PROGRESS REPORT

Report3

Prepared By:

Mohamed Gamal

Contents

Introduction 2

Project Selection 3

Market research 4

Conceptual Design 6

Bill of materials 7

Feasibility Study and potential customers 8

- **Technical Feasibility** 8
- **Economic Feasibility** 8
- **Legal Feasibility** 8
- **Operational Feasibility** 8

Business model and marketing strategy 9

Introduction

For The purpose of applying what we learned throughout the internship, we were presented with the task of researching the market, selecting an existing market product, reverse engineer it, and try to prototype a similar product with a lower production cost.

We were presented with different ideas to be able to implement what we learned in sheet metal, electronics and control systems.

In this report I will present the project selected, provide a market study of similar products and the potential customers that can buy the product, the feasibility study, provide the bill of materials and provide the conceptual design and finally suggest a marketing and business model for my product.

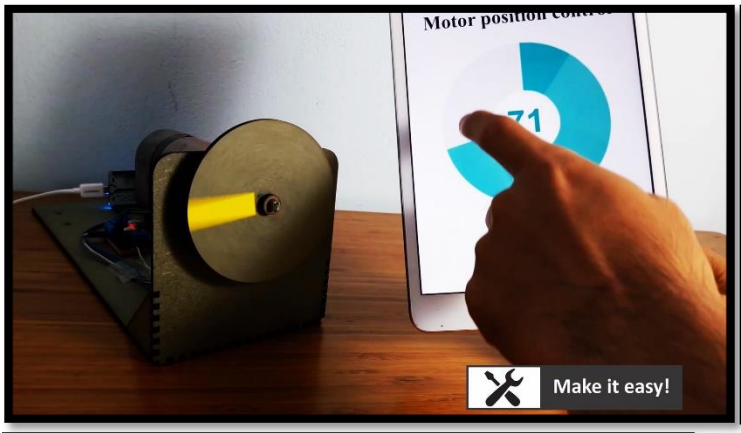
Project Selection

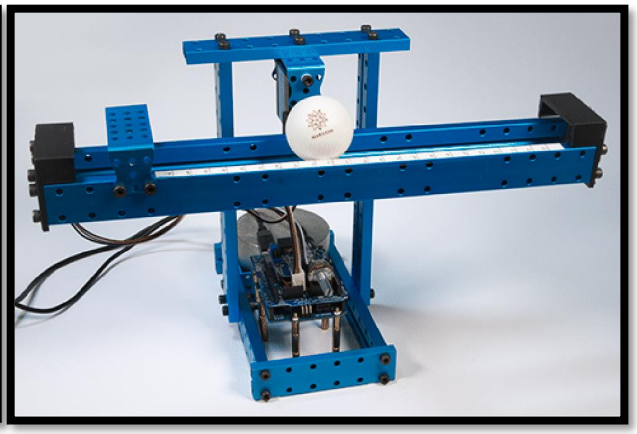
The following projects were suggested by our training mentor:-

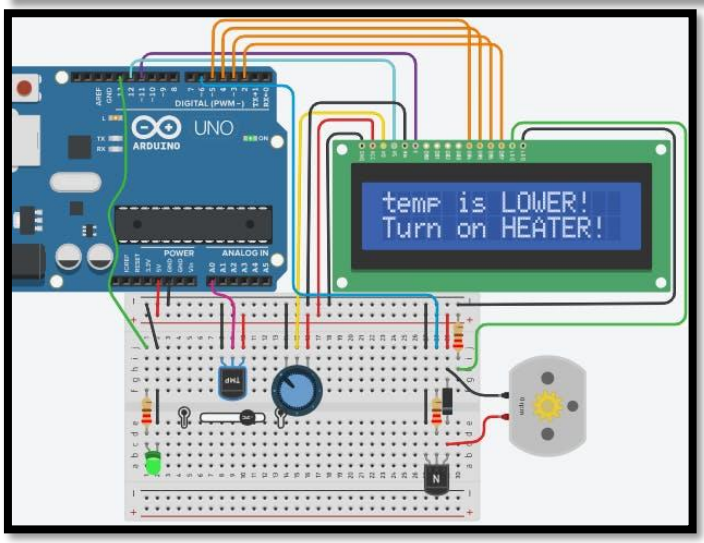
- Motor position control system
- Ball and beam balancing system
- Temperature control system
- Water level control system

