Development Project: Online Business During/Post COVID

SciEngr Electronics

Team Members

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E-commerce store name: SciEngr Electronics

Background

In Myanmar, electronic components are not easy to buy and there are not many shops selling them. Thus, people in Myanmar, especially engineering students have to spend longer time and more money than in Thailand. Thus, we plan to create an online shop where Myanmar people can conveniently buy our products from home with the affordable delivery service fee. Our shop is partnered with the companies such as "**Dielectric**" which produces micro-controllers and sensors and "**Kiddeelab**" which is a training school which provides training courses and sells training sets.

Purpose

Our purpose is to help the electronic training schools and engineering students (Electrical, Electronics and Mechatronics) get the electronic components for their projects. We also intend to provide the high quality 3D prints and PCB design according to the customer's project. Another goal is to provide the efficient and effective training courses for those who want to learn about microcontrollers and electronics.

Description

In this project, we will create an ecommerce store which will be built as both a website and a mobile application. On our online store, each of the products and services are grouped by categories and are described in detail in order to avoid misunderstandings by our customers. Our website contains basic features such as customers creating accounts, choosing and adding products and services to cart, and purchasing them. We also allow customers to choose different payment options and to write reviews for the products and services; they can also read the reviews that other customers have written. For businesses, they can sell their products and services on our website and we will help them find and contact other businesses to work.

Target Customers

Our target customers are electronics training schools and engineering students (Electrical, Electronics and Mechatronics) in Myanmar.

E-Commerce Type

Since we are targeting engineering students and electronics training schools in Myanmar, our e-commerce type falls under the B2B and B2C model. Seeing that we are creating a digital market where people can transcats for goods, our B2B model represents the E-procurement B2B model. In addition our store is an online version of a traditional retailer and also we are creating a digital environment where buyers and sellers can meet and transact so it falls under E-tailer and market creator, respectively, for B2C models.

Revenue Model

Since we have 3 business models, we also have 3 different revenue models such as service fees from E-procurement (B2B) model, sales of the products from E-tailer (B2C) model, and fees from merchants for access to our store from Market Creator (B2C) model.

Value proposition

Our value proposition contains ease of searching for products, reasonable prices, and different payment options.

Market Strategy

Goals

Our goals are to reach more customers and increase the market and to increase gross revenue by 30 percent within 24 months.

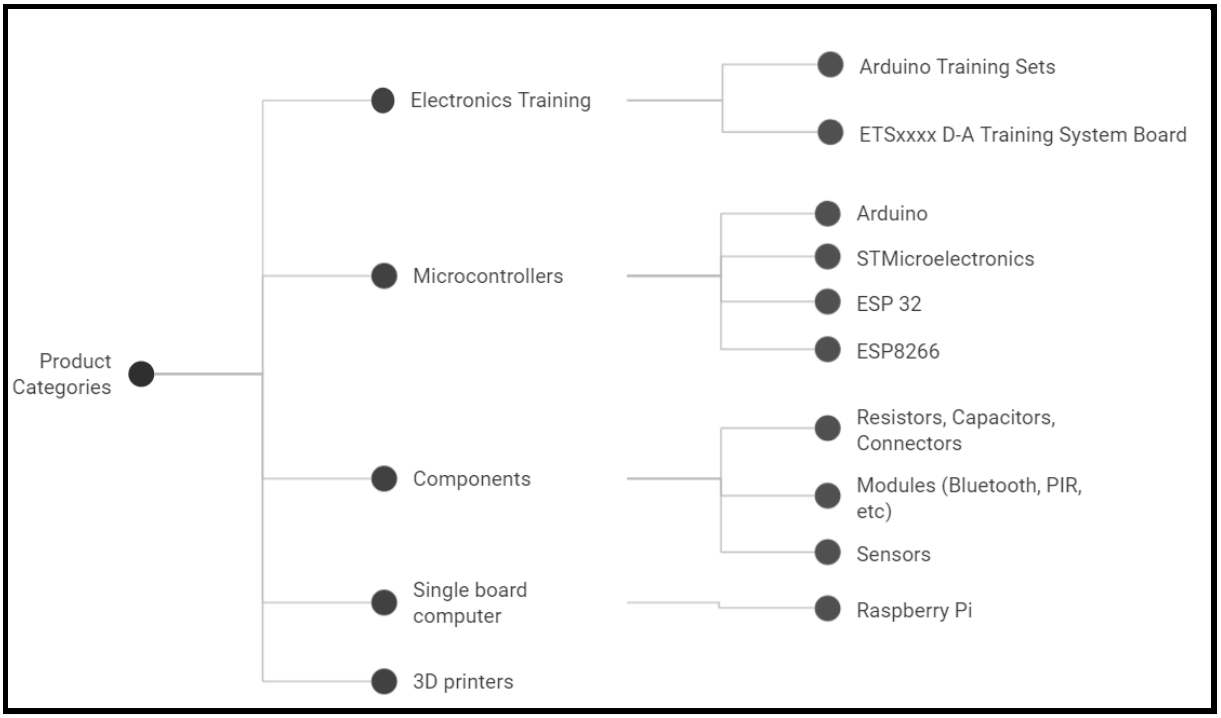
Plan

In order to achieve our goals, we set the plans. First, we will use social media advertising; for example, advertising on Facebook with lucky draw promotions. Next, we will contact private and public universities in Myanmar, and try to make business agreements and contracts to collaborate with us; we will offer them some benefits such as special discounts for training sets and long term contracts to work with KiddeeLab company. Lastly, we will create sales events such as 12.12, Christmas, New Year sales; we will offer special discounts for products and delivery fees.

Products and services

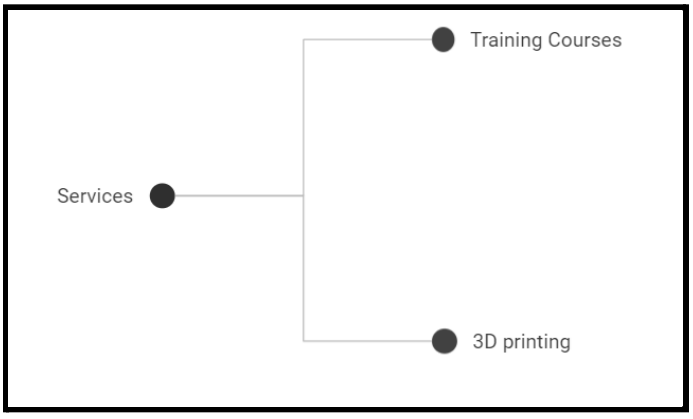
Our products and services by categories are shown below with tree diagrams.

Products



We have products with five different categories: Electronics training, Microcontrollers, Electrical components, Single board computers, and 3D printers. We help other businesses to sell Arduino training sets and ETS7000 D-A training systems on our store website for the electronics training category. For the microcontrollers category, we sell essential microcontrollers such as Arduino, STMicroelectronics and ESP 32 and 8266. Below the components category, we have resistors, capacitors, connectors as well as modules such as bluetooth, PIR and sensors. We have raspberry pi for the single board computers category. For 3D printers, we have Ender and Anet brands.

Services



Our store also provides services that may be divided into two main categories: training courses and 3D printing. For training courses, individual customers can choose the class schedule according to their time availability. Businesses such as universities can contact us to have business agreements and collaborate with us on training programs. For 3D printing, customers have to upload the design that they want to print so that we can use 3D printing software to slice the design and let the customers know how much their 3D printed design will cost.

SWOT Analysis

Strengths	**Weaknesses**
● Lower Prices ● Ease of searching/purchasing products/services ● Variety of products	● Costs of maintaining the equipment ● Inventory cost
Opportunities	**Threats**
● Growth of online shoppers in Myanmar ● Expansion of Internet Access to rural areas in Myanmar	● Many competitors for e-tailing and 3D printing service ● Low customer's trust and preference on using the service online ● Fraud ● Data Concerns ● Myanmar Military Junta

Existing and Potential Competitors

Since Myanmar is also a developing country, it already has some online and offline electronics and educational training centers which are our existing and potential competitors. In order to know our competitors, we did research and found the following competitors: Cherry plaza, DCX store, MicroWorld, GreenElectronics Store, Lat Twae Education, PN Electronic Lab, BeSimple Electronics and Crenonative.

Information of some of our competitors for both electronics & teaching and 3D printing services are shown in the table below.

Name of Companies	**Products and Services**
Cherry Plaza	Electronic - Retail microelectronics & kits - Emulators

DCX Store	Electronic - Microelectronics kits - Retail second hand laptops
Lat Twae Education	Education Service - Basic Web Technology - HTML, CSS - Python - Basic Robotics
I am MAKER	Thailand-based 3D Printing services
Proto Factory	Thailand-based 3D Printing services
THE FAST 3D PRINT	Thailand-based 3D Printing services

Competitive Advantages

As for competitive advantages over our competitors, we provide not only products but also services. Next, our products are cheaper and better quality than that of other competitors since we buy them from different suppliers. And we buy and store most of our products in the warehouse based in Myanmar, thus we can also deliver them to our customers in a shorter period of time. In addition, the courses that are available on our website are effective and offered by the company which has professional teachers..

Moreover, we also provide higher quality 3D printing services than most of the competitors in Myanmar. Besides, our customers do not need to come to our store to give us detailed information; they can upload it on our store website. They can also check the status of their order on the store website and interact with us through the email. Compared to the 3D printing services based in Thailand who accept work from Myanmar, we have advantages on price. Since our 3D printing shop will be based in Myanmar, we can offer our customers cheaper prices and faster delivery time than the 3D printing shops in Thailand.

Investment Requirement

Initial Investment

Items	**Cost (฿)**
Custom language extension for OpenCart website	1,200
Devices for Services (3D printer, etc)	100,000
Website Building and Hosting	60,000
Total	161,2000

Recurring Investment and Expenses per year

Items	**Cost (฿) /** year
Product Stock	100,000
Warehouse for Storage	48,000
Delivery Fee	24,000
Electricity and Water	15,000
Website Maintenance	10,000
Staff (Web Developer)	192,000
Total	389,000

Projected Revenue

Revenue Model	Cost (ℍ) / year
Service Fees from E-Procurement (B2B) Model	350,000
Sales of Products from E-tailer (B2C) Model	250,000
Fees from Merchant for access to store from Market Creator (B2C) Model	132,000
Total	732,000

Technical Infrastructure

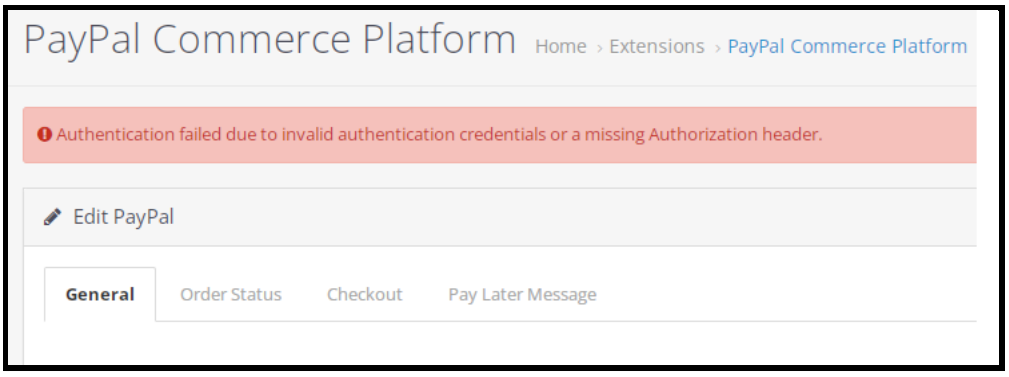
The main technical infrastructure of our business is the internet and E-commerce environment. We have cart capabilities in our website so that customers can add any products and services they want. We also have our inventory where we store and manage our goods. After purchasing, customers will get an email regarding their personal purchases. We also have a newsletter system, so that customers will be up to date with our business news and events.

