1. **OBJECTIVES**

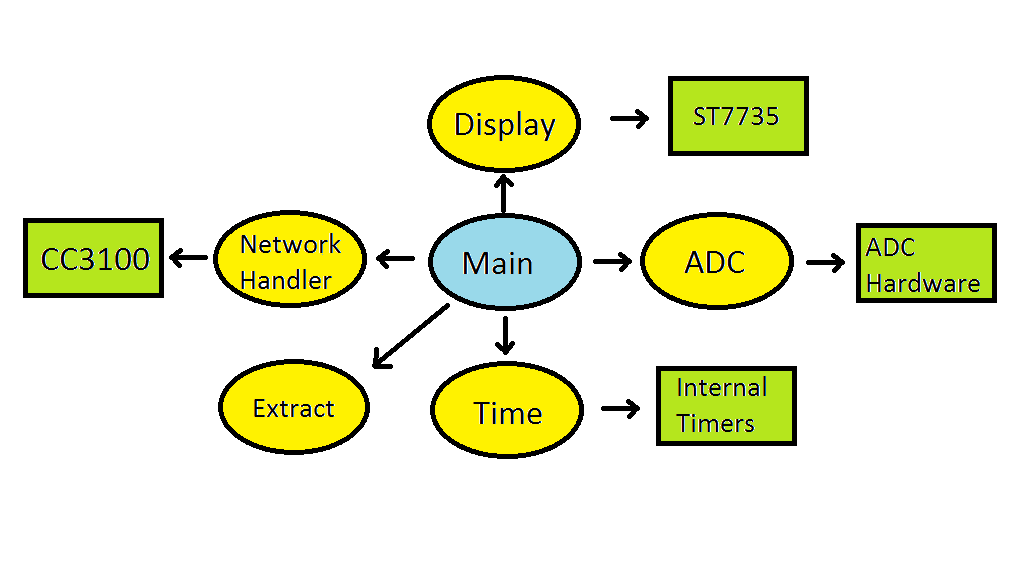
Lab 4 aims to implement a system which connects to the internet via an IEEE 802.11 Wifi module, CC3100. We will use DNS to convert web names to IP addresses. We will configure a smart object that can retrieve data from a weather server as well as store data onto another internet server using TCP.

1. **HARDWARE DESIGN**

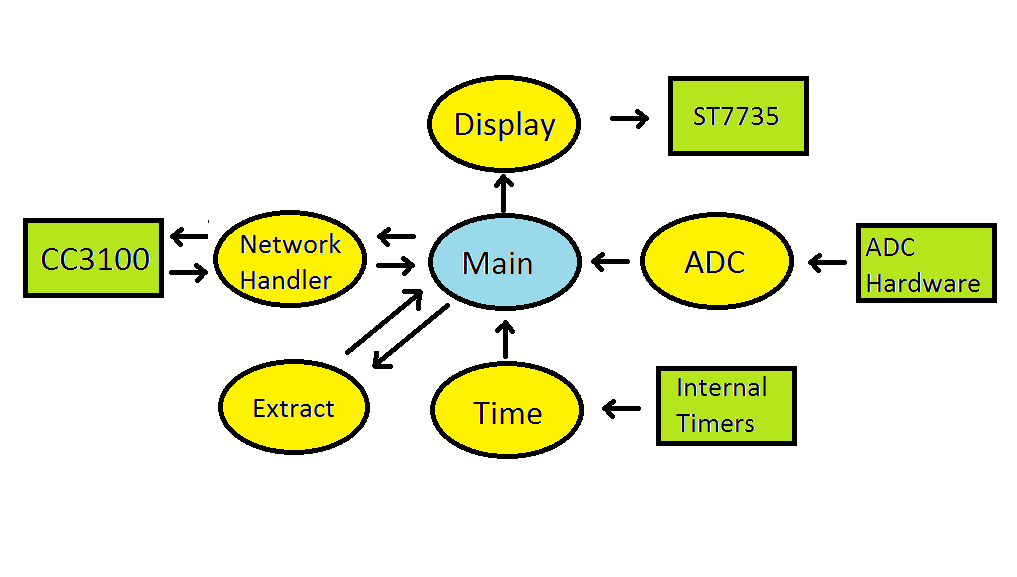
None.

1. **SOFTWARE DESIGN**

Call Graph:



Data Flow Graph:



1. **MEASUREMENT DATA**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trial | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Time to download (ms) | 29 | 36 | 234 | 266 | 15 | 188 | 294 | 280 | 65 | 32 |
| Time to upload (ms) | 257 | 166 | 166 | 264 | 59 | 161 | 263 | 59 | 59 | 59 |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Lost Packets | Avg. Time | Min Time | Max Time |
| Download from openweathermap.org | 0% | 144 | 15 | 294 |
| Upload to EE 445L server | 0% | 151 | 59 | 264 |

1. **ANALYSIS AND DISCUSSION**
   1. **In the client server paradigm, explain the sequence of internet communications sent from client to server and from server to client as the client saves data on the server. Assume the client already is connected to the Wifi AP and the client knows the IP address of the server.**

The server creates a connection socket (it may need to create multiple sockets depending on the number of clients), the client creates its own connection socket, the server waits for the client to make a request, the client makes a request by sending data through its connection socket, the server processes the request, the server sends a response back to the client, and then the client and server close their sockets.

* 1. **What is the purpose of the DNS?**

The Domain Name System (DNS) is basically a phone book that translates human-friendly computer hostnames into IP addresses, which is convenient since names are much easier (for humans) to remember than a string of numbers. DNS allows humans to conveniently work with things like URLs and email addresses but still have the translation into IP addresses that allow these devices to be located and addressed world-wide.

* 1. **What is the difference between UDP and TCP communication? More specifically when should we use UDP and when should we use TCP?**

User Datagram Protocol (UDP) has no handshaking mechanisms, is unable to guarantee message delivery or error correction, and should be used when dropping packets is better than waiting for delayed packets. Transmission Control Protocol (TCP) has handshaking methods, is able to guarantee message delivery, and should be used when dealing with data that must be received with high reliability and must be able to be sent both ways.

UDP examples: media streaming, online gaming

TCP examples: email, file transfer, World Wide Web

Mixed examples: use TCP to send the packet skeleton, then UDP to send payload