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Trouble SOCCERBOT

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ABSTRACT

Robo soccers are one of the star attraction in the field of robo games. Robo soccer comes up with the basics rules of normal football. Generally in robo soccers two teams consisting of robots acts as players and they kicks the ball to score goal. Her e we are coming up with some improvements in the existing models. In our proposing model we are introducing a soccer field with advantages that enables "powerup" ability for the players and providing the ability to slow down the opponent, freeze the opponent and to increase our robo's speed. In our model , the administrator is able to take control over the whole system which gives the ability for time managing, goal counting, powerup activating. There exist a master controller to perform these above listed action. Introducing this model to the modern world increases the thrill of this gaming.

Keywords:- Raspberry-pi, Nodemcu, ESC(Electronic Speed Controller), Infrared, RFID, Ultrasonic sensor.

I. INTRODUCTION

A classic soccer-bot game consist of wireless controlled robots. Goal counting is handled by a monitoring person. Goal is scored when the ball moves into the post.

The **TROUBLE SOCCER BOT** is an advanced form of classical soccer-bot. The robots are wirelessly controlled.Trouble soccerbot has some additional features. One is the "POWERUP" ability. Just like in some video games, this one has powerups located in the soccer field. When a robot is passed through an activated "powerup", it will get some ability. Abilities include speedup, freeze the opponent, shield, slow the opponent..etc.

The robot can shoot these offensive powerups to the opponent, which makes the opponent in trouble for some time. Powerup shooting is done with Infrared transmitters.IR transmitters and receivers are attached in the front and rear of the robots respectively.

When a robot want to shoot a powerup, it should be behind the opponent.for the powerups we use Rfid tags. The RFID receivers are placed in the field. Rfid tags are attached in the robots.

A Master controller is there for managing the powerups and robots. The robots, controllers and master controller are connected in a single Wi-Fi network.

The RFID readers are connected to this Master controller. This will randomly activates the particular power up. When ever a power up is active, a light will show up.So that the players can understand the active power ups. When the robot is passed through it, its tag id is passed to the master controller.

The controller will send the message to the robot. thus the robot will get the power up. Master controller also manages the goal counting. A goal sensing unit is present in each goal post. It is connected to the Master controller. Other things like time managing, light-sound notification mechanism, etc.. are controlled by master controller.

Here we are using raspberry pi as master controller. The robots are individually controlled by users with a controlling application enabled smart phone.

II. RELATED WORK

In [1]small-size league is of particular interest, because it combines engineering tasks, such as building robot hardware and designing electronic components, with computer science applications, such as localization of objects, finding the robots' positions, and calculating the best path through obstacles.

In [2] They propose a system of Android platform for robot soccer rather than personal computer. This method uses tagging technique and few mathematical formulations to detect the object and follow the desired path so as to keep the game as close and real as the actual soccer game.

In [3] a design and implementation method for a robot soccer system with two soccer robots is proposed for Robo Cup middle-size league. Two vision-based autonomous soccer robots are implemented. In the robot design, an omni-directional movement mechanism and an omni-directional vision system are constructed so that the implemented robot

can move in any direction and the environmental information of the robot can be obtained.

In [4] This Work is based on Arduino, motor driver and bluetooth module. Arduino is an opensource prototyping platform Based on easy-to-use hardware and software. Arduino uses an ATmega328 microcontroller. Since robotics has become a major part in our daily life and also in the engineering field and it plays a vital role in the development of new technology
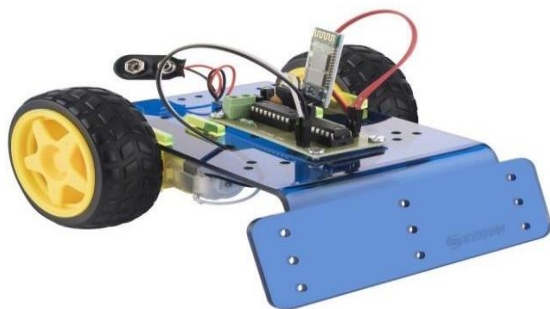

Figure 1.1: Classic soccerbot

III. SYSTEM OVERVIEW

The system is composed of a remote control robot(rolling chasis) unit,a soccer pitch that contains powerup and other sensors,a master controller to manage the whole system and an android smartphone running on a custom made application. In the following we have described the contents that collectively makes the soccerbot system.

