Gaming Controllers with Micro:bit(s)
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A Customizable PC Gaming Experience

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<th>Motivation</th>
<th>Micro:bit Game Controller Design</th>
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<td><strong>Micro:bit</strong>: An embedded system designed for use in computer education in the UK</td>
<td>Wireless Control Clients (Opt.) Wireless Server / Wired Controller</td>
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**PC Gaming With Micro:bit**

- Provides a cheap, customizable gaming experience that suits each child’s preference
- Introduces kids to general programming as they code their desired controller functionalities.
- Enhances the understanding of geometry and physics when using the built-in accelerometer and communication by utilizing the Micro USB and radio functionality.
- Gaming is also beneficial as it enhances memory and improves problem-solving skills as well as coordination and attention.

Game Controller(s) Implementations

**Modified Single-Player Games**

- **Neverball**
  - “Tilt the floor to roll a ball through an obstacle course within the given time. If the ball falls or time expires, a ball is lost.”
  - An open-source game that now uses micro:bit’s accelerometer as a gyroscope to adjust the angle of the floor. Kids can experiment with the serial output functionality and how varying the position of the micro:bit impacts the readings of the accelerometer.
  - **Accelerometer, Wired, Linux**

- **TORCS “Car Racing”**
  - An open-source game that now uses micro:bit as a controller in tilting and steering wheel modes. The implementation consists of collecting accelerometer data and adding a new TORCS driver that reacts to micro:bit status updates. Kids can learn simulation and control of car driving while programming.
  - **Accelerometer, Push buttons, wired, Linux-only**

- **AirSim “Car Driving and Drone Flying Simulator”**
  - An application based on Microsoft AirSim and Unreal Engine. Our micro:bit controller allows users to drive a car or a drone in a given 3D scenario simply by tilting and pressing buttons. Raw data from micro:bit is first collected and the corresponding control instructions are then sent to the car/drone through AirSim Python APIs.
  - **Accelerometer, Pushbuttons, Wired, Windows**

**Generic Controllers: Wireless Multi-Player Gaming**

- **Featured Linux Game:** **SuperTuxKart**
  - “Adventurous Car Racing”
  - An open-source clone of Mario Kart that allows players to participate using keyboard commands. Players can now wirelessly use their controller micro:bit(s) to control their gaming characters. This approach can be used for any Linux game...
  - **Accelerometer, Pushbuttons, Wireless, Linux**

- **Featured Windows Game:** **Bubble Trouble**
  - “Classic old school game; run around and shoot your harpoon at the dangerous bubbles to break them down”.
  - An online game that allows up to two players. Two control modes are provided that either use the accelerometer or pushbuttons to wirelessly control the screen character by mapping received micro:bit instructions to appropriate keyboard commands. This can be used for any Windows game...
  - **Accelerometer, Pushbuttons, Wireless, Windows**

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