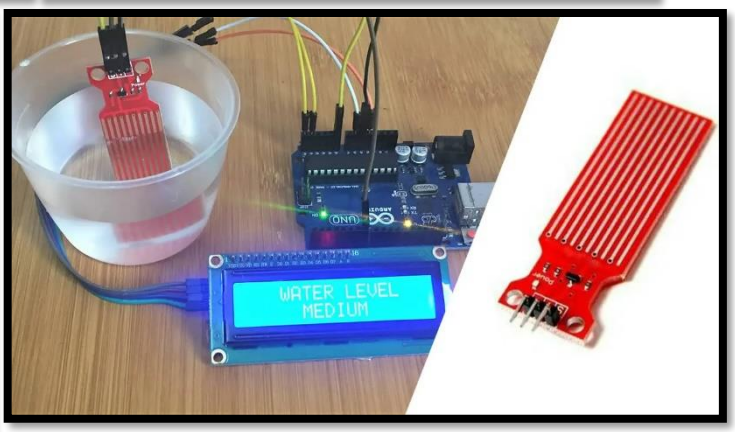
Out of all of these projects the one that I choose was Motor position control.

The motor position control not only helps understanding PID controllers and its uses, but it physically shows the changes that occur when the PID inputs are changed and helps people who can't visualize what a PID controller does understand and observe it in real life.









Market research

Using browser search tools, we can find multiple results of motor position control kits that are available for sale, here I will present some results, compare between them and mark all the pros and cons of each kit

1. **Ali Express (DC Motor PID Learning Kit Encoder Position Control Speed Control PID Development Guide)**

   Price: 2104 EGP
   Estimated shipping: 300 EGP
   Includes:

   - DC Motor
   - Motor Encoder
   - Controller
   - Metal motor bracket
   - Data cable
   - Power cable
   - Display

   Pros: Includes Simulink and Arduino software that provides feedback data and shows position.

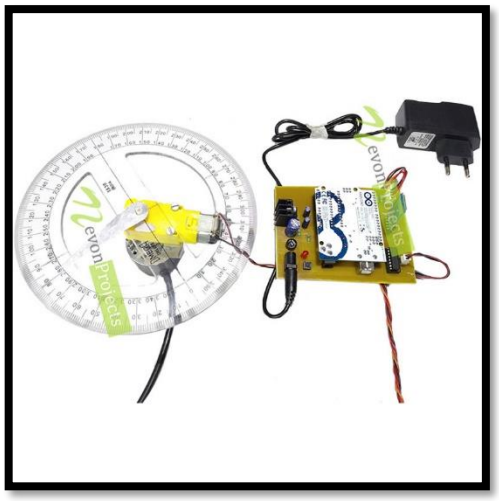
   Cons: no Physical visualization, without the software and a functional PC the kit loses most of its capabilities.

2. **Nevon Projects (Arduino PID based DC Motor Position Control System**

   Price:

   Self-builder kit 5250EGP**/**Ready to go kit 5800EGP**/**Self learner kit 6600EGP

   Free shipping



   Includes

   - Arduino
   - Dc motor
   - Protractor
   - L293d IC
   - Optical encoder
   - Crystal Oscillator
   - Resistors
   - Capacitors
   - Transistors
   - Cables and Connectors
   - Diodes
   - PCB and Breadboards
   - LED
   - Transformer/Adapter
   - Push Buttons
   - Switch
   - IC
   - IC Sockets

   Pros: Variable purchase options, Bluetooth option, good visual representation, online support

   Cons: High price, Very cheap/low quality components, doesn't include MATLAB/Simulink.