Human Resources Requirements

As for the human resources requirements, we will hire a web developer to maintain the website since the three of us can manage 3D printing, PCB design, inventory management, acting as a representative as well as admin to manage other things.

Payment Methods

We plan to set 3 payment methods such as direct bank transfer, cash on delivery and paypal on our e-commerce store. Although the Paypal extension for OpenCart comes pre-installed, we did not finalize it's setup in our project website: we must link a genuine PayPal business account to our OpenCart shop in order to enable the extension. This requirement is demonstrated below.



Delivery Agents

For delivery, we use Thai post and Aung Thai-Myanmar cargo for cross border delivery.

E-Commerce Platform

We use OpenCart (OpenCart, 2021) to implement our store as it is a good open-source platform for self-hosted E-commerce websites. It is easier than the other platforms for non-technical users. It offers us many extensions such as payment gateways, shipping and pricing, sales records, etc. By default, websites created with OpenCart are responsive, allowing mobile phones to easily browse without the need of horizontal scrolling. Search engine optimization tools are also available in OpenCart. It has a relatively high amount of low level control compared to some cloud-based E-commerce platforms, since we have full access to the website source code. We can also manage marketing campaigns from the Administrator dashboard. Since it provides us many features and functions that are enough for our store, we chose it to implement our store.

Our OpenCart website implementation was done without paying any fees for the extensions employed. We need a web host to make our store online. For testing, we can use the local network as a host and can test the store from different devices. On our store website, we allow customers to browse, add to cart and buy our products as either registered members or guests. We set the email service, so the store will send email to customers after they registered their account, purchased the products and services, or their orders are updated. We also set up SEO settings, shipping pricing and payment options for our store. We use Google Analytics to analyze the performance of our store.

OpenCart Website Implementation

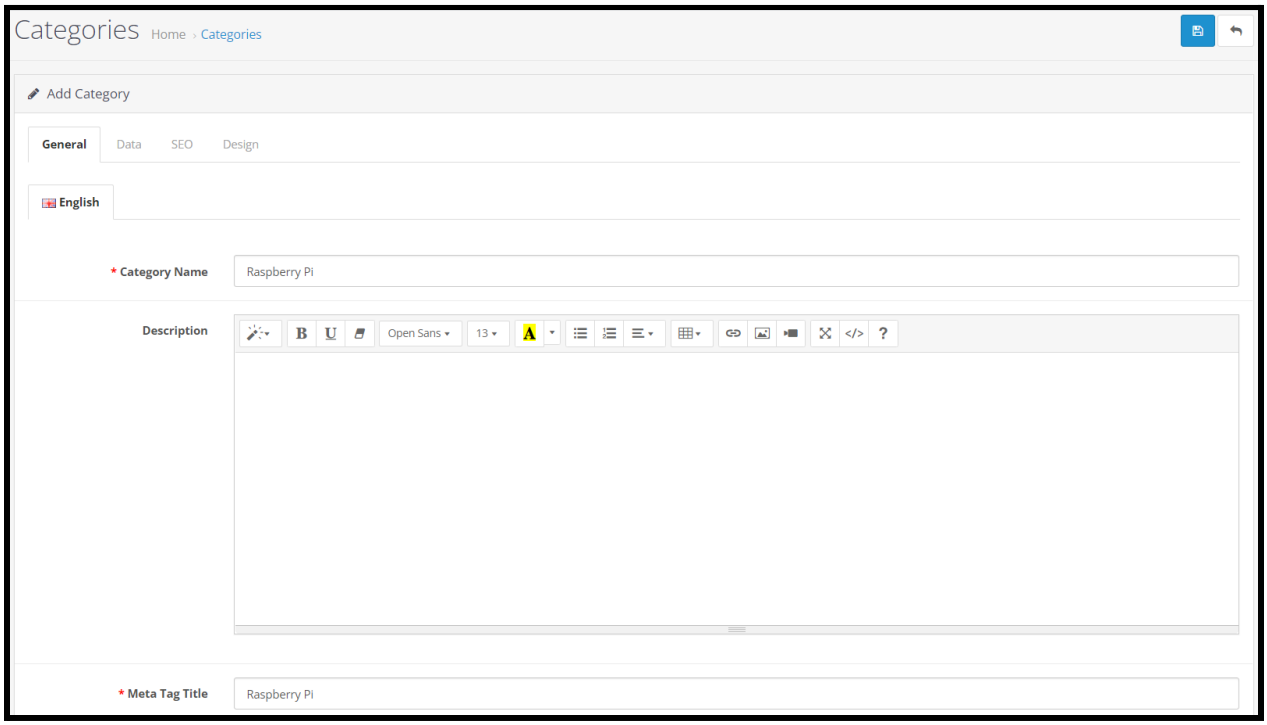
Initial Setup

We used the current version of OpenCart, version 3.0.3.8 (OpenCart, 2021). By following the setup guidelines from (Chakraborty, 2017) and editing the Apache server httpd.conf file, our website was set up to work for our local network.

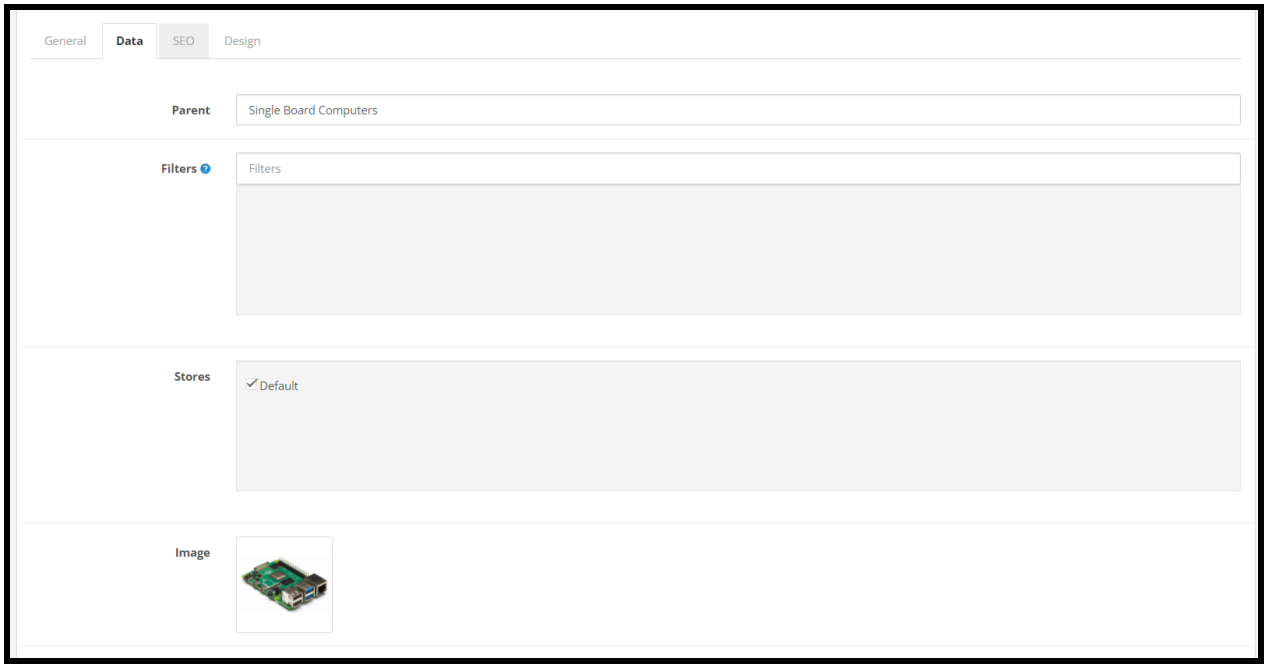
Creating Category for Products or Services

1. As an admin, click **Categories** under the **Catalog** tab which is on the left side of the page. Then click the "**Add new**" button as shown in figure below.

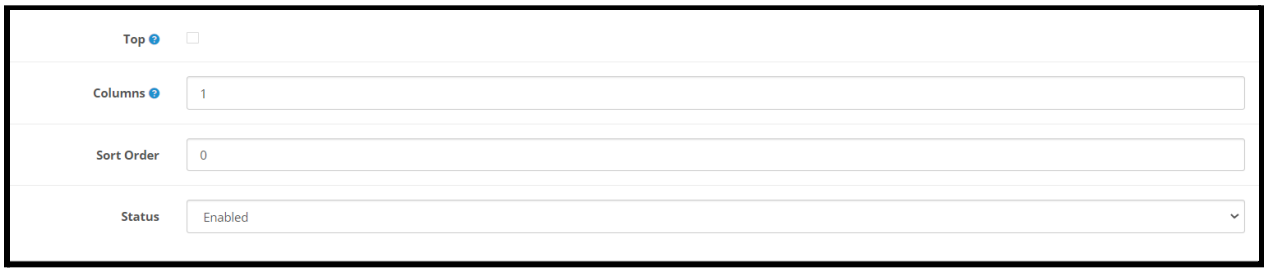
2. In the General tab, create the **Category Name**. **Description** of this category can be written to tell the customer what this category is about. **Meta Tag Title** is to tell the search engine what the title of this category is.



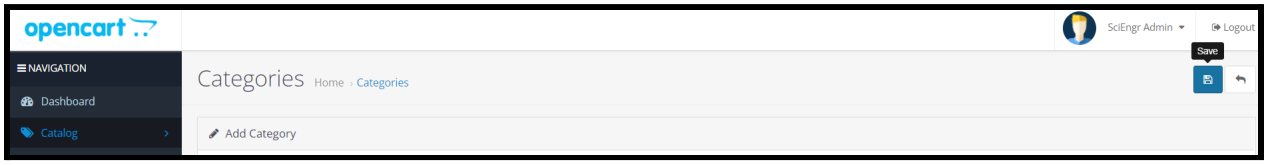
3. In the **Data** tab, if the category is the sub category of a category, name the **parent** category (which must already be created) and the **image** for the current category can be added to visually describe.



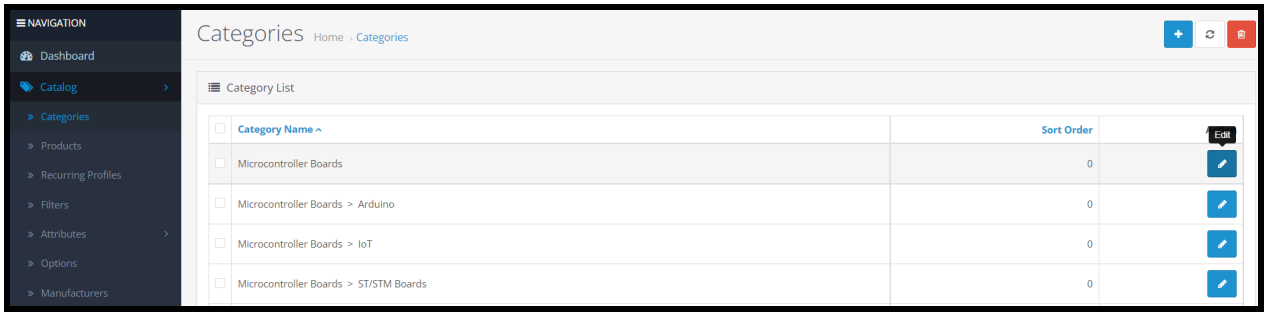
4. Under the lower part of the **Data** tab, we can set the **status** of this category as either Enable or Disabled to show on the store page or not. Sort Order can be set to display which category shows on the left (for parent category) and on the top (for child category). If we set default 0, the categories will be solved by alphabetical order. **Top** and **Columns** are to display the parent category in the Menu Bar and to display the child category of a parent category in specific numbers of columns.



