathode Ray Tube
DC	-	Direct Current
DSP	-	Digital Signal Processor
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
IC	-	Integrated Circuit
LCD	-	Liquid Crystal Display
MCU	-	Microprocessor Control Unit
OTP	-	One-Time Programmable
PIC	-	Programmable Integrated Circuit

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## **CHAPTER I**

### **INTRODUCTION**

This project is about designing a prototype of electronic dartboard which has auto-scoring function with push buttons work as detecting sensor. Background and rules related to dart game will be shown in later part of this chapter. Advantages and disadvantage of electronic dartboard are also discussed in this chapter. Problems which have been existed in dart game by manual scoring will be stated in project statement. Objectives and scope of this project will also be discussed in this chapter.

## 1.1 Introduction Project

### 1.1.1 Dart

Darts is a form of sport where darts are thrown at a circular target (dartboard) hung on a wall. United Kingdom is the first country to officially recognize darts as a sport. A regulation board is 47.08 cm (17¾ inches) in diameter and is divided into 20 sections. Each section is separated with metal wire or a thin band of sheet metal. [1]

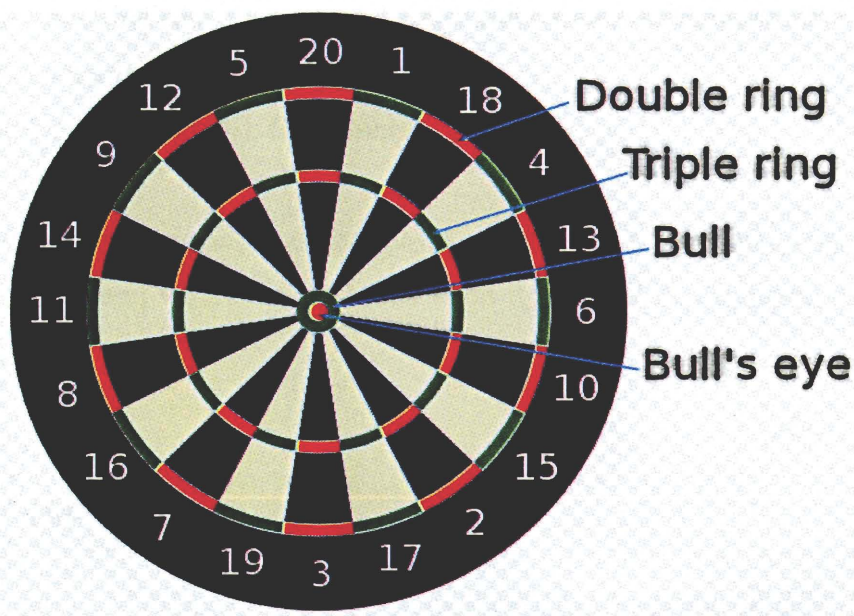


Figure 1.1: Dartboard[1]

Basically, dart game is played between two players or two teams. The teams can be made up of two or more peoples each. Variations that allow for more than two sides have been devised, but these have not achieved any popularity. Nine throws are generally allowed for each person as a warm-up before a game begins. Then, to determine which team or person is to take his turn first one dart is thrown by a person from each team. The team with the dart closest to the bull's eye takes the first turn. Each player throws three darts in their turn. Then the darts are retrieved. If a foot

crosses over the line or a person happens to trip over the oche (line behind which darts players must stand to throw darts) and releases his dart, the throw counts for no points and may not be re-thrown. Darts must stay on the board for at least five seconds after a player's final throw to count. A throw does not score if it sticks into another dart or if it falls off the board.

Darts making it on the board score in the following manner:

- a) In the wedge: the amount posted on the outer ring.
- b) The double ring (the outer, narrow ring): twice the number hit.
- c) The triple ring (the inner, narrow ring): three times the number hit.
- d) Bull (outer bull): twenty-five points.
- e) Bull's eye (inner bull): fifty points.

This is the basic method for playing and scoring the dart game. A wide variety of games and variations are based upon it and will be discussed in the next section.

### 1.1.2 501 and 301

Most professional matches are "501 up". This is the simplest of games. Each player starts with a score of 501 and takes turns to throw 3 darts. The score for each turn is calculated and deducted from the players total. Bullseye scores 50, the outer ring scores 25 and a dart in the double or treble ring counts double or treble the segment score. The objective is to be the first player to reduce the score to exactly zero, the only caveat being that the last dart thrown must land in a double or the bullseye.[2]

If a player reduces the score to 1 or goes below zero, the score is bust, that turn ends immediately and the score is returned to what it was at the start of that turn.



For example, if a player has 32 to go out and the first dart is a 16, the second is a 15, the player is bust and the score is returned to 32. So on the last turn, it is not necessary to throw all 3 darts but a player can win with the first or second dart of the turn.

Since a player who misses a targeted double is likely to score the single of that segment, good players attempt to leave themselves with a repeatably bisectable number such as 24 or most ideally 32 which is double 16. So for instance, if a player has double 16 left, and hits a 16, he has double 8 left and if he then hits an 8 he has double 4 left and so on. Obviously, this is advantageous because no extra darts need to be thrown in order to reduce the score to an even number. It so often happens that people reduce their score to 1 (typically while aiming for double 1), some people play a very unofficial rule called "splitting the 11". This rule says that when the score is reduced to 1, instead of going bust, the player must "split the 11" by throwing a dart between the two numbers forming the number 11 on the edge of the board. This is tricky.

### **1.1.3 Electronic Dartboard**

There are two options for playing a dartboard. Either get a traditional board made of bristle, or choose one of the more modern electronic boards. Electronic dartboards have a few advantages and disadvantages when compared to traditional boards.

One of the first advantages of electronic dartboards is scoring. It can be a pain to keep score manually while you're playing a game. Electronic dartboard will detect where you hit the board and keep the score appropriately.

Another advantage of electronic dartboards is safety. Traditional bristle boards usually require darts steel tip darts. These darts are very sharp and can be dangerous to have around small children. The darts used with electronic dartboards have plastic tips. They are much safer to have around children. The electronic dartboard is also that usually come with many different games built into them. Most come with at least 25 games that can play with up to 16 different players. This is a great feature to have if a dart player ever gets tired of playing traditional darts and wants something new to play.

While electronic dartboards have their advantages, they also have their disadvantages. One of the first is portability. A dart player can easily take traditional bristle boards anywhere as long as a dart player has a place to mount it. Electronic dartboards are not as portable. Since they require electricity, a dart player can only use them in areas that are near a power outlet. If a dart player chooses to power the board with batteries, a dart player will likely have to change them often to supply voltage to the circuit.

## 1.2 Problem Statement

The most obvious problem that exists in a traditional dartboard is manual scoring. This project will concentrate on designing a prototype of an electronic dartboard which can auto-score and make a dart game more easily for a player, especially a beginner in a dart game. If a manual scoring method is chosen, it needs someone to calculate and record the total score for each player and even the score of each dart thrown by a player. Auto-scoring solves the problem by using the combination of a microcontroller circuit and a sensor circuit.