



作品名稱	超級守門員 Super Goalkeeper
隊伍名稱	機器人時代 Robot Times
隊長	曾義翔 淡江大學電機工程碩士班
隊員	鍾奕帆 · 周民偉 · 張登堯 淡江大學電機工程學系
指導老師	翁慶昌 淡江大學電機工程學系

作品摘要

本作品設計實現一台具有23個自由度的人形機器人，並且讓其在機器人足球賽中具有守門員的功能。所設計實現之人形機器人的機構主要有5大部分：1.頭部(2個自由度)、2.身體、3.手部(8個自由度)、4.腰部(1個自由度)、以及5.腳部(12個自由度)。在動作的設計實現上，本作品主要讓人形機器人具有雙足行走、踢球、撲球與拿球的動作。在守門員功能的設計實現，本作品主要讓人形機器人具有2大功能：1.機器人的定位、以及2.球之狀態的判斷與分析。在機器人的定位上，本作品讓機器人守門員可以自主判斷自己與球是否在禁區內，並且依據各種不同的狀態做出適當的反應。譬如當球在禁區內，則守門員執行用手部去碰觸球的動作。若球不在禁區內，則守門員不執行用手部去碰觸球的動作以避免犯規。在球之狀態的判斷與分析上，本作品讓機器人守門員可以自主判斷與分析球的狀態，並且依據各種不同的狀態做出適當的反應。譬如當對方球員將球踢向我方球門時，則守門員執行接撲球動作。若球停止在禁區附近，則守門員執行將球踢離的動作。

ABSTRACT

A humanoid robot which has 23 degree of freedoms (DOFs) is designed and implemented by using servo motors. This humanoid robot has 2 DOF for the head, 8 DOF for two arms, 1 DOF for the waist, and 12 DOF for two legs. This humanoid robot is designed and implemented to be a goalkeeper robot in the robot soccer game so that it can walk, kick the ball, catch the ball, and hold the ball. Two functions are designed and implemented for the goalkeeper: (1) robot localization, and (2) ball estimation. In the robot localization, the goalkeeper robot has the ability to determine whether the ball is in the forbidden zone and do an appropriate action based on the state autonomously. For example, when the robot and the ball are both in the forbidden zone, the goalkeeper can use the hand to touch the ball. If the ball is not in the forbidden zone, the goalkeeper do not perform the action of the hand touch the ball to avoid the foul. In the ball estimation, the goalkeeper robot has the ability to estimate and analysis the ball state autonomously and make an appropriate action based on a variety of different states. For example, when an opposing player kicked the ball to our goal, then the goalkeeper performs the action of catching and diving. If the ball stops in the forbidden zone, the goalkeeper decides to kick the ball away from the goal.