Overview
As companies are redeveloping their bricks-and-mortar stores in the face of rival companies, old customer engagement techniques have become ineffective in our technology driven culture. Vending machines are often derided as being unimaginative, basic, and temperamental. The Coca Cola Company has asked our team to develop a low cost solution to connect over 300,000 vending machines around the world to the internet and putting them into the “internet of things” (IoT) space.

Objectives
The objective was to develop applications using IoT technology to monitor and analyze consumer data mined from vending machines around the globe. Features included:
- Immediate product and campaign data analytics
- Remote management with online monitoring and diagnostics
- Touch screen solutions for customer and operator interactions
- Interactive digital signage
- 3D printed touchpad housing device for streamlined installation processes

Approach
Our team approached the problem while considering existing computing products, and chose a combination of modification and development.
- We needed something with both Ethernet and WiFi that was easy to expand
- The Raspberry Pi 3 was our choice with 2 network interfaces and a 40-pin GPIO header
- Mechanical and industrial engineering members focused on physical aspects, including:
  - Procuring & refurbishing the the vending machine
  - Creating a 3D printed enclosure for the Pi & screen
- Electrical and computer engineering members focused on interfacing the Pi with the vending machine, including:
  - Rewiring the vending machine and adding circuitry to to make it compatible with the Pi
  - Developing GPIO drivers in Python and C#
- Software engineering and data science focused on the server and client software:
  - Set up the server, including databases and website
  - Wrote client GUI in C# and client database to communicate with the server
- Software was tested in virtual machines before being tested directly on the Pi

Outcomes
The outcome was a Raspberry Pi system that can control a vending machine and sends data to a remote server. The Pi can read and write up to twenty-three 3.3V signals and has four standard USB ports. This allows for considerable physical expansion and is affordable at approximately $35 for a Raspberry Pi 3. In addition, the team developed a web server database and a website for collecting and displaying vending machine statistics.