5. After that, click **save** to create the category.

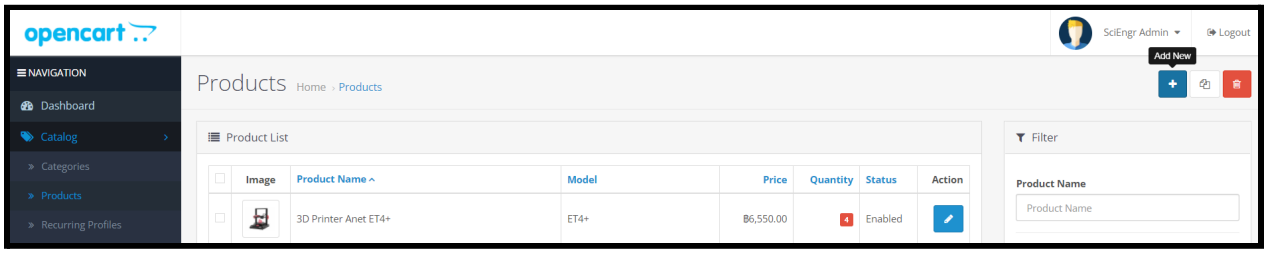


6. To edit the information of a category, we can click **edit**.

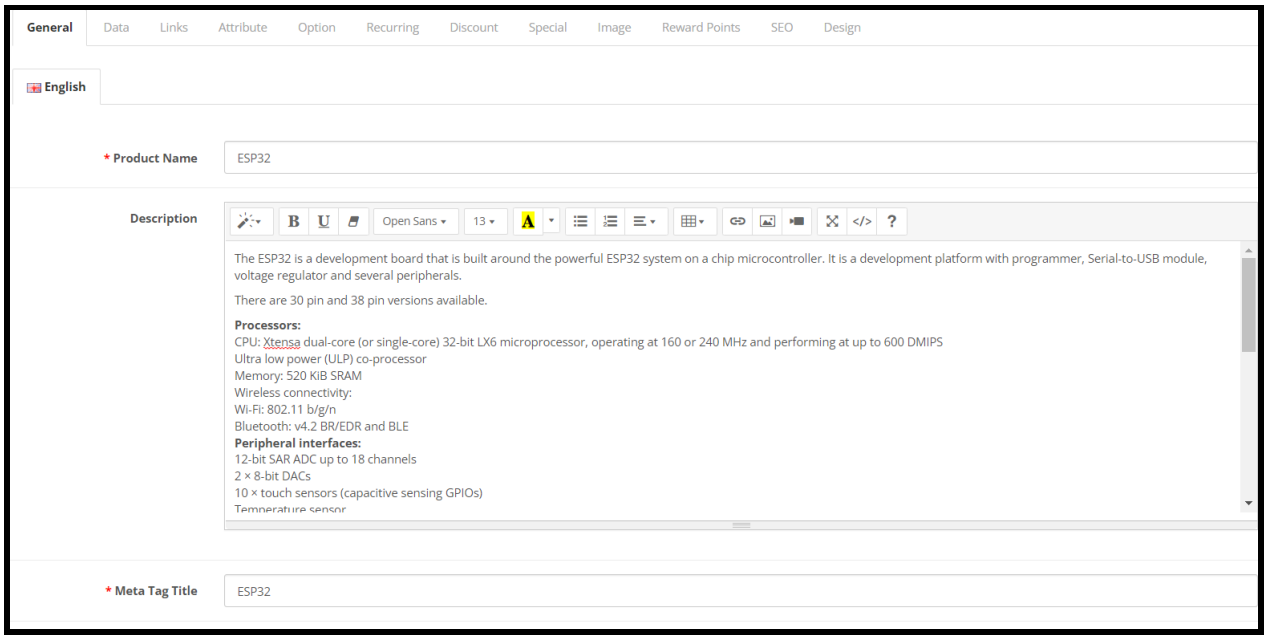


Adding Products or Services

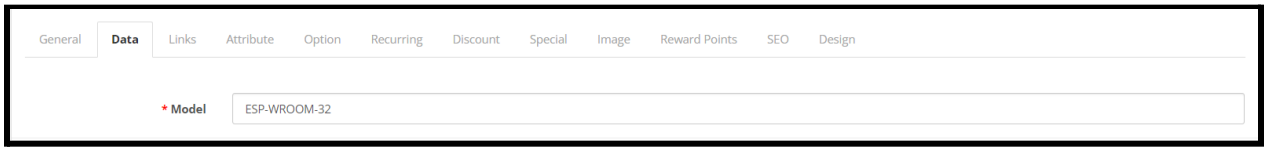
1. As an admin, click **Products**under the **Catalog** tab which is on the left side of the page. Then click the "**Add new**" button as shown in figure below.



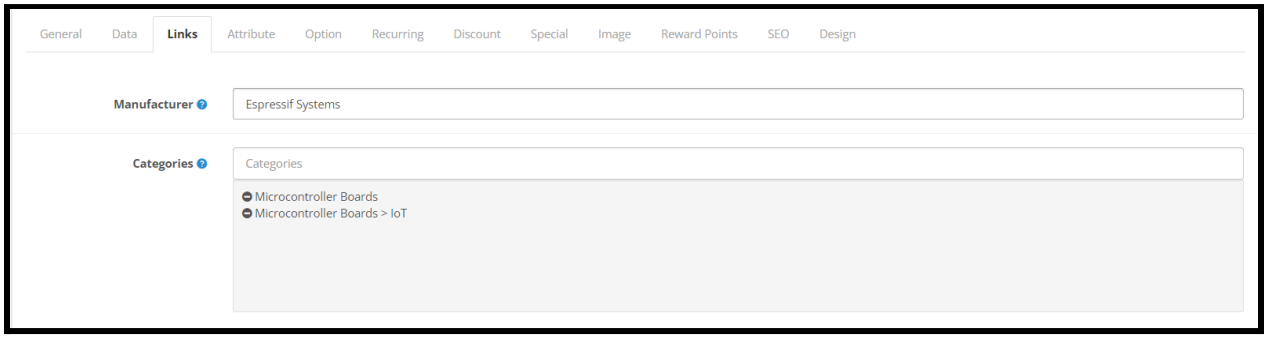
2. In the General tab, create the **Product Name**. **Description** of this product can be written to tell the customer what this product is. **Meta Tag Title** is to tell the search engine what the title of this product is.



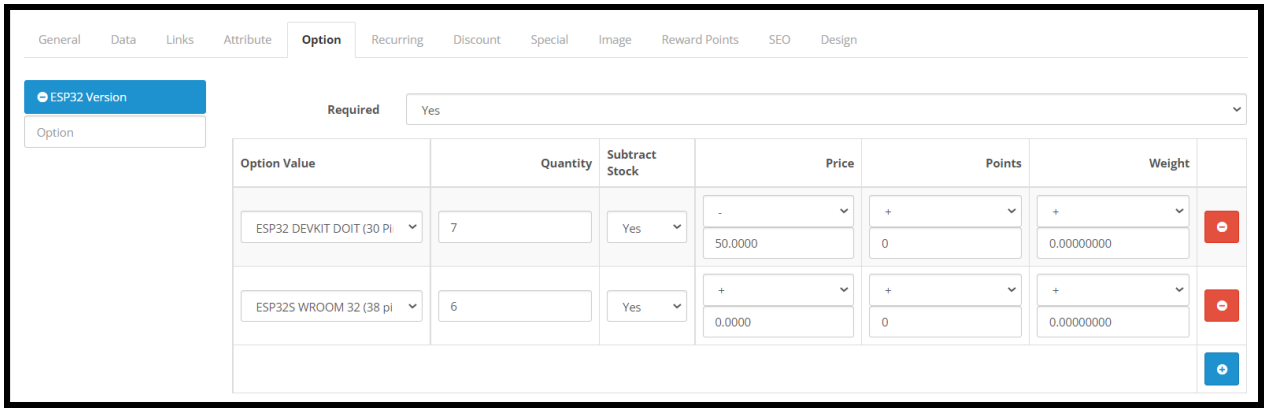
3. In the **Data** tab, we can set the **Model** of the product, **Price**, **Tax Class**, **Quantity**, **Minimum Quantity** (that a customer has to buy). We can also enable the **Subtract Stock** option which will deduct the current quantity by the number of that product bought. We can also display whether the products are in stock or out of stock by selecting in **Out of Stock Status**. By enabling **Require Shipping**, when a customer checks out, shipping fee will be added in total amount. We can also set the **date of availability** of the product. The dimensions of the products can be described in **Dimension** and **Length Class**.



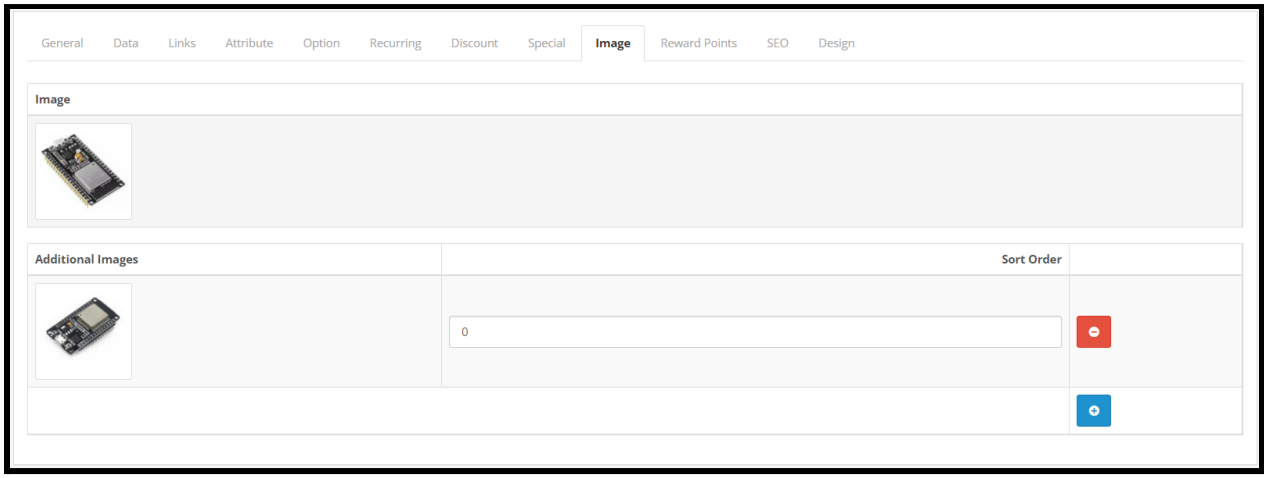
4. In the **Links** tab, we can **categorize** our product and describe the name of the **manufacturer**. If it is a service, we can describe the name of the service provider.



5. This step is required only if we have different versions of the same product. In the **Option** tab, we can add the **different versions** of the same product with **different prices and available quantities**. By selecting **Yes** for **Subtract Stock**, everytime the product is bought, the quantity of that product will be deducted by the number of that product bought.

