

# Computer Systems

## Week 9



### Overview

In this laboratory you will be implementing functions on your Raspberry Pi in ARM Assembly

**Purpose:** Learn how functions can be constructed, arguments passed, and old register values remembered using the stack.

**Task:**

**Time:** This lab is due by the start of your week 10 lab.

**Assessment:** This lab is worth 1% of your assessment for this unit, and only if demonstrated to your lab demonstrator in the week it is due.

#### Bring to Lab

- your Raspberry Pi (either model 2B or 3B)
- an SD card and SD card reader
- 2 lead wires, one LED, one resistor and breadboard.

#### Resources:

- Lectures slides - week 7, 8 and 9
- Download the associated files in Resources.zip from Canvas
- Video tutorials:
  - [Lab 9 Video](#)
  - [The GPIO registers and header pins](#)
  - [Connecting up a simple LED circuit](#)

### Submission Details

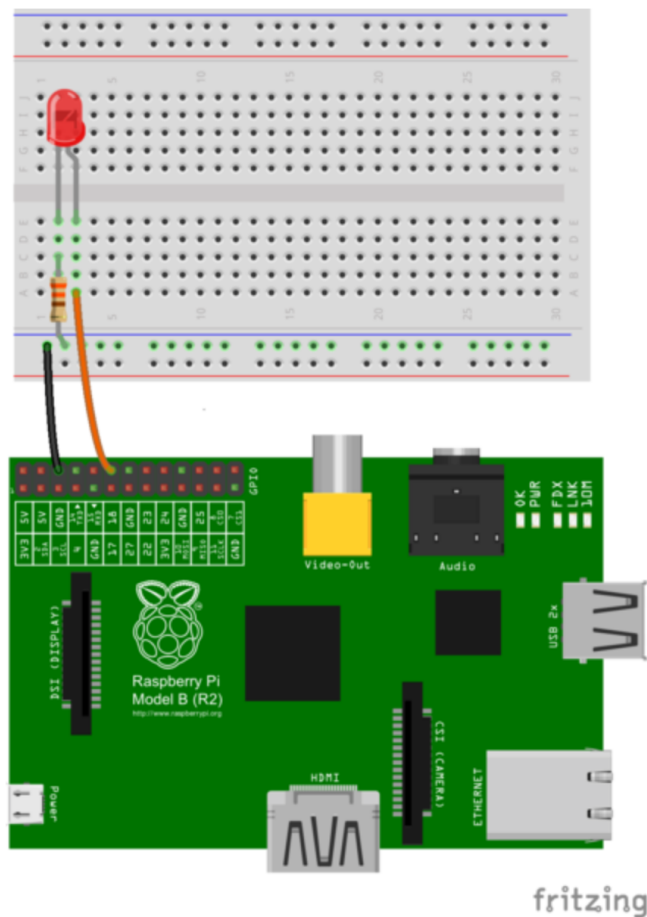
You must submit the following files to Canvas:

- A document containing all required work as described below.

# Instructions

## Function decomposition

1. Wire up a circuit exactly as shown below (same as last week). Ask your lab demonstrator for help if you need. Note we are using GPIO18 to control the LED.



2. Start up FASMARM.exe and open up kernel7.ASM from the task resources Recursion folder on Canvas.
3. Take some time to step through the code and understand what it is doing. Open up the other files as well (TIMER.ASM and FACTORIAL.ASM).
4. Provide a brief description of the following:
  - 4.1. what is the code in each file doing ?
  - 4.2. what register holds the input to the program (and what is the input) ?

***Discuss your answers with your lab demonstrator and include them in your submission document.***

5. You are going to modify the code in kernel7.ASM by breaking up logical components into functions. Open up HOWTO\_Lab9.pdf from the task resources and follow the instructions on how to do this (or, if you want to do it your own way, go for it!).

***Copy your kernel7.asm code into your submission document at each stage of testing (marked by the “Compile and Test” slide in the HOW TO document).***

**When complete:**

- Submit your answers (screen shots, etc) in a single document using **Canvas**
- Show your lab demonstrator your working circuits in class (you must do this to get the 1%). Your lab demonstrator may request you to resubmit if issues exist.