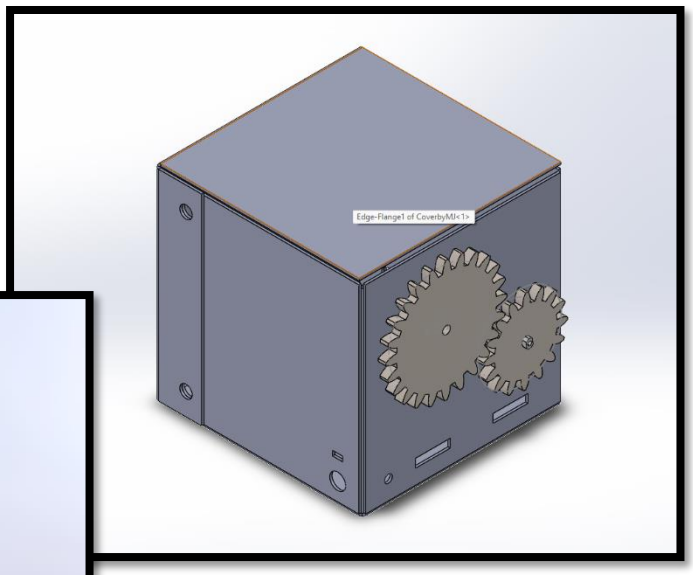
Conceptual Design

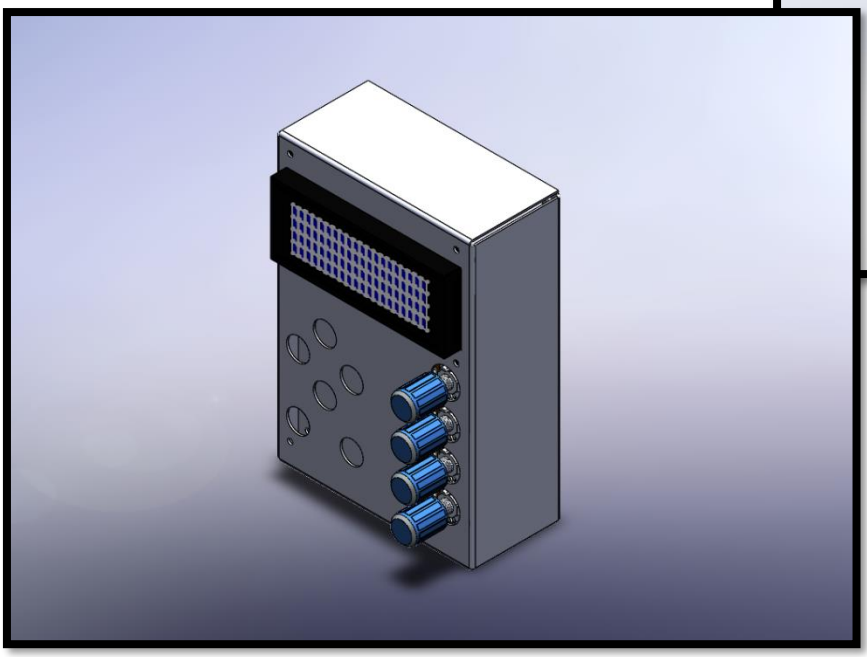
For the sake of this project, we decided with the guidance of our mentor to create a universal controller, so we can cut costs on each kit, and make it an incentive for the buyer to prefer to buy any kits in the future from us to get the full use of the controller.

We also decided that we will have our kits enclosed in a sheet metal box, with the ability for the user to open and replace parts of the kit in case they got damaged.

Here is the first conceptual hand drawn design of the kit.

Here is the SolidWorks model of the kit.





Bill of materials

Here is the bill of materials, detailed with the cost of every part and component.

Component	Price	Quantity	Total cost
DC Motor	70	1	70
Potentiometer	4	1	4
L298N motor driver	65	1	65
Buzzer	6	1	6
Encoder + sensor	50	1	50
Pref board	14	1	14
LED	1	3	3
JST	4	2	8
			220

Some of the material used in the project was not listed here as they were either manufactured through sheet metal processes or modeled and 3D printed.

A detailed full cost of the project will be attached later in the report.

Feasibility Study and potential customers

We will discuss the variable aspects of the projects, and whether the project will be feasible in all aspects or not, and we will also discuss the customers and the market of the project.

Technical Feasibility

The project can be implemented through locally available technology in Egypt. In addition to that certain parts of the project can also be mass produced.

Economic Feasibility

The projected cost of the prototype is around 600 EGP for the prototype. The mass production of this kit can further reduce this cost. The project has minimal dependencies on imported items, and the imported items used are readily available on the market for the foreseeable future, and can be bought and stored safely in order to avoid any increase in price later on.

Legal Feasibility

The idea is not exclusive towards a certain company. Any and all legal procedures can be finished.

Operational Feasibility

Many of the operations required for the production can be outsourced, cutting on cost and ensuring best quality is received.

Scheduling Feasibility

Parts can be prepared and stored. When a product is sold, the product can be assembled, packaged and shipped. Products can also be assembled and displayed as ready to pick in shops.

Business model and marketing strategy

Our business model is to promote our product as a build-yourself kit, and a learning kit. It will be promoted to universities, learning institutions and STEM schools. Our kit will be also available for passionate learners who want to learn at home.

The Idea of the controller being universal between all our kits will work as an incentive for the buyer to buy more than one kit, as the expense of the controller will be a one-time purchase.

We will also approach social media platforms that has a lot of learners societies like LinkedIn, Facebook and Instagram. Where we will try to promote our product through universities communities, or a paid AD. We can also drop our product on online shops like Amazon Egypt

We will also create and handout posters to give to university students who may have interest in our product.

We will also use our established connection network to personally promote the kit to universities with engineering departments all across Egypt.

Lastly, we can peruse universities in neighboring countries as the Egyptian market will be cheaper compared to other markets.