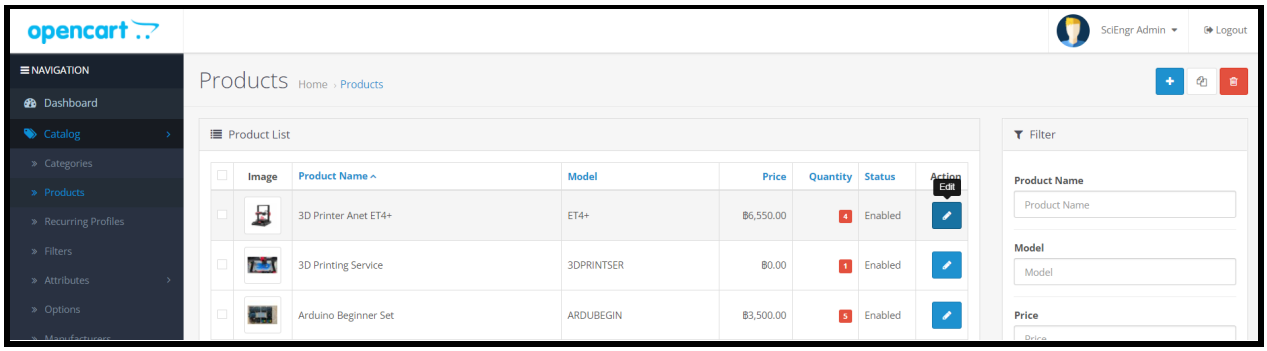


6. If we add different versions of the same product, we can also add the **images** for each version.



7. After that, click **save** to create the product.

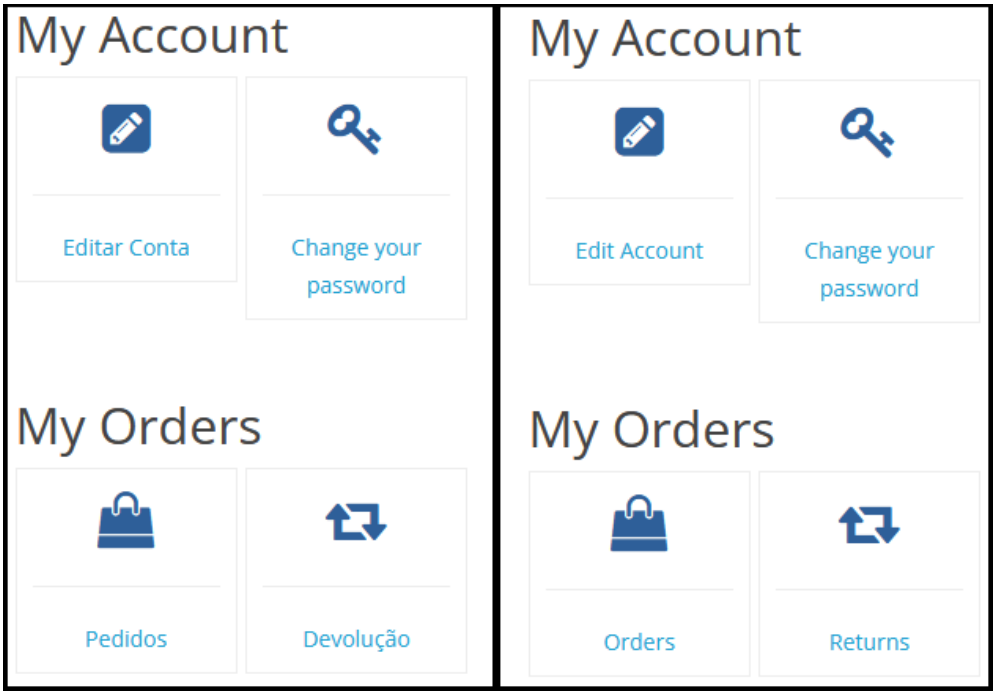
8. To edit the information of a product, we can click **edit**.



Implementing the OpenCart built-in functions

After populating the categories and products, we set the theme to (OpenCart, 2018), which is not fully compatible with our version of OpenCart but is available for free. One of the issues caused the "Edit Account", "My Orders", and "Returns" buttons to use the wrong language, as shown below. Another issue caused the radio buttons to not be aligned with the text and each button would be partially off the screen when viewed in the app. These issues were resolved by editing the source files for the theme.

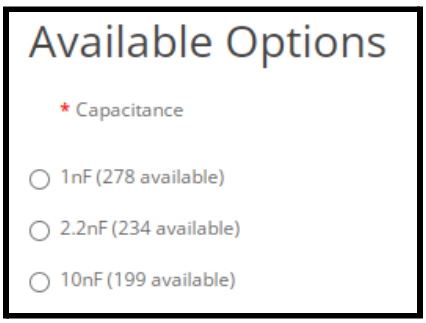
Shown below are the before and after of the wrong language fix.



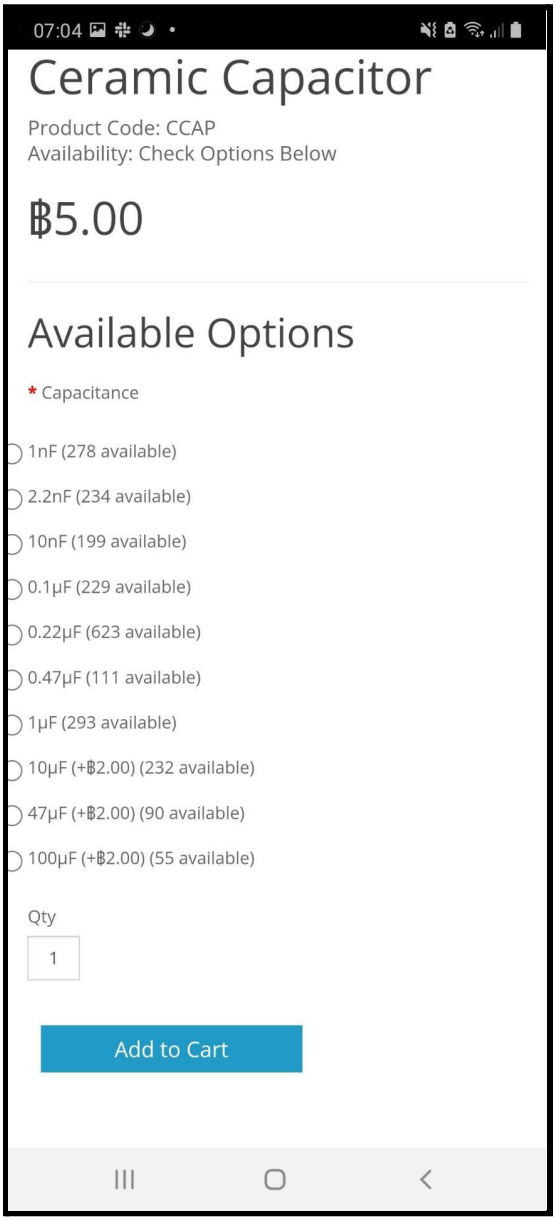
Below shows the before and after for the website and app for the radio buttons fix.

Before

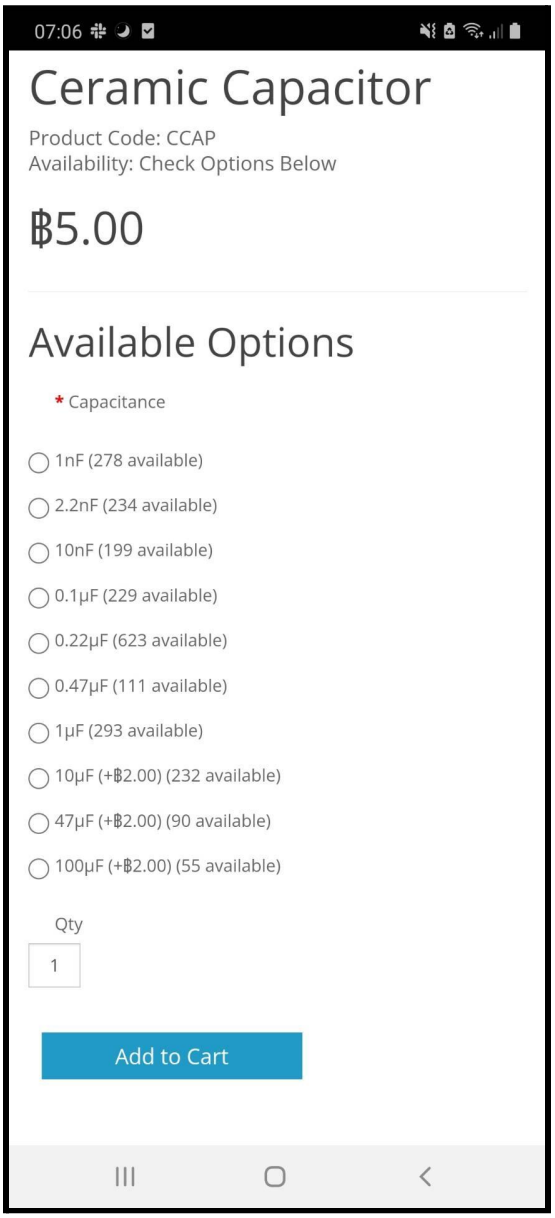
After



Before

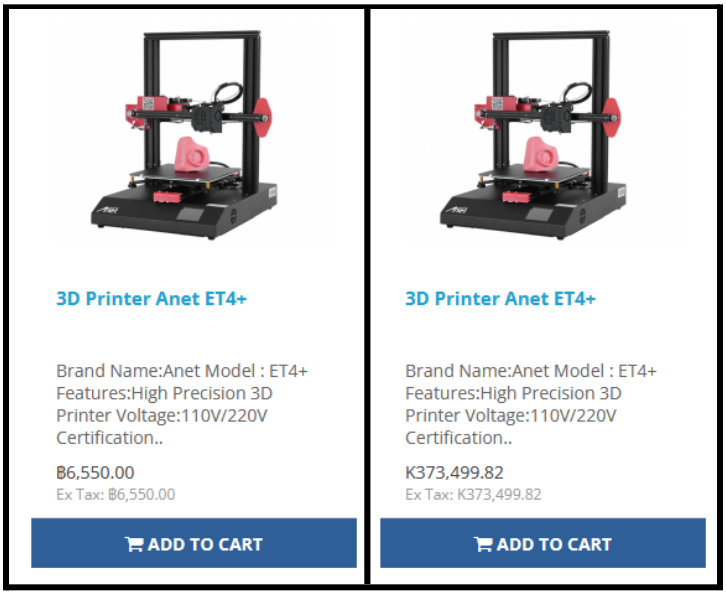


After



Currency Exchange Feature

We set the website currency to switch between Thai Baht and Burmese Kyat, as shown in the image below.



Implementation of correct stock amount visibility

In order to allow the customer to view the current amount of stock available for each product, we installed the extension, (OpenCart, 2020), which is meant to display the quantity of product options. Since this extension was likely meant to be used for products with options that are add-ons to a the product rather than selecting variations of a specific product, it was not able to display the current stock when the options of a product did not alter the original price. It is also not designed for our version of OpenCart. As we are using the product options to allow a customer to select variations of a product and we do not sell any products that have optional add-ons, our modifications will not cause any issues for us.

The steps to resolve the unseen option stock amounts are shown below.

1. Edit the index.xml file from the extension folder. This file contains the changes to be made to the OpenCart code when the extension is enabled.

