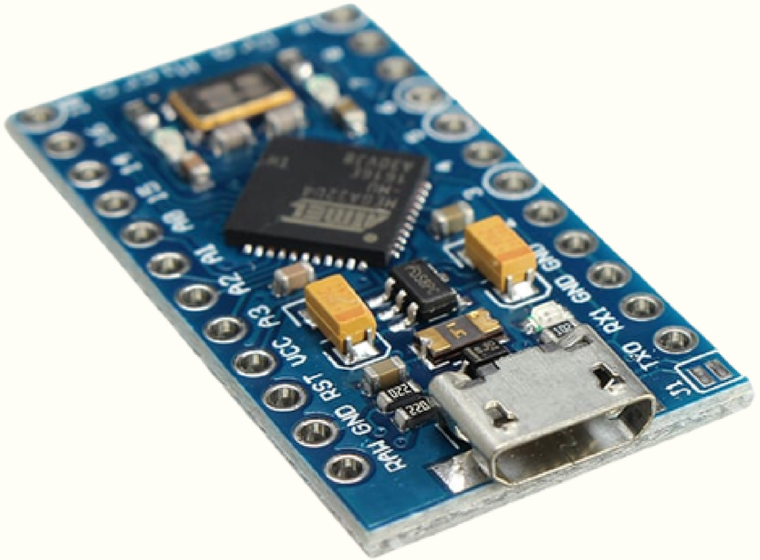
Game Controller

Based on Arduino Pro Mirco



Introduction

Designing gaming controllers for accessibility and inclusivity can transform lives. By considering diverse needs, individuals with disabilities gain equal access to gaming, boosting their quality of life. Such controllers empower everyone to enjoy gaming, fostering a more inclusive and connected gaming community.
This project was inspired by Microsoft's work on the Xbox Adaptive Controller. The controller was designed for people with disabilities to help make user input for video games more accessible. This project is a first step in my efforts developing such devices.

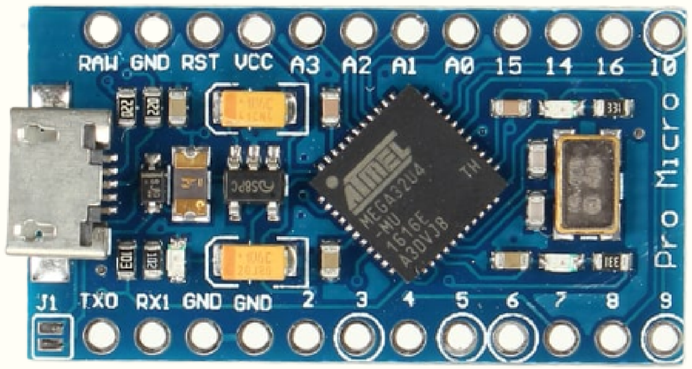
The report provides an overview of the components required, working principle, pros and cons, as well as necessary precautions for this project.

Components Required

The components required for reproducing such a project will be:

a> A Microcontroller (In this case it is Arduino Pro Micro)
b> Two Joystick Modules
c> 12 Tactile Push Buttons
d> 2m Connecting Wire
e> Two Perforated PCB Board
f>Soldering Iron and Cable
g> Switch Board Panel
h> Micro USB Cable with Data Transfer Capablities
i> Nuts, Bolts and other mechanical tools.

Arduino Pro Micro



Before we discuss the project further lets familiarize ourself with the converging point of the project - the microcontroller, as in this case its Arduino Pro Mirco

The Arduino Pro Micro is a compact microcontroller board designed for various projects. It's based on the ATmega32U4 microcontroller, offering 5V voltage support. With 18 digital input/output pins, 5 analog inputs. It's favored for small-scale electronics, DIY keyboards, game controllers, and wearable tech due to its size and native USB Host Support which allows it to emmit and receave USB signals.

The pin-map of the Pro Micro is described below:

RAW - Provides the RAW voltage provided to the microcontroller

VCC - Provides as steady 5V

GND - Ground Pin

AO to A3 - Analog Pins

D2 to D15 - Digital Pins

TX & RX - Pins for Serial Coms

Setup

The hardware setup involves connecting different input components to the Arduino board. These components can include:

- *Buttons: Used for actions like jumping, shooting, or selecting in the game.*
- *Joysticks: Used for precise directional input, commonly for character movement or camera control, they use potentiometers for there working.*

Each component is wired to specific pins on the Arduino board. Buttons are usually connected to digital pins, while analog inputs like potentiometers and joysticks are connected to analog pins. The circuit diagram is provided on the following slides.

The Arduino board needs to be programmed to read input data from the connected components. This is done using Arduino's programming language, which is similar to C/C++. The code defines how the microcontroller reads and interprets the signals from the components.

