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Sensor Based Shopping using Eye-Blink and IoT Technology

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Abstract

The proposed research is an innovative system designed to enhance the shopping experience for physically challenged individuals. The system makes use of relay motors, LCD displays, and Arduino-based eye-blink sensors to provide a user-friendly interface that enables people with physical limitations to explore and engage with shopping environments. Additionally, IoT is used for user interaction. The main functionality of the system is based on eye-blink technology. By detecting eye blinks, the sensors interpret user commands, enabling individuals to control shopping cart movement, and select items from shelves.

Keywords: Eyeblink Sensor, Relay Motor, Arduino, IoT, LCD Display.

1. Introduction

Today, the technology continues to break barriers and redefine possibilities, particularly in areas of accessibility. Among the numerous domains being transformed, the shopping experience for individuals with physical disabilities stands out as an area for innovation [1-5]. Traditional shopping experiences often pose significant challenges for individuals with physical disabilities when reaching items on high shelves. These barriers not only prevent autonomy but also contribute to feelings of exclusion and frustration. Recognizing these challenges, we must create solutions that empower individuals with disabilities to navigate the shopping environment with ease [6-10]. In this quest, sensor-based shopping using eye-blink technology is a major advancement. Arduino-based eye-blink sensors are engineered to interpret intentional eye movements as user commands. These sensors serve as the primary

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input mechanism, allowing individuals with limited mobility to navigate the shopping environment effortlessly [11-14].

2. Existing System

A. Human Aides: Many individuals with physical challenges rely on human aides for assistance while shopping.

B. Shopping Carts: Some stores offer specialized shopping carts designed for individuals with physical challenges.

C. Assistive Technologies: Various assistive technologies exist to assist individuals with disabilities in shopping environments.

3. Proposed System

The blink shop system is a revolutionary approach to shopping designed to empower individuals with physical disabilities. By harnessing the power of cutting-edge eye-blink technology along with IoT integration, blink shop offers an innovative solution for a more inclusive and accessible shopping experience. At the heart of blink shop lies its Arduino-based eye-blink sensors, meticulously crafted to interpret the subtlest of user commands.

Through intuitive eye movements, individuals with limited mobility can effortlessly navigate the shopping environment, seamlessly interacting with shelves, carts, and displays. Key to blink shop's functionality are its meticulously integrated components. Arduino microcontrollers act as the brain, and handles sensor data and controls the motors with accuracy. With relay motors smoothly built into shopping carts, people can easily move through store aisles without using their hands, giving them more freedom from physical effort.

Blink shop has LCD screens that show real-time info. They tell about products, prices, and directions, helping everyone shop easily. It's made to help people with disabilities shop independently and with respect, by removing barriers and giving simple controls

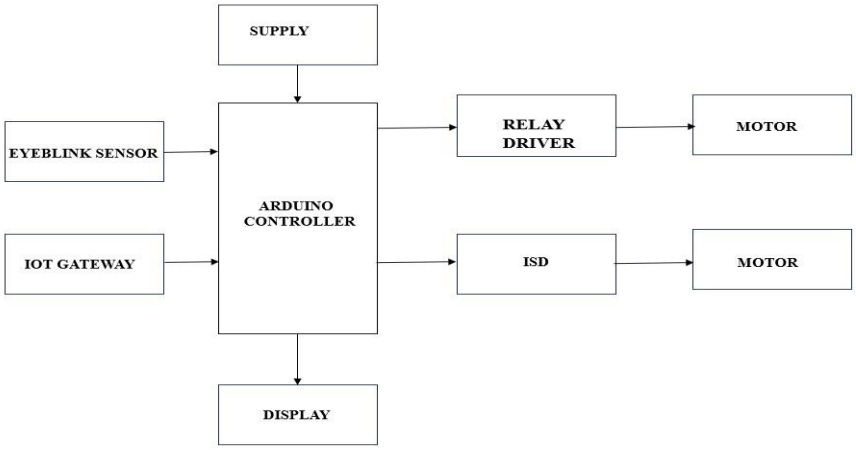

Figure 1. Block Diagram

4. Working

- The ISD module gives voice commands to blind people.
- They listen to the command and give the corresponding eye blink.
- The eye blink sensor detects the human eye blink, and then the detected blink is given to the microcontroller
- Then the microcontroller gives the command to the relay drive to rotate the motor.
- We can also monitor the eye blink through the mobile.
- The mobile does not need any wire connections; it uses the Wi-Fi connection.

