DESIGN OF LED COURT LINES USING IOT

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Abstract-

Design of led interactive court lines using IOT and monitoring athlete's heart rate and temperature monitoring during exercise and training period. A microcontroller is used to supervise the functions and controllability. An RFID security system is used to activate and deactivate courts and for entry and exit of the player .RFID tag acts as an electronic key for accessing the courts. Heart rate and temperature sensors are used to monitor athlete's condition and zigbee data transmission is used to transmit the monitored data from sensor and displays in the monitor system .This design provides efficient way to use a small space for multiple courts for various games under single space as it utilizes the space and time efficiently with multipurpose single sporting space.

Keywords:- Microcontroller, RFID, Zigbee, ANT+,

INTRODUCTION

Now-a-days for design of multiple court lines in a single court may leads to overlapping of lines for this we are using LED's instead of paint for easy monitor of court lines. LEDs are preferred more instead of incandescent bulbs because of their high brightness, similar performance in both indoor and outdoor field, less power consumption and their good luminous efficiency. The important aspect is that during night times players feel uncomfortable with the broad margins drawn using paints, by using these LED strips people not only control the width of the lines but also can control brightness too.

For ease control of court lines using wireless control, without roaming here and there we are implementing remote operate system with the help of IOT. For complete control of court lines from switching on or off, to change the working function of court lines depending on the game IOT based technology is being used, to keep people away in contact with devices connected to electricity and for avoiding transfer of diseases through touching of things by sweat hands.

To track player's heart rate while doing vigorous exercise and to prevent player's health injury off the court Heart rate monitoring system is also used.

This paper not only focusing on the implementation of court lines using IOT but also targeted on players health through monitoring their heart rate. This proposed instrument programmed to calculate heart rate zones by indicating different LED colors depending on the pulse rate. Zigbee wireless protocol is used as transmission medium because they are wireless devices, small in size, high expansion, low power consumption which helps for coaches to have complete track of players heart rate.

METHODOLOGY AND PROTOTYPE DESIGN

a.) Design process of LED court lines using IOT

Embedded systems are designed in a variety of ways depending on their roles and implementations. Microcontrollers, LED lines, RFID module, and IR sensors are the main components of the proposed design in this paper.

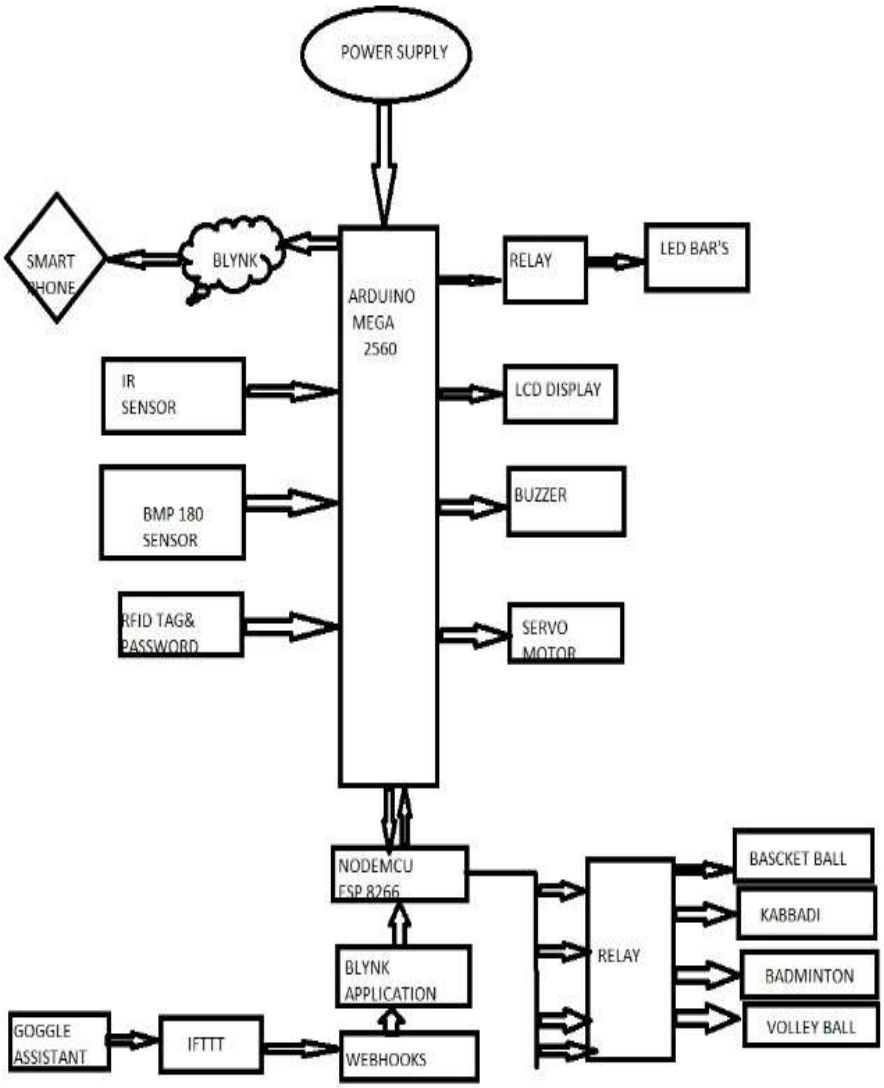


Figure 1: block diagram of led court design

ATmega 328 is the microcontroller which is centered in the design. The entire design built on Embedded system and IOT technology. components are connected to other components of its subcomponents are dependent on each other, we want to access the main flow of the project that they have to go through many stages related to each other. Arduino IDE software is programmed which is a microcontroller to perform actions based on the input received. The figure 1 displays a block diagram and illustrating the proposed work.