Before

```
<file path="catalog/view/theme/default/template/product/product.twig">
  <operation>
    <search><![CDATA[({{ option_value.price_prefix }}{{ option_value.price }})]]></search>
    <add position="after"><![CDATA[ ({% if option_value.quantity <= '5' %}<span style="color: #ff0000;">{{
    option_value.quantity }}</span> {{ text_qty_option_pp }}{% else %}{{ option_value.quantity }} {{
    text_qty_option_pp }}{% endif %})]]></add>
  </operation>
</file>
<file path="catalog/language/en-gb/product/product.php">
  <operation>
    <search><![CDATA[<?php]]></search>
    <add position="after"><![CDATA[
    $_['text_qty_option_pp']              = 'pcs.';]]></add>
  </operation>
</file>
```

After

```
<file path="catalog/view/theme/default/template/product/product.twig">
  <operation>
    <search><![CDATA[({{ option_value.price_prefix }}{{ option_value.price }})]]></search>
    <add position="after"><![CDATA[ {% endif %}({% if option_value.quantity <= '5' %}<span style="color: #ff0000;">{{
    option_value.quantity }}</span> {{ text_qty_option_pp }}{% else %}{{ option_value.quantity }} {{
    text_qty_option_pp }}{% endif %}{% if 0 %})]]></add>
  </operation>
</file>
<file path="catalog/language/en-gb/product/product.php">
  <operation>
    <search><![CDATA[<?php]]></search>
    <add position="after"><![CDATA[
    $_['text_qty_option_pp']              = 'available)';]]></add>
  </operation>
</file>
```

2. Since OpenCart's built-in stock display only shows a stock quantity that is unrelated to the options the OpenCart source code file, product.php, was edited.

Before

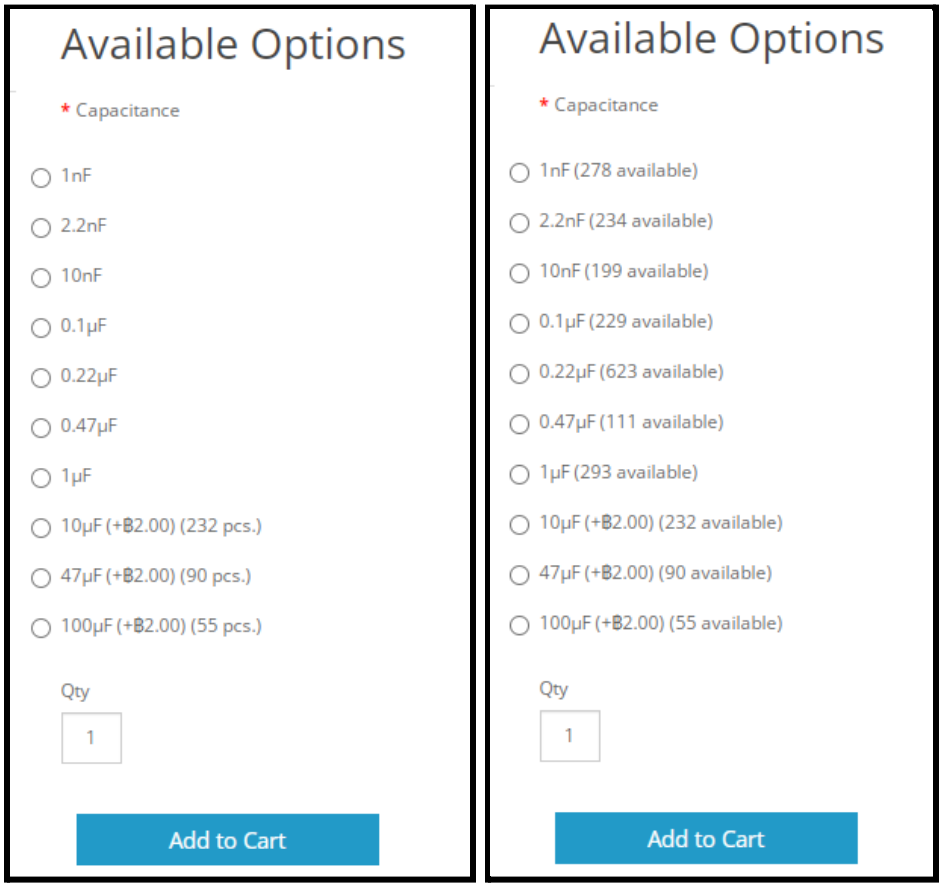
```
            if ($product_info['quantity'] <= 0) {
                $data['stock'] = $product_info['stock_status'];
            } elseif ($this->config->get('config_stock_display')) {
                $data['stock'] = $product_info['quantity'];
            } else {
                $data['stock'] = $this->language->get('text_instock');
            }

```

After

```
            if ($product_info['quantity'] <= 0) {
                $data['stock'] = $product_info['stock_status'];
            } elseif ($this->config->get('config_stock_display')) {
                if(empty($this->model_catalog_product->getProductOptions($this->request->get['product_id']))){
                    $data['stock'] = $product_info['quantity'];
                } else {
                    $data['stock'] = 'Check Options Below';
                }
            } else {
                $data['stock'] = $this->language->get('text_instock');
            }
```

The before and after of step 1 are shown below.

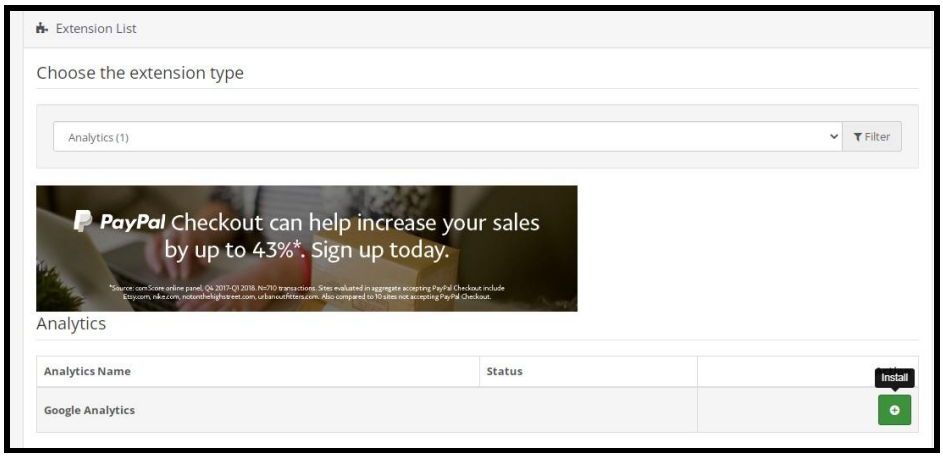


The before and after of step 2 are shown below.

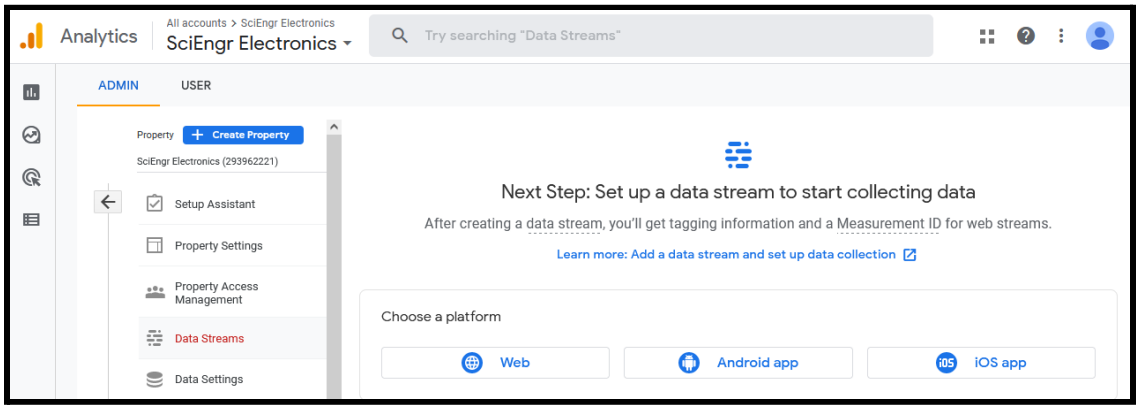
Setting Up Google Analytics

We decided to use Google Analytics as our analytics platform, as it is free, cloud-hosted, and easy to set up (Rohloff et al., 2019). The setup steps for using Google Analytics in OpenCart are shown below.

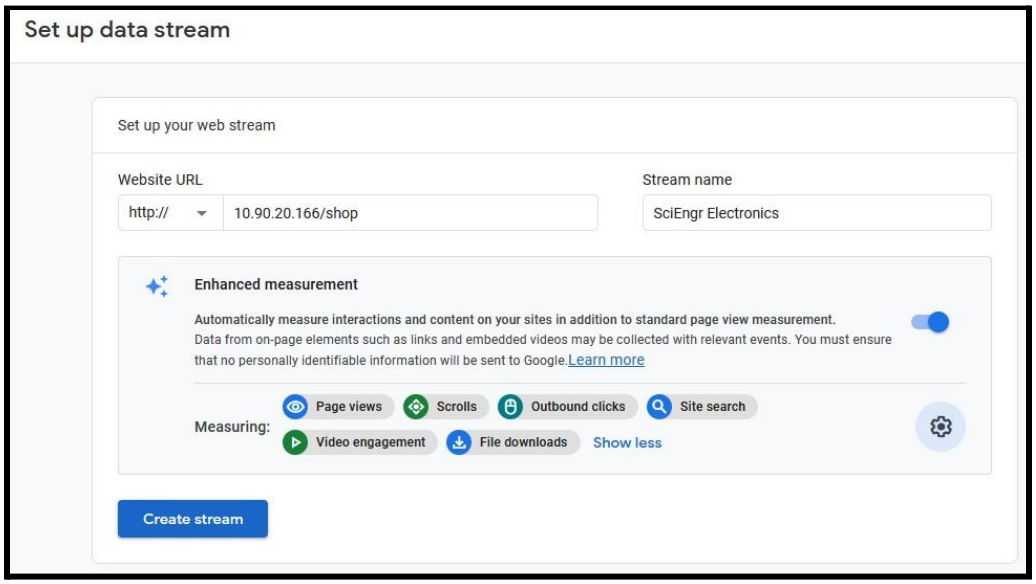
1. Install the Google Analytics extension that comes with OpenCart by default.



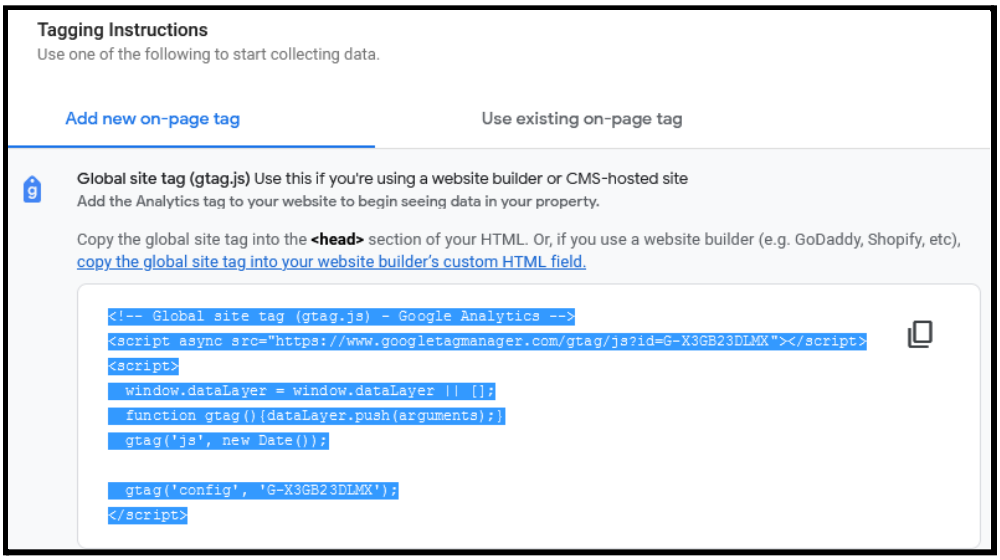
2. Create a Google Analytics account.