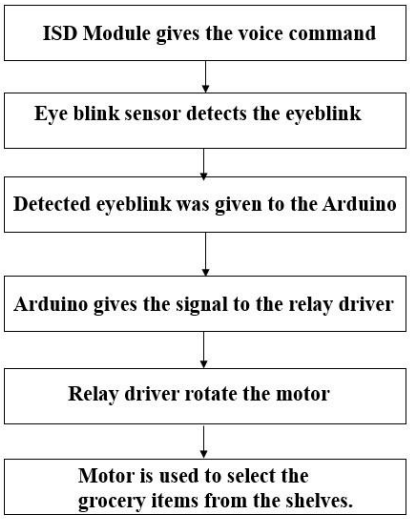

Figure 2. Flow chart

5. Hardware Protocol

- Arduino
- Eye blink Sensor
- Supply Unit
- Relay Driver
- ISD
- ATMEGA328
- DC Motor

5.1 Arduino

- Arduino has 14 digital input and output pins
- It also has 6 analog inputs and a USB connection.
- It has a power and a reset button.

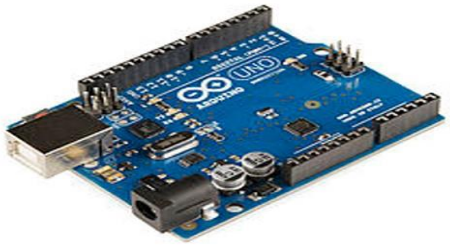

Figure 3. Arduino

5.2 Eyeblink Sensor

- The eye blink sensor is used to detect the human eye blink.
- The eye blink sensor consists of an IR sensor composed of an LED and a photodiode.

Figure 4. Eyeblink Sensor

5.3 ATMEGA328

- ATMEGA 328 microcontroller acts as a processor for the Arduino board.
- It consists of 28 pins.
- From these 28 pins, the inputs can be controlled by transmitting and receiving the inputs to the external device.

Figure 5. ATMEGA328

5.4 ISD

- The ISD1820 is a record and playback module that can record a sound and play it whenever required.
- The module comes with a microphone to record the sound and an 8-ohm speaker to play the recorded sound.

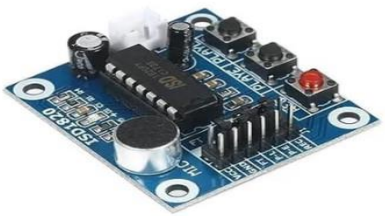

Figure 6. ISD

5.5 Relay Driver

- The Relay Driver is a logic module that provides high-level system control functions.
- Relays are switching that open and close circuits by receiving electrical signals from outside sources.
- Relays are normally used in manufacturing, building automation and control panels.

Figure 7. Relay Drive

5.6 DC Motor

- The motor control module governs the operation of the motorcycle's motor, regulating its speed and performance based on input from the prosthetic system.
- It receives commands from the relay drive module and adjusts motor output accordingly, facilitating responsive and precise control over acceleration and braking.

Figure 8. DC Motor

6. Software Required

- Arduino IDE

6.1 Arduino IDE

- Arduino IDE is software used to upload the code to the microcontroller.
- IDE stands for Integrated Development Environment.
- The compiled code is uploaded to the microcontroller through the USB connection.

