ESP8266 Wireless Communication Module

Robert Elder

1 Purpose

This project will involve testing the feasibility of using a small low-cost wireless module to do simple computation in a completely wireless, but networked context. The primary deliverable of this project will be a working physical prototype that can be easily flashed with new firmware, and most importantly documentation describing challenges faced in getting it to work, or any unforseen caveats of the hardware or software associated with this module.

2 Objectives

The project has the following objectives. Not all are required, but as many as possible should be considered:

- The project should use the ESP8266-ESP-01 wifi module as a stand-alone computing device without any external microcontroller.
- The development platform for interacting with the ESP8266-ESP-01 should be Linux.
- Demonstrate and document the ability to flash the ESP8266-ESP-01 with modified firmware. Achieve a 'hello world' change to the firmware.
- Demonstrate and document the ability to connect the ESP8266-ESP-01 to a secured wifi network.
- Demonstrate and document the ability to send an HTTP request form the ESP8266-ESP-01 to a web site on the public internet.
- Demonstrate and document the ability to interact with the ESP8266-ESP-01 using a command prompt from a computer connected to the same LAN as the module.

Other more advanced objectives (if you want to challenge yourselves) include:

- Demonstrate and document the use of low power mode, and operation in the context of extremely limited power sources: Solar, battery etc. Calculate the minimum size of battery/solar panel required for various forms of operation: standby mode, high-power mode etc. Validate that the hardware specifications match reality.
- Demonstrate and document the use of transparent wireless briging to extend the range using multiple devices. How many devices can you use to extend the range? How does adding multiple nodes affect the latency and throughput?
- Demonstrate and document the use of a trivial web server on the module.

3 Examples Of Project Success

- A working prototype with documentation that meets many of the objectives above.
- A prototype that does not work for a well understood and documented reason (missing parts, unsupported hardware version, etc.). Alternatives are explored and suggested.

4 Examples of Project Failure

- A prototype that does not work for an unknown reason. No analysis of what the possible issues are, and no attempt has been made to document the experiments that were done before giving up.
- A working prototype that cannot be replicated due to incomplete documentation and references.

5 Co-Ops

I just wanted to note that even though I have a business, I don't have enough money to hire any co-ops now, or anytime in the near future.

6 Resources

Here are various resources that may or may not be useful. It is up to you to determine if the information in these resources is correct and relevant:

`https://www.allaboutcircuits.com/projects/flashing-the-ESP-01-firmware-to-SDK-v2.0.0-is-ea`

`http://www.instructables.com/id/Intro-Esp-8266-firmware-update/`

`http://www.instructables.com/id/Getting-Started-With-the-ESP8266-ESP-01/`

`https://www.hackster.io/ROBINTHOMAS/esp8266-esp-01-webserver-7248ca`

`http://rancidbacon.com/files/kiwicon8/ESP8266_WiFi_Module_Quick_Start_Guide_v_1.0.4.pdf`

`https://hackaday.com/2015/09/18/transparent-esp8266-wifi-to-serial-bridge/`

7 Documentation

During this project, you will likely have to do a lot of Googling, and experimenting to get a process that works. You can expect online documentation to be potentially misleading, outdated or completely wrong. Part of the challenge of this project is to find at least one process that works.

You will certainly have to follow online resources in order to complete this project. Do not copy and paste any documentation you find, simply provide a link. What I'm really interested in is commentary on which documentation to follow, what NOT to follow and any context that I would need to replicate your results. Include mistakes you made so that I can learn from them.

Your documentation should be detailed enough that someone else would be able to re-produce exactly what you did using only the documentation as a guide. If you joined the project as a new member, think about what you would need to have explained to you in order for you to be helpful.

Do not copy and paste documentation from Wikipedia, or elsewhere. Simply provide a link instead of copying.

8 Hardware

I will cover the cost of purchasing hardware, but **ONLY IF I APPROVE IT FIRST**. I will also keep any hardware that I have purchased after the project finishes.

9 After The Project - Ownership

Depending the quality of the results of this project, I may publish a blog post describing the technical details of how the project works, and how to set up something similar. In doing so, I will make use of documentation and source code that you have produced in the course of this project. In addition, I, (Robert Elder) will also take legal ownership of all project artifacts, copyright, and intellectual property you have produced in the course of this project. You are permitted to make use of any non-physical project artifacts in meeting course obligations, and I encourage you to create a portfolio item using the documentation to promote yourself.