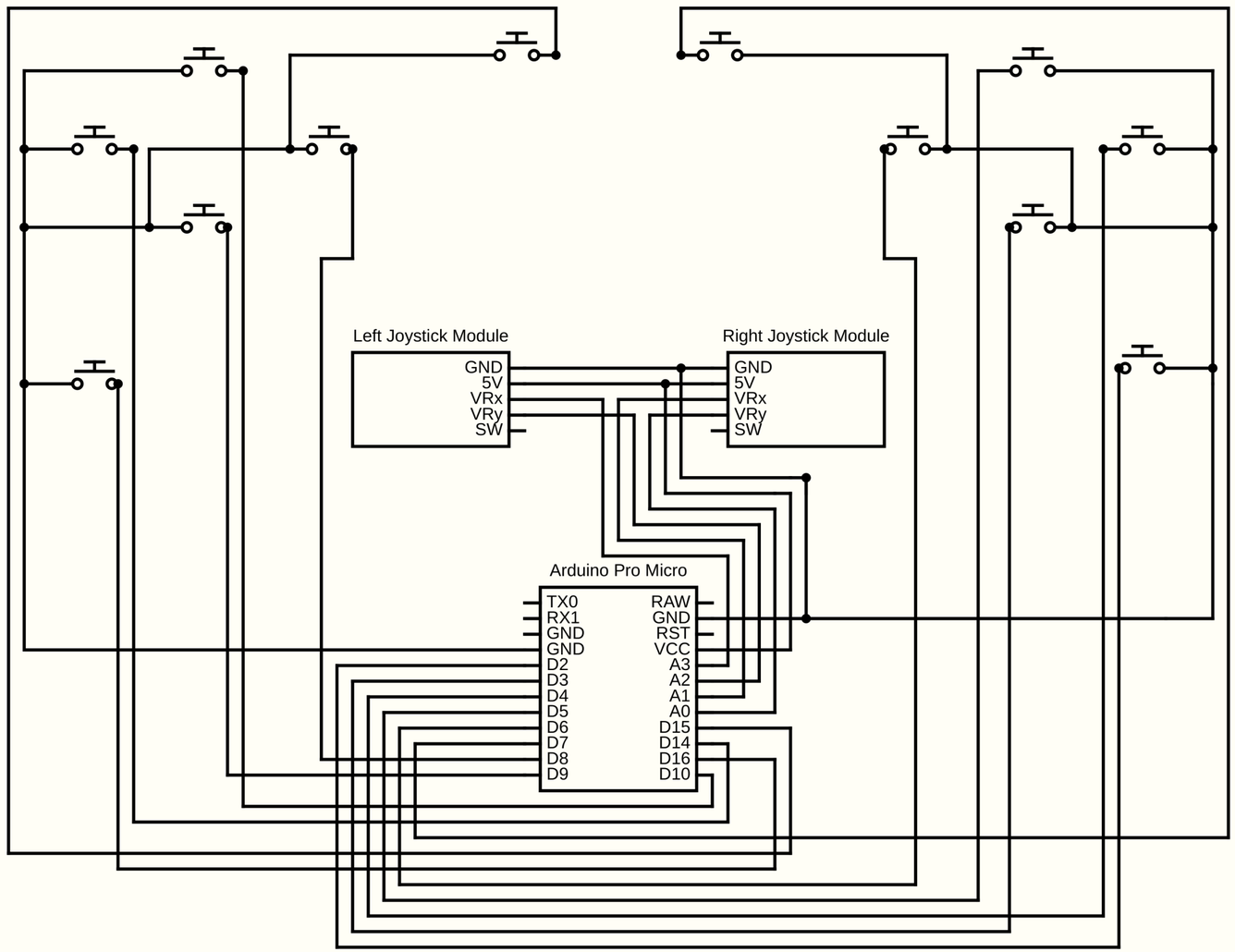
Working

The microcontroller continuously reads the state of the connected components. For buttons, this involves checking if a button is pressed or released. For analog inputs like potentiometers or joysticks, the microcontroller reads voltage values that correspond to the position of the input device.

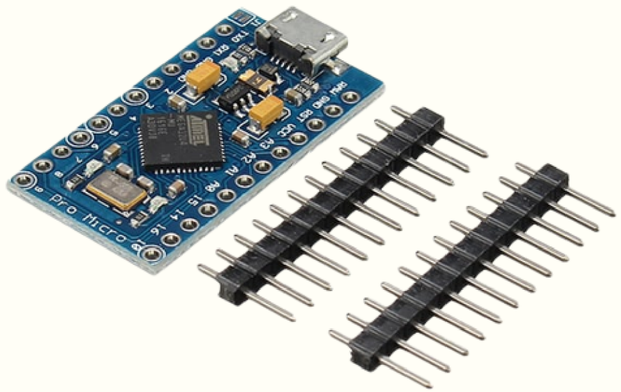
The Arduino communicates with the computer or gaming console to send the generated commands. This can be achieved through various means, such as USB, Bluetooth, or wireless communication modules. For USB communication, the Arduino might emulate a standard game controller interface that the computer can recognize.

The computer or console receives the commands from the Arduino and translates them into in-game actions. For example, if the player presses a button on the Arduino controller, the character in the game might perform a corresponding action like shooting a weapon.

Circuit Diagram



Conclusion



The Obstacle Avoiding Car is an exciting project that combines robotics, electronics, and programming skills. By incorporating ultrasonic sensors and a turning mechanism, the car can autonomously navigate an environment while avoiding obstacles. Although it has its limitations, this project offers valuable educational opportunities and insights into the field of autonomous vehicles. With the necessary components, understanding of the working principle, awareness of the pros and cons, and adherence to precautions, building an Obstacle Avoiding Car can be a rewarding and educational experience.