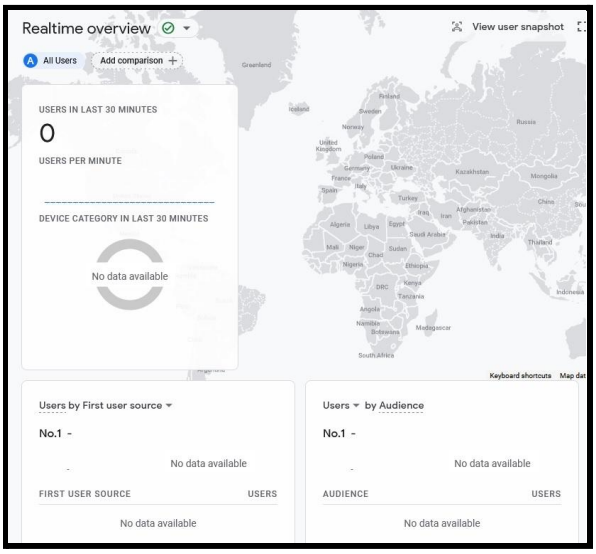
3. Setup the Google Analytics data stream.

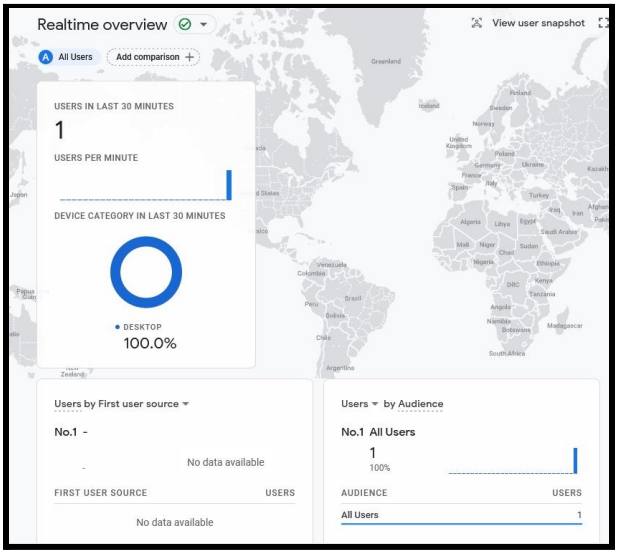


4. Copy the global site tag and paste it into the setting for the extension.



Below is the output of the real-time display from Google Analytics before and after a user visits the site.

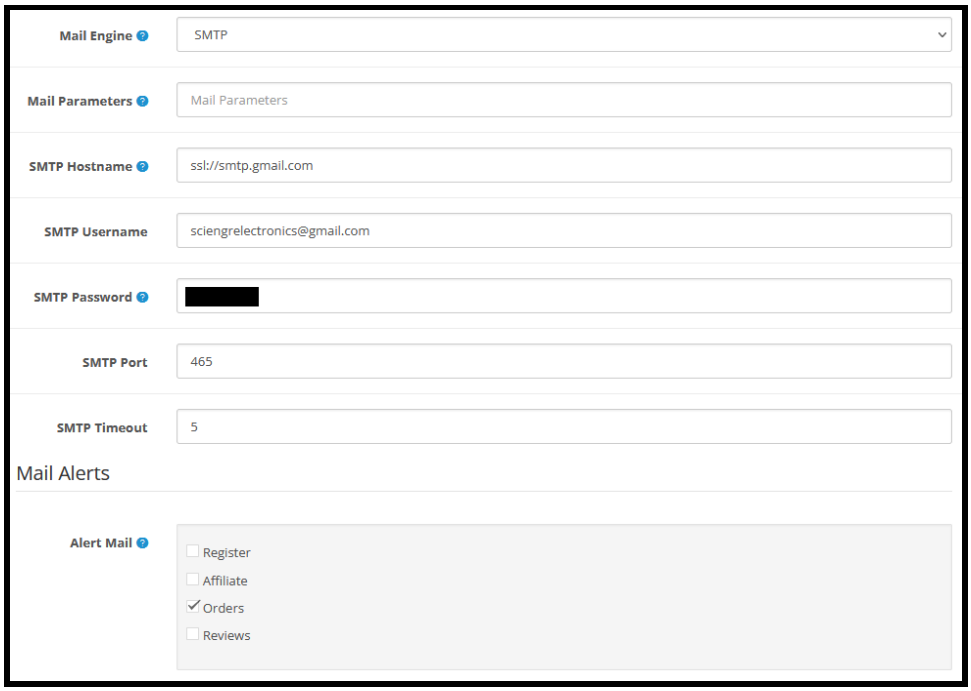




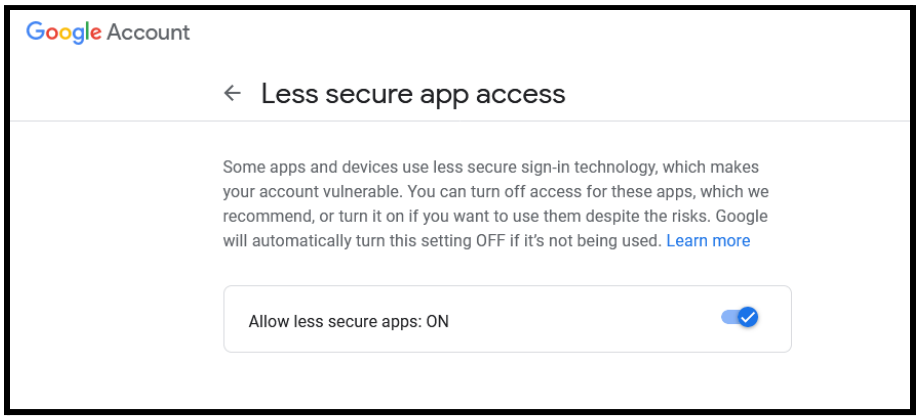
Setting Up Store's Email

We set up OpenCart to use Gmail via the Simple Mail Transfer Protocol. The setup steps are shown below.

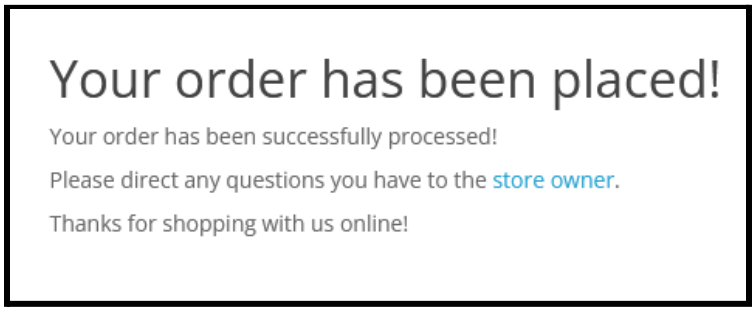
1. Create a Gmail account.
2. Input Gmail account information into OpenCart.



3. Allow less secure apps access the Gmail Google account.

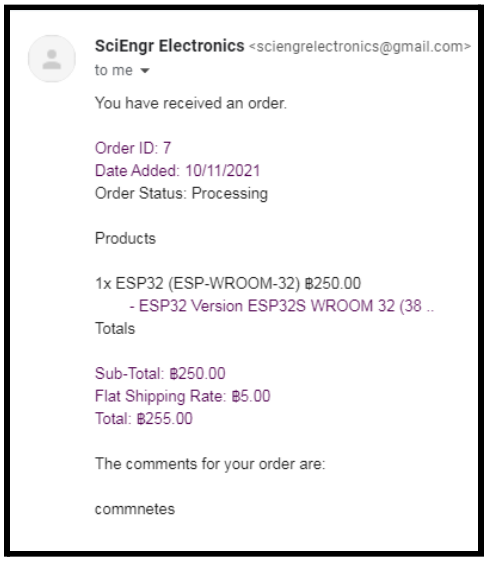


4. Trigger OpenCart to try to send an email by ordering a product.



5. Gmail will have stored the information for OpenCart and will allow it to send emails when the less secure app access is automatically turned off.

The emails sent to the store owner and the customer from OpenCart are shown below.



SciEngr Electronics <sciengrelectronics@gmail.com>
to me

You have received an order.

Order ID: 7
Date Added: 10/11/2021
Order Status: Processing

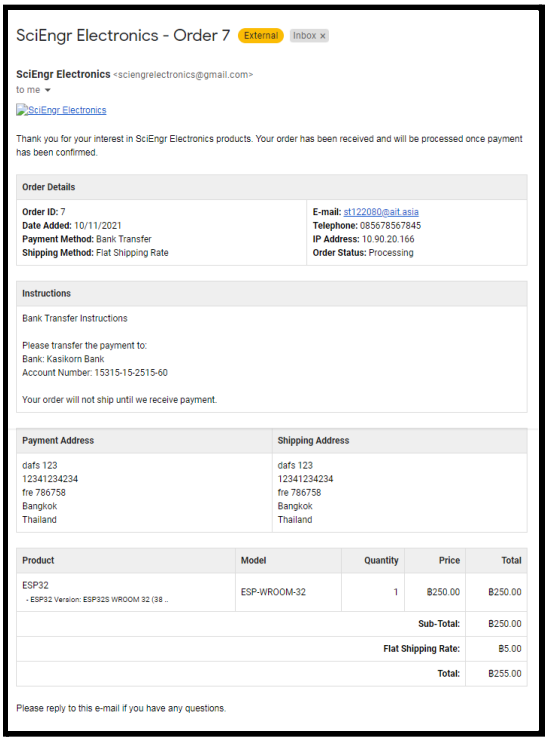
Products

1x ESP32 (ESP-WROOM-32) ฿250.00
- ESP32 Version ESP32S WROOM 32 (38 ..
Totals

Sub-Total: ฿250.00
Flat Shipping Rate: ฿5.00
Total: ฿255.00

The comments for your order are:

commnetes



SciEngr Electronics - Order 7 External Inbox ×

SciEngr Electronics <sciengrelectronics@gmail.com>
to me

SciEngr Electronics

Thank you for your interest in SciEngr Electronics products. Your order has been received and will be processed once payment has been confirmed.

Order Details

Order ID: 7
Date Added: 10/11/2021
Payment Method: Bank Transfer
Shipping Method: Flat Shipping Rate

E-mail: st122080@ait.asia
Telephone: 0856785678 45
IP Address: 10.90.20.166
Order Status: Processing

Instructions

Bank Transfer Instructions

Please transfer the payment to:
Bank: Kasikorn Bank
Account Number: 15315-15-2515-60

Your order will not ship until we receive payment.

