**Requirement specification**

1. The must be a means to implement a force to control the motion of the mass
2. There should be means to monitor the behaviour of the system
3. There must be a feedback control method to match the output to the specified input
4. There must be a user input method to define the control of the mass
5. There should be a method to display associated data

**Functional specification**

**Motor**

**Position sensor**

**Damper**

**Spring**

**Mass**

**Embedded system for motor control**

**GUI**

**User input**

**Display**

USER

The proposal is illustrated by the block diagram above.

The means to implement a force to control the motion of the mass, utilises an embedded system, which would provide voltage levels relative to the required input reference and adjustments from the feedback control loop.

The position sensor provides the means to monitor the behaviour of the system.

The GUI realises the need to implement a user input method to define the control of the mass whilst displaying the current state of the system from the position sensor via the embedded system interface. And forming a feedback control method to match the output to the specified input, which can either be implemented within the embedded system code or the GUI.

A **design or product specification** describes the features of the solutions for the Requirement Specification, referring to the designed solution **or** final produced solution. Sometimes the term specification is here used in connection with a [data sheet](https://en.wikipedia.org/wiki/Data_sheet) (or spec sheet). This may be confusing. A data sheet describes the technical characteristics of an item or product as designed and/or produced. It can be published by a manufacturer to help people choose products or to help use the products. A data sheet is not a technical specification as described in this article.

This is a breakdown of the product list:

|  |  |  |
| --- | --- | --- |
| Name | Price | Site |
| Derwent Macdee Syphon Plumbers Repair Spring DSY1400 | £5.37 | <https://www.ebay.co.uk/itm/Derwent-Macdee-Syphon-Plumbers-Repair-Spring-DSY1400/272948172553?epid=1144747393&hash=item3f8cfa9709:g:gCcAAOSw8DJaFFSP> |
| L298N STEPPER MOTOR DRIVER CONTROLLER BOARD | £ 4.50 | <http://hobbycomponents.com/motor-drivers/54-l298n-stepper-motor-driver-controller-board?search_query=stepper+motor+controller&results=4> |
| Adafruit 2809 LIS3DH Triple-Axis Accelerometer (+-2g/4g/8g/16g) | £5.89 | <https://www.rapidonline.com/adafruit-2809-lis3dh-triple-axis-accelerometer-2g-4g-8g-16g-73-5283> |
| BELT DRIVEN LINEAR ACTUATOR KIT | £74.95 | <http://ooznest.co.uk/3D-Printer-CNC-Kits-Bundles/Linear-Actuators/Belt-Driven-Linear-Actuator-Kit>  Extrusion Profile:20x20mm Extrusion Length: 500mm Extrusion Colour: Black Precise Length: No Gantry Type: Smalll V-Slot gantry- - 4 Wheels Motor: 1 x NEMA174OZ 2.00A uStepper: No |
| Total | £90.71 | Ended up with £4.26 left |
| 06/12/17 |  | 14:16 |

Arduino code to drive the stepper motor:

Matlab simulation mathematically modelling the mass spring damper system:

x