A.The Robot

The robot is based on cheetah 1:16 rc car chassis which is a commercially available rc car set. The chassis was modified to make the space bigger to accommodate bigger hardware inside the chassis. In addition the front portion of the car was modified to fit an ultrasonic unit

The ESP8266 MCU board which includes a inbuilt wifi and 14 GPIO pins (of which some can be used as PWM), a USB connection and a recommended input voltage of 3.7 to 10 V. the ESP8266 board generate thr control pulse for the forward / backward and left/ right propulsions through the DC motors . this is also used to receive and transmit the 'powerup' IR signal.

For controlling the speed of the motor we used brushed ESC. It has the PWM range from 0 to 180, which determines the direction and speed of the motor. Operational voltage is 5 to 12 V.

A pair of IR transmitter and receiver are placed in the front and rear of the robot.these are used to receive the offensive and shoot the defensive powerupsAll paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

B .The Soccer Arena

The soccer arena is robo soccer platform with RFID readers , goal line sensors , master controller and few other components.
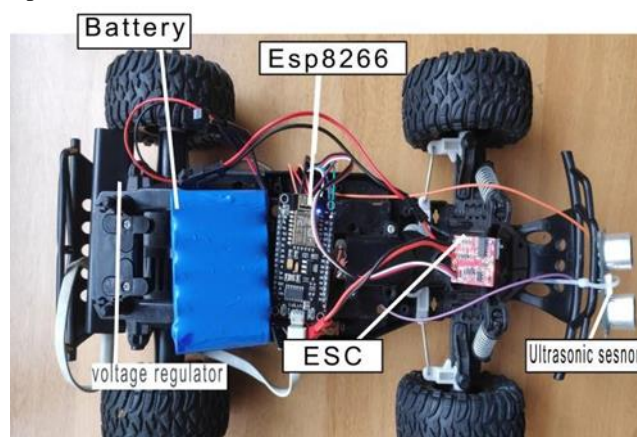

Figure 1.2: Trouble soccerbot

Here MC522 RFID reader is used as sensor.it is placed in the groung with conceald wiring.This receiver is connected to the master controller.An LED feedback is provided in order to understand the activation/deactivation of powerups.

Raspberry pi is used as Master controller.it has 20 GPIO pins.this will randomly activates the powerups.Master controller also monitors the goal counting with the help of goal line sensors implemented in the posts.

C. Robot controller

Android smartphone is used as player controller.Each robot is connected to the specific robots.This is done by using a custom made application

IV. WORKING

The Overall system is connected in a single wifi network.UDP protocol is used for the communication. The main working phases are general soccer game and the

powerup mechanism. Match time is 10 minutes. It includes a half time.

The robots are connected to the phone and to the master controller. Whole communication is based on UDP protocol.The player controller can control the movement of the robot.The master controller can control the robot in some ways.For example, if a goal is scored, then the robots should freeze for a 30 seconds. This is considered as re spawn time. Goal scoring and rules are same that of the classical robo soccer. In addition a goal sensor is added for the automatic counting of the goal.

The POWERUP is a feature in which whenever a player gets a powerup it will get some abilities. POWERUP is achieved by passing through the "activated " powerup areas.The Powerups are slow down the opponent, increase speed, shield, malfunction the opponent,e.t.c. For getting the powerup RFID system is used.The POWERUP has 2 phases. They are mentined below.

A .Powerup acquiring

For activating a particular powerup the Master controller will send message to the Particular RFID reader.a light will show up.so the players can understand the currently activating powerup.When robot is passed above that region the rfid tag ID of the robot is noted.the receiver will sent the message to the master controller.The controller will send a message to the Robot. The robot will send a message to the player's phone to notify that the poweup is activated. Thus the powerup is acquired.

B. Shooting the powerup

If a robot want to shoot the offensive powerups like "slow down, freezing, malfunctioning ,touch-me- not,..e.t.c. to the opponent Infrared transmitter can be used. The IR receiver is placed in the rear end of the robot. The transmitter is placed at the front part of the robot. If we need to shoot the powerups to opponent we should stand behind the opponent.