Payment Address	Shipping Address
dafs 123 12341234234 fre 786758 Bangkok Thailand	dafs 123 12341234234 fre 786758 Bangkok Thailand

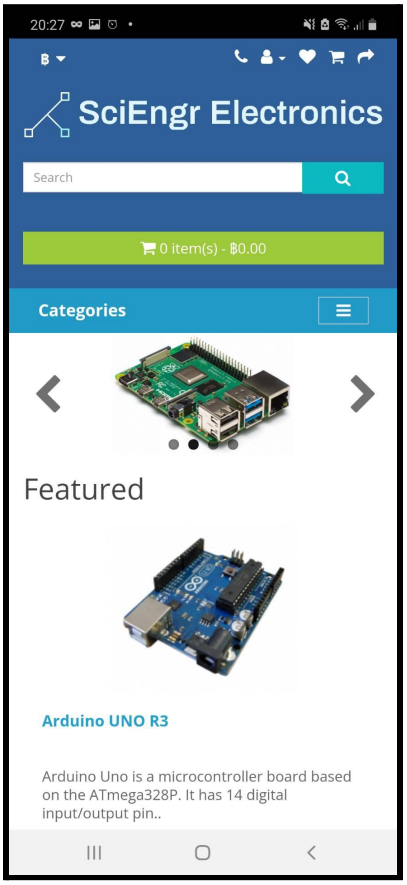
Product	Model	Quantity	Price	Total
ESP32 - ESP32 Version: ESP32S WROOM 32 (38 ..	ESP-WROOM-32	1	฿250.00	฿250.00
			Sub-Total:	฿250.00
			Flat Shipping Rate:	฿5.00
			Total:	฿255.00

Please reply to this e-mail if you have any questions.

Mobile App Implementation

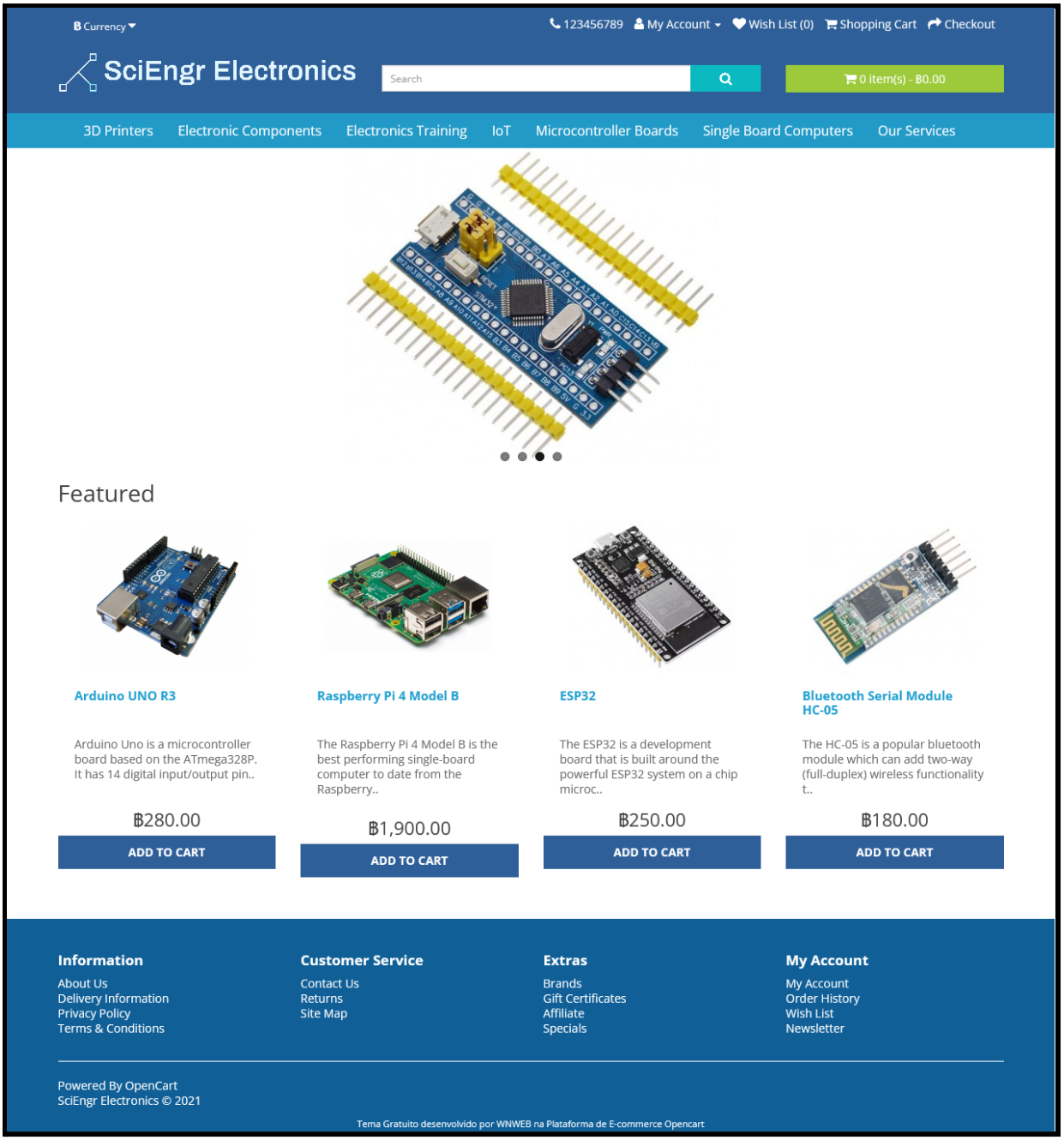
We implemented the app using MIT App Inventor (MIT, 2012). The app utilizes a webviewer to access our responsive website. For a better user experience, we set up a splash page to appear when the app starts while it is loading the website. The app also has full use of a smartphone's back button and does not require the user to log in each time the app is started.

The app icon, splash screen, and the website homepage as viewed from the app are shown below.



Website Usage

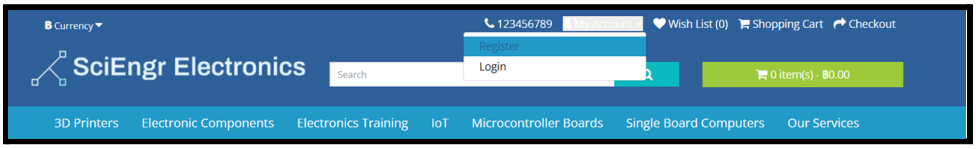
Our website homepage is shown below.



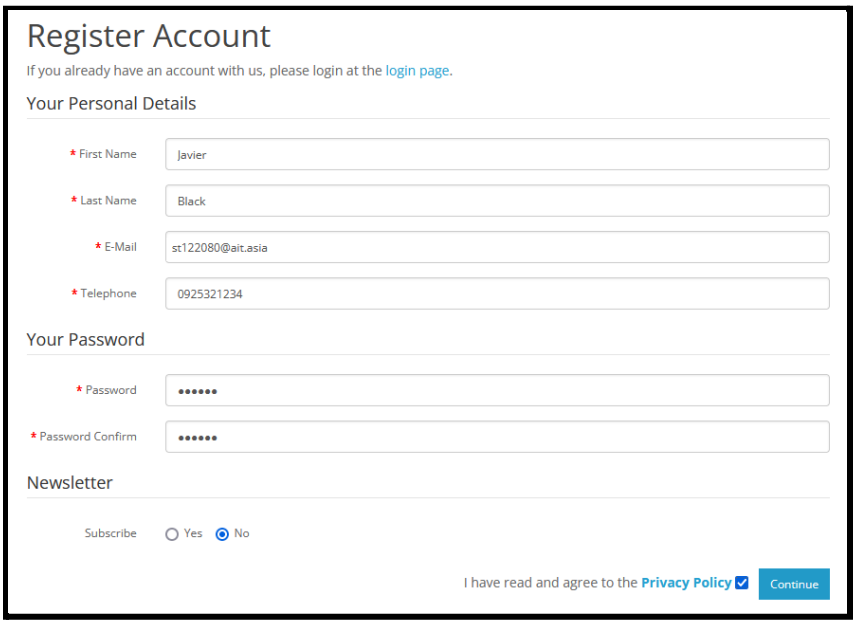
Customer registers an account

The steps for a customer to register are shown below.

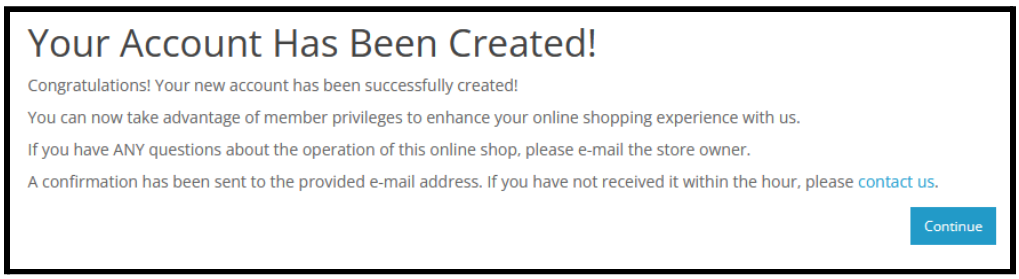
1. Customer clicks on “Register”.



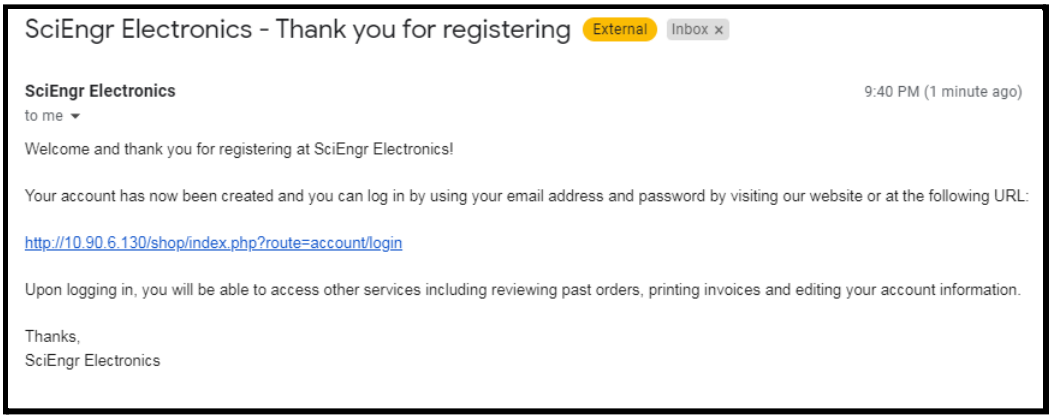
2. Customer fills in registration information.



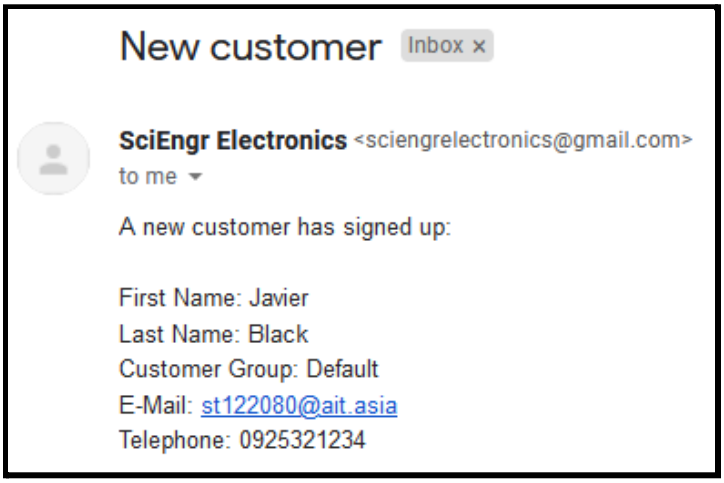
3. Customer is now registered.

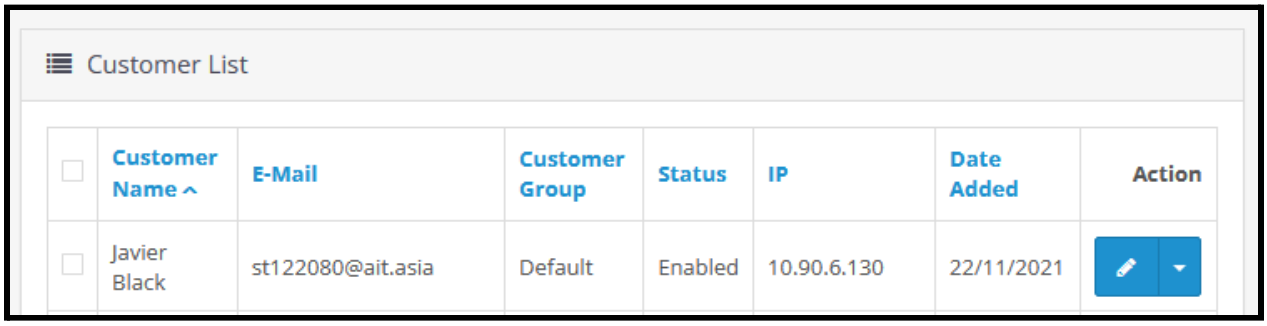


4. Customer receives a confirmation email.



When a customer creates their account, the store admin also receives an email alert and can use OpenCart to see that a new user has registered, as shown below.

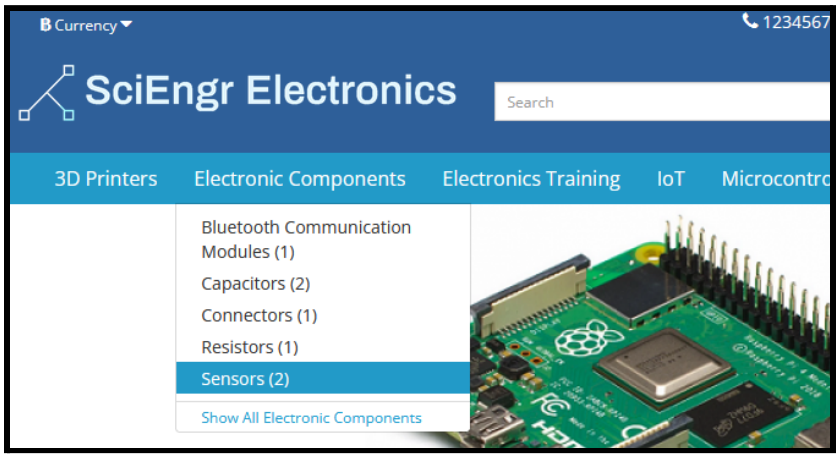




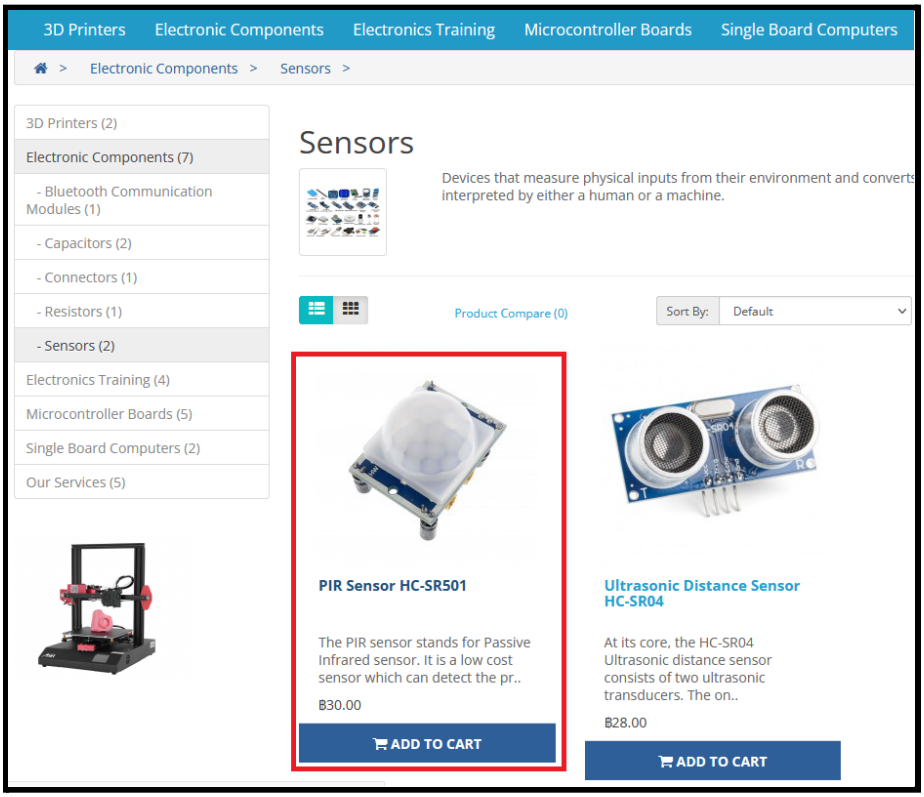
Customer orders a product

The steps below are an example of the steps performed by a customer with a store account in order to purchase 15 PIR sensors.

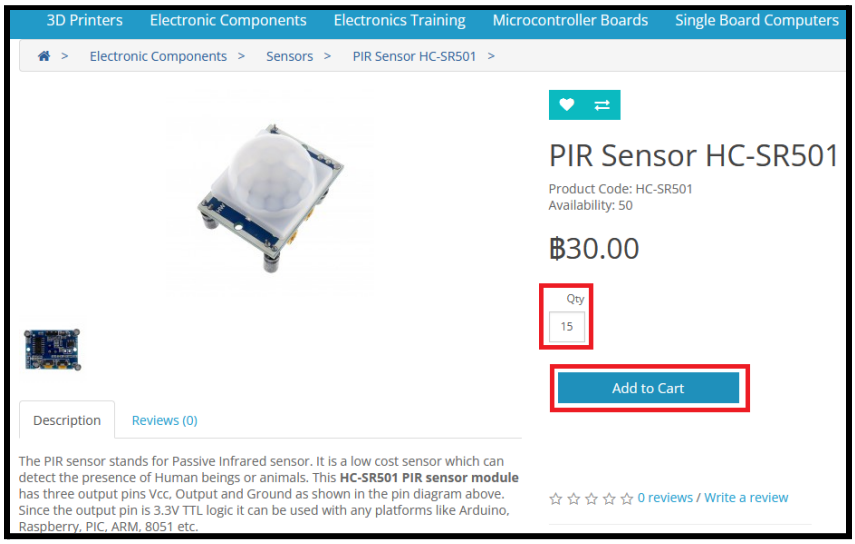
1. From the home page, go to the sensors catalog.



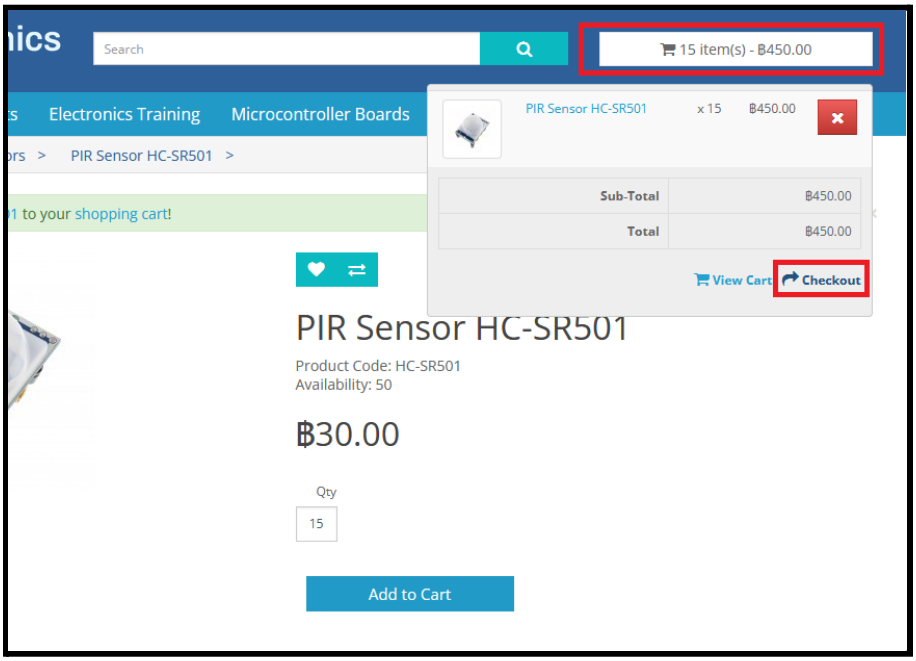
2. From the sensors catalog, go to the PIR sensor product page.



3. Set the qty option to 15 and click Add to Cart.

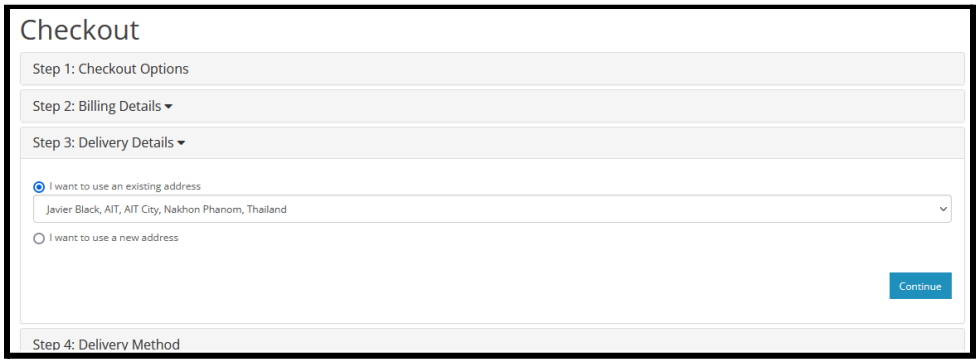


4. Go to the checkout page.



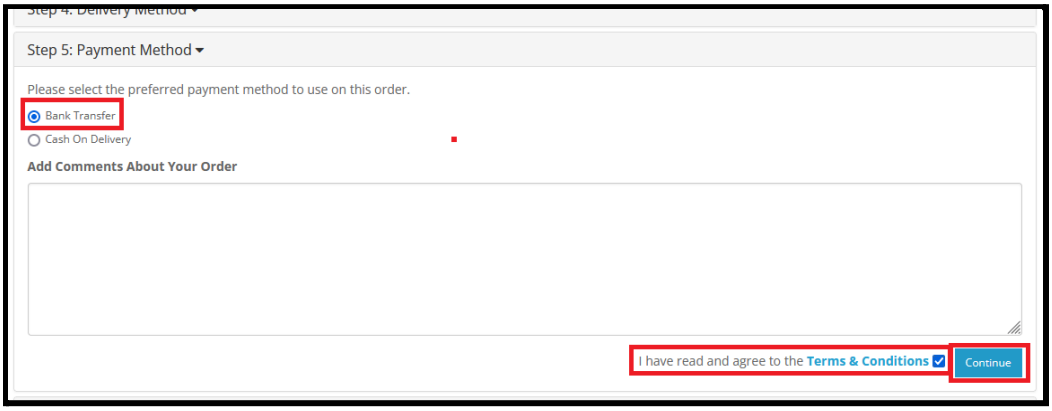
5. Set the billing address.

6. Set the delivery address.