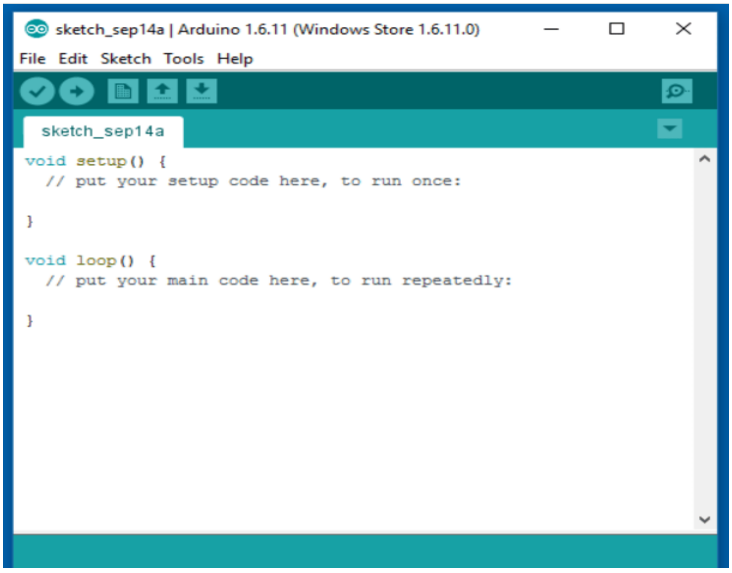

Figure 9. Software window

6.2 Software Implementation

- write the coding
- compile it using the Arduino IDE software.
- If there was any error, resolve it.
- after correcting the errors upload the code to the microcontroller.

7. Prototype

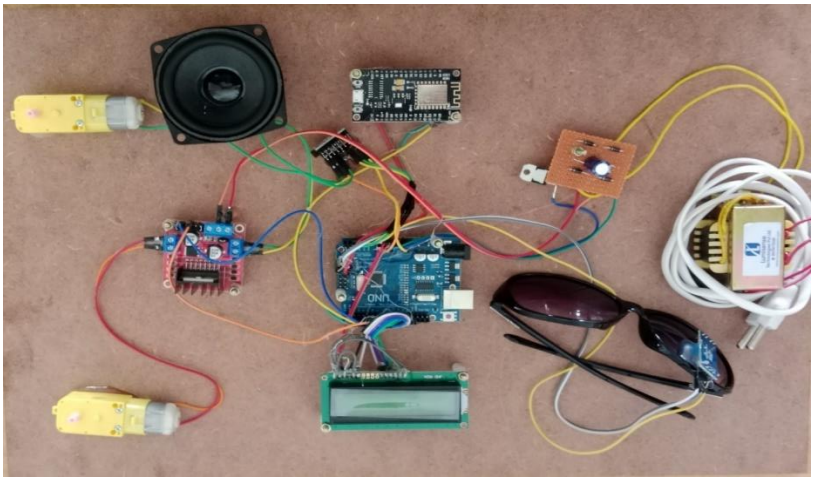

Figure 10. Hardware Implementation

7.1 Discussion

1. Through rigorous testing and practical implementation, the efficacy of blink shop in revolutionizing the shopping experience for physically challenged individuals can be ensured. By seamlessly integrating technology and human-centric design principles, blink shop paves the way for a more inclusive future where everyone can navigate the aisles with confidence and ease, ultimately enriching the lives of individuals with disabilities.

2. Furthermore, the integration of IoT technology has facilitated seamless communication between different components of the system, ensuring a smooth and responsive user experience. Real-time feedback provided through LCD displays has proven instrumental in guiding users and enhancing their understanding of the shopping environment. This has resulted in increased confidence and efficiency among users, further underscoring the positive impact of the system on their shopping experience.

3. The implementation of sensor-based shopping using eye-blink technology will yield promising results in enhancing the shopping experience for physically challenged individuals. Through extensive user testing and practical application, the efficacy of the system in providing a more accessible and inclusive environment within retail spaces

can be proved. One of the key findings from our testing is the intuitive nature of the eye-blink control mechanism.

8. Conclusion

In conclusion, blink shop stands as a beacon of innovation and inclusivity in the realm of shopping technology. By leveraging Arduino-based eye-blink sensors, relay motors, and LCD displays, this system redefines the shopping experience for individuals with physical disabilities. Through intuitive control mechanisms and seamless integration, blink shop empowers users to navigate stores, select items, and interact with displays with unprecedented ease and efficiency. By prioritizing accessibility and inclusivity, blink shop not only eliminates physical barriers but also fosters independence and autonomy for individuals with disabilities. As we move forward, blink shop serves as a testament to the transformative power of technology in enhancing the lives of all individuals, regardless of ability. With its user-centric design and practical implementation, blink shop sets a new standard for inclusive shopping experiences, promising a brighter, more accessible future for all.

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