

# Portable game device

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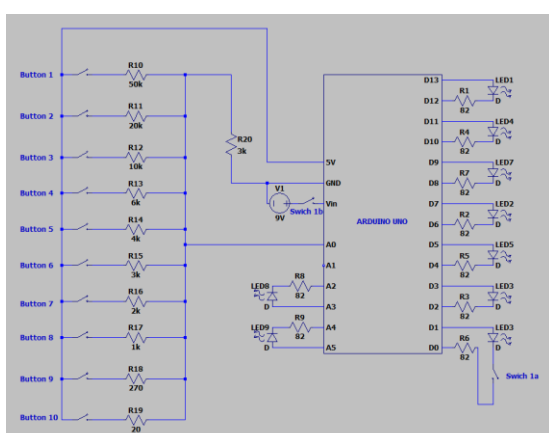
## Introduction

The aim of this project was to develop a portable game device with three playable games.

## Objectives

The basic aim was to construct the game device itself and program the three games individually: a memory game, a reaction game and a two player tic-tac-toe game. An additional objective was to have all of the games installed on the device so that the player could choose which game to play.

Possible extensions included developing an AI opponent for the tic-tac-toe and a tweeter speaker for game sound effects but these were dismissed due to strict project schedule as other problems were encountered.

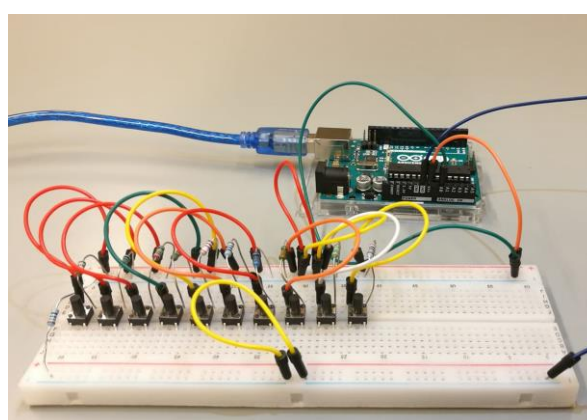


*FIGURE 1. The circuit diagram.*

## Methods

The device is built around an Arduino Uno (R3) board. It consists of a 3x3 bi-coloured LED output screen, ten push buttons for input, several resistors and a two-channel power switch which doubles as a bypass switch for the LED connected to the serial communication pins (see Figure 1).

The input system uses a circuit of resistors and buttons designed to make each individual button press change the circuit voltage to a target value which is being read and identified by a single Arduino pin (see Figure 2). The display LEDs are controlled by the majority of the Arduino's I/O pins (including the serial communication pins) each LED using up two pins.



*FIGURE 2. The first button circuit prototype coupled with Arduino.*

## Results

The device functions as intended, apart from the issues addressed below.



*FIGURE 3. The final prototype.*

The one pin input system has some issues with reliability as approximately two percent of button pushes are misread, even more so when the device is battery powered. This was partially countered by optimizing threshold values and delay buffers for button input. Setting the serial connection pins as output also caused some issues especially during debugging and software upload but the bypass switch solved this issue.

## Conclusions

Our team learned a lot about working on a project, scheduling, teamwork and dealing with setbacks. We also deepened our programming skills and definitely learned more about the Arduino's microcontroller and its behavior.

## Reference

<https://www.arduino.cc/>