Among these offensive powerups "touch-me-not" is more interesting. If we shoot this powerup to the opponent the obstacle sensor which is placed in the front of the opponent will active.thus whenever he tries to hit a object the robot will freeze. Thus the shooting of powerup.

FIGURE 1.3: POWERUP SYSTEM

All the powerups will only last for acertain time.when an opponent recieves the "hit" it will lasts for some seconds.different types of Powerups are mentioned below:

1.FREEZE:This is an offensive powerup.when a player accuires this powerup he can shoot this powerup to the opponent.this will slow down the opponent for certain time
2.STICKY:when this powerup is activated certain powerup ares in the field will shows a yellow light. Passing through these areas will make the robot freeze thus these areas are called "STICKY"
3.BOOORING:this offensive powerup will make the opponent slow down.
4.SHIELD:This is a Defensive powerup.a temporary shield against powerup hit is activated for cetain time.
5.NITROS:this powerup will give 25%increase in the speed

For controlling we use an android application which acts as an interface between the user and the robo. The application consist of basic keys to control the movement of the robots. The application also provides notifications once the power is achieved.
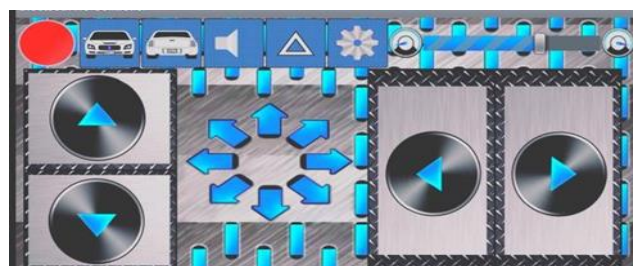

Fig 1.4: Android Application

The whole system is under a wifi network. Since UDP protocol is used the communication is wireless and transferring is quick. The Above represented schematic diagram shows an abstract of the entire process.Whole

working process being shown in the above figure when a Robo moves above the power up which is RFID the Robo would get some abilities to defensive opponent when it passes over it the signal would send to raspberry pi and it will then provide the abilities to current Robo.
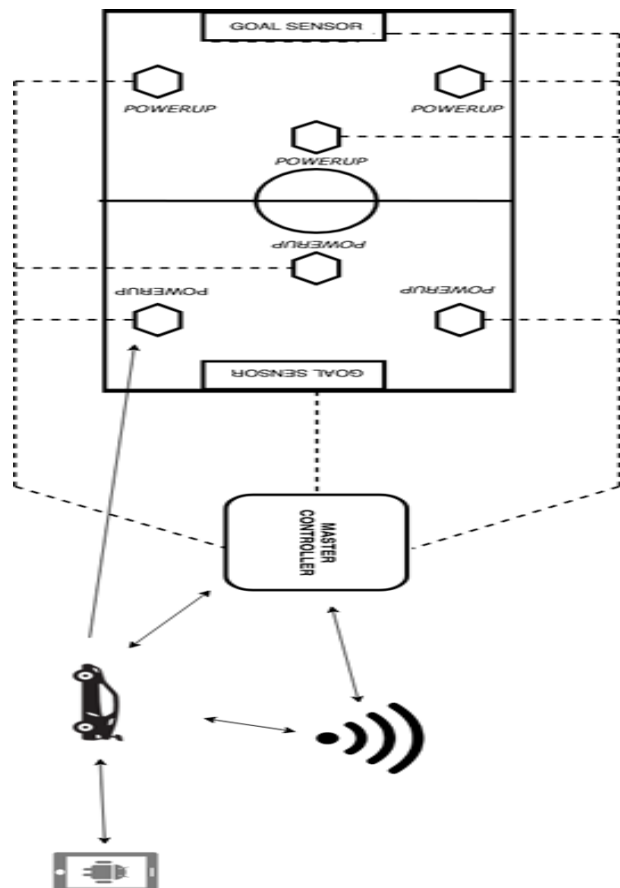
The proposed system is simple and the most advanced form of the previous chassis. One of the crutial feature of this system is include powerups and more interesting features compared to previous design.The ideal concept of this proposed system is more contrast and more reliable and being one of the prosperious concept compared to the previous one.

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Figure 1.5:Schematic representation

V. CONCLUSION