SAND2016-6896C

The Center for Cyber Defenders

Expanding computer security knowledge

Embedded Web Server

Loic Guegan, University of Colorado Boulder

Project Mentor: Adam Goldhammer, Org. 5632

Problem Statement:

Our goal was to develop a small web server application running on a microcontroller. The web server aims to send JavaScript via WiFi to a PC and graphically display streaming data in a web browser using the JavaScript that was initially sent. The server also aims to use primarily off the shelf commercial hardware components.

Objective:

- Implement HTTP POST request method handling in order to accept and store data in the request body
- Research and then utilize the WebSocket protocol on the web server and/or web client to simplify communication between them

Approach:

- Started off by working with a microprocessor development board in order to get familiar with the Keil uVision Integrated Development Environment. Learned about pin multiplexing and ran prebuilt LED and HTTP programs to understand how to use C to interact with the ARM processor and board components
- Implemented the parsing of POST requests that are sent from the client to the Wifi module, which then sends it to the ARM processor on the board
- Restructured the web client and web server programs to communicate via WebSockets using C and JavaScript

Impact and Benefits:

- Web server enabled device will allow faster and more flexible monitoring of systems than current hardwired PC based solution
- Added networking functionality to the webserver, specifically handling HTTP POST requests
- Used WebSockets to simplify the networking code and enable simultaneous communication in both directions between the client and embedded web server

Sandia National Laboratories · LOCKHEED MARTIN

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-84AL8500. SAND2016-XXXXC.

U.S. DEPARTMENT OF ENERGY · NNSA National Nuclear Security Administration