Harley Balabanian

Toronto, ON — ✉ harleyb@mac.com

Education

Bachelor of Science in Engineering, Mechanical — Queen's University — 2009
Bachelor of Arts, Computing — Queen's University — 2011

Skills and Strengths

- Extensive programming experience: PHP/Python/ C++/Arduino/Java/ MySQL/PostgreSQL
- Electronics design and prototyping
- Systems design from idea conception to functioning product
- Resourceful and tenacious
- Strong communication and interpersonal skills
- Very fast learner
- Born tinkerer with an insatiable appetite for discovery
- Avid cyclist and part-time bike mechanic
- Excellent cook

Experience

Systems Engineer — Battlegrounds Live Gaming — 2011-2015

Battlegrounds was an advanced laser tag system, composed of highly responsive player hardware, an interactive playing field, and a sophisticated and customizable player experience. My responsibilities varied extensively, but I was continuously involved in electronics prototyping using off-the-shelf parts, embedded software development in Arduino/C++, and internal tools development in Python, as well as top-level design of all aspects of the project. In only four years, our six-person team developed a complete laser tag system from scratch and gave over 1000 testers an unforgettable experience.

2015

- Design and construction (physical, electrical and software) of targets that react to physical contact utilizing accelerometers and environmental sensors, with control and communication via OTS Internet-of-Things hardware (ESP8266)
- Design and implementation of position-based audio on field using Raspberry Pi hardware
- Design and construction (physical, electrical and software) of referee control box for all game control on the field, containing physical switches, an LCD screen, and WiFi communication

2014

- Design, manufacture and assembly of combination infrared (IR) and RFID unit for player and equipment identification and synchronization
- Bluetooth LE/iBeacon programming and testing for player and equipment identification purposes
- Development of live scoreboard and player HUD in HTML/CSS/JavaScript using JSON over WebSockets
- Design and implementation of live-updating field lighting to react to game progression using Philips Hue hardware and API
- Development of game data aggregation/logging system using Python/Twisted/Protocol Buffers/MySQL to power the scoreboard/HUD/field lighting systems
- IR emitter test design and execution to determine optimal power level and duty cycle for specific applications (different fire modes on player equipment, different field applications with varying field-of-effect)
- Player equipment mechanical and electrical failure analysis using FMEA
- Public player testing at Toronto Mini MakerFaire 2014 at the Toronto Reference Library
- Player testing with backers from IndieGoGo campaign

2013

- CAD (SolidWorks) for player equipment to accommodate changing electronics payloads and manufacturing methods (3D printing, injection moulding)
- High-speed hardware-assisted serial protocol development for player equipment LEDs
- Electrical design of audio crossover to match speaker design
- Error checking and correcting (ECC) code design for IR data transmission
- Transmission control protocol for serial communication between onboard components
- Manufacture and assembly (3D printing with manual finishing, through-hole and surface mount component soldering, fabric work, cable harness assembly) of 12 sets of player equipment
- Multiple-emitter IR package design (patent pending)
- Public player testing at Toronto Mini MakerFaire 2013 at Wychwood Barns

2012

- ARM-based embedded hardware evaluation (Raspberry Pi, BeagleBone, Gumstix Overo)
- Speaker driver selection, cabinet design, amplifier electrical design, test design and execution
- Configuration and test of live video streaming over network using Gumstix board and camera, with H.264 hardware encoding using the Gumstix DSP
- IR transmission/lensing test design and test equipment fabrication
- RFID hardware trials for player and equipment identification
- Player equipment CAD (SolidWorks) and CAM (SprutCAM) for urethane mould casting
- Player equipment 802.11g network performance test design and execution
- Vibration motor physics modelling and evaluation for player equipment

2011

- GPS test design and execution, hardware evaluation for outdoor player location
- 802.15.4/ZigBee topology design for all gameplay communication, accompanying test design and execution
- Electronics prototyping with OTS hardware in conjunction with custom IR emission control hardware

Software Developer — OpenConcept Consulting — 2011

- Development of Drupal websites, focusing on multi-language management and large data displays
- Ottawa-based project and team necessitated remote and colocated work and communication

Software Developer — Airsoft Innovations Inc. — 2009

- Creation of PHP/MySQL-based inventory and production management system

Software Developer — Faculty of Engineering at Queen's University — 2008

- Development of in-house PHP/MySQL-based content management system for students

Senior Technician — Carbon Computing — 2004-2006

- Diagnosis and repair of Apple desktop and notebook computers

Volunteer and Extra-Curricular Involvement

- Queen’s University Marching Bands — 2007-2011 — Publicity Director during 2008-2009, 2010-2011
- Queen's University Golden Words Newspaper — 2006-2011 — Webmaster and IT
- Queen's University Solar Car — 2008-2009 — Telemetry Team
- Queen's University Engineering Society — 2006-2007 — Webmaster Team

Certification

Apple Certified Desktop and Portable Technician — 2003-2008 — Tech ID: CAN032GE