TouchPoint Companions

Modeling Digital Twins

ELECOMP Capstone Design Project 2019-2020

Sponsoring Company:

IGT Global Solutions Corporation
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IGT is continuing their support of the Program for the 3rd Consecutive Year!
http://web.uri.edu/elecomp-capstone/past-projects-2016-2017/igt-jackpot/
http://web.uri.edu/elecomp-capstone/past-projects-2016-2017/igt-windfall/
https://web.uri.edu/elecomp-capstone/project-details-by-team/igt/

Company Overview:

IGT is the world's leading end-to-end gaming company. It is listed on the New York Stock Exchange under "IGT." Its holding company headquarters are in the United Kingdom, with operating headquarters in Rome, Italy; Las Vegas, Nevada; and Providence, Rhode Island. IGT attracts the industry's top talent, with more than 12,000 employees across the globe.

IGT's integrated portfolio of technology, products and services, including its best-in-class content, is shaping the future of the gaming industry by delivering the innovation for players.

IGT is uniquely positioned to provide the government-sponsored and commercial gaming industry with proven solutions for gaming, lottery, interactive, and social, through every channel across the spectrum, including retail, web, and mobile. It is IGT's mission is to be the global innovation leader in the gaming industry.

Our vision to combine the best of our legacy companies to enhance and build our capabilities; deliver content, technology, and expertise that drive customer and player demand; continue to grow leadership in the lottery and gaming space, and become a leader in the interactive space; and use the power of our understanding of central systems and connectivity to define the future of gaming.

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Project Motivation:

TouchPoint terminals are lottery-based devices that process online wagers. These devices range from point of sales devices to self-service devices. These devices typically stay deployed in the field for many years and need to be serviced in order to keep them running for the duration of a contract. The motivation behind this project is create a digital twin of a TouchPoint device that will allow IGT to better monitor devices in the field.

Anticipated Best Outcome:

The anticipated best outcome is a functional prototype of a digital twin TouchPoint device. This device will make use of the telemetry that is currently collected from our devices and add additional sensors to show a true representation of a digital twin.

Project Details:

The project hardware environment is composed of a TouchPoint device, sensors and backend server to process telemetry collected from device. The digital twin is meant to be an up-to-date and accurate copy of a TouchPoint properties and states. It will be used for monitoring, diagnostics and prognostics to optimize asset performance and utilization. The sensory data will be combined with historical data, human expertise and field data to improve the outcome of prognostics. Therefore, a prognostics and intelligent maintenance system platform can use digital twins in finding the root cause of issues and improve uptime of the TouchPoint device.

The operating system of the server may be either Windows-based or Linux-based; pending initial investigation and discovery.

Figure 1. Example TouchPoint Devices

The digital twin should be able to do the following.

- Receive existing TouchPoint telemetry data from the IGT Platform Data Acquisition module
- View the status of the TouchPoint device in the digital world
- Support additional sensor types for additional monitoring of the TouchPoint connected device pending evaluation
- Update its existing model using collected sensor data
- Provide the TouchPoint device's state in near real time

Electrical Tasks:

- Gain familiarity with existing IGT terminal systems
- Research and determine hardware to meet product specifications
- Design and implement the underlying system circuitry required to interface new sensor types
- Develop and implement necessary project components in order to produce a prototype system

Firmware/Software/Computer Tasks:

- Gain familiarity with existing IGT terminal systems
- Determine a hardware platform for the embedded computing system
- Determine cost-effective sensor devices capable of meeting specifications and product requirements
- Investigate best way to display digital twin
- Development and high-level design
- Create use cases
- Underlying Firmware Development (if needed)
    - Sensor drivers
    - Sensor Interfaces
- Main Application
    - Business and Domain
        - TouchPoint Logic
        - Operations Logic
    - Digital Twin Presentation
        - User Interface Development and Implementation

Composition of Team:

1 Electrical Engineer and 2 Computer Engineers

Skills Required:

Computer Engineering Skills Required:

- Proficiency in Java application development
- Experience developing GUI applications
- Experience with 3D modeling is desirable
- Familiarity with cross-platform application development (Java, Qt, Xamarin)
- Familiarity with embedded systems
- Familiarity with Windows and Linux Operating Systems
- Low-level programming experience, such as C

Electrical Engineering Skills Required:

- Analog and Digital Circuit Design
- Data acquisition
- IoT sensor devices

Anticipated Best Outcome's Impact on Company's Business, and Economic Impact:

Maintenance of our TouchPoint fleet of terminals is an enormous cost to IGT. In addition, IGT pays penalties for downtime of our devices. Reducing the field service visits, maintenance costs and downtime of our terminals will have a positive economic impact.

Broader Implications of the Best Outcome on the Company's Industry:

IGT will have greater insight into the overall health of there lottery network of TouchPoint devices.