The microcontroller monitors all the inputs being connected to it. The block includes an electronic security as a RFID , the player entering the court is detected by the IR sensor and asks for electronic key swipe near the RFID receiver ,if the key matches the entry is enabled and activates the respective court.

The working system can be known easily from the block diagram shown below in Figure 2.

Steps to implement

Step 1: The RFID board, BMP 180 sensor, 7-segment monitor, LED strips, relay, IR sensor, buzzer, and servomotor are all connected to the Arduino Mega 2560 in the first stage.

Step 2: The IR sensor senses the person entering and asks for the RFID key tag, which is then scanned by the RFID module. The message "swipe your wallet" appears on the screen at first. When the tag is matched, the message "C1-IN" appears.

Step 3: if the tag is C1 swiped court C1 is activated ,if the tag C2 swiped court C2 is activated.

Step 4: Heart rate and temperature senses the pulse and body temperature and displays on monitor.

Step 5: The XOT framework that was created is used to track and view player and court details.

Step 6: The consumer must choose his preferred game. The user's chosen game shows the appropriate led lines for play.

Step 7: As the game progresses, we'll be able to see how each team's players are doing.

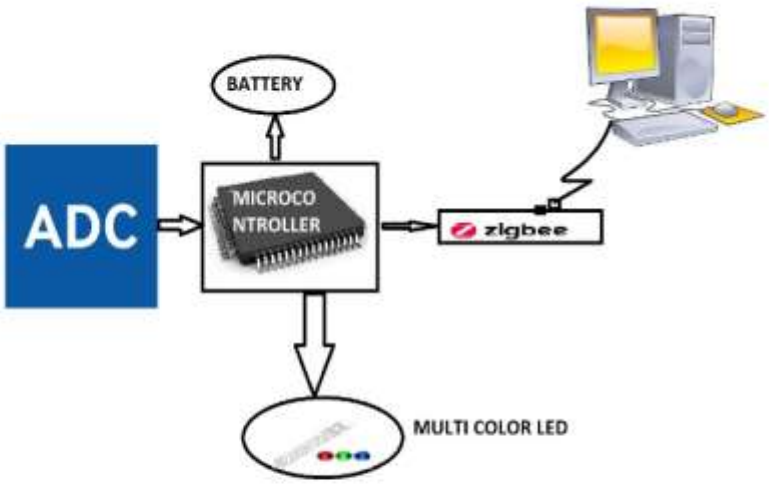
- Use the buttons on the side of the court to manually update the scores.
- The person entering via the RFID-based entrance is detected using an infrared sensor.

RESULTS:-

for part A: The led interactive court lines are accessed through RFID tags .There are two tags for court 1 and court 2 .when a person entered the court with tag 1 court C1 will be activated and when he is out the court C1 will be deactivated and same results for tag 2 and court C2 for activating and deactivating the data of which court is accessed is shown on displays through zigbee data transmission protocol

b.) Design process of heart rate monitoring system

This section explains how Zigbee can be used as a communication protocol tool. Both implementations are conducted independently, which means there are two experiments, one using Zigbee as a communication protocol between transmitter and receiver and the other using Bluetooth. Figure 3 depicts the prototype's entire design process.



The procedure begins with the collection of required data from the pulse sensing diodes. Since it is a low-power microcontroller with a serial port interface, the PIC16F1827 is used (SPI). On the LCD monitor and computer screen, the data processed by the microcontroller will be displayed. The heart rate and temperature are shown on this LED display. The ZigBee wireless network, which is connected to the MRF24J40 microchip, sends data from the microcontroller to the computer.

ANT+ has been chosen as an alternative to Zigbee as a communication protocol. The heart rate data obtained from ANT+ is monitored using the microcontroller. Initially, the microcontroller will determine the real heart rate by measuring the user's ideal target heart rate region (HRmax). The user's age and gender were used to measure the HRmax.

Male: $HR_{max} = 204.8 - (0.59 * age)$ ---1

Female: $HR_{max} = 256.9 - (0.68 * age)$ ----2

Then, Equation (3) is used to calculate the target heart rate (THR) zone.

$THR = HR_{max} * \%\ intensity$ -----3

Figure 4 shows the full block diagram of the heart rate monitoring device design starting with the bracelet. During each heartbeat, the transmitter can sense a voltage difference on the skin. The wireless protocol, nRF24L01, will communicate with the chest. Finally, the data is interpreted by the microcontroller, and the outcome is shown on the LED panel. The colour of the LED display will show the user's desired target heart rate zone.

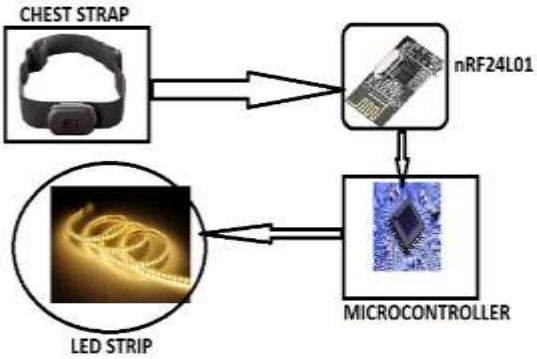


Figure 4:block diagram of heart rate and temperature system

RESULT:-

for part B: when the heart rate sensor and temperature sensor senses the heart rate and temperature it display on monitor through zigbee data transmission protocol

CONCLUSION:

Hence the design and the concept is demonstrated. The design of this project not only helps for athletes and referees, but also helps in reduction of spreading diseases. The engineered module projects a series of lines onto the surface and also converts a basketball court into a volleyball court in seconds, allowing for effective use of room and time with a multi-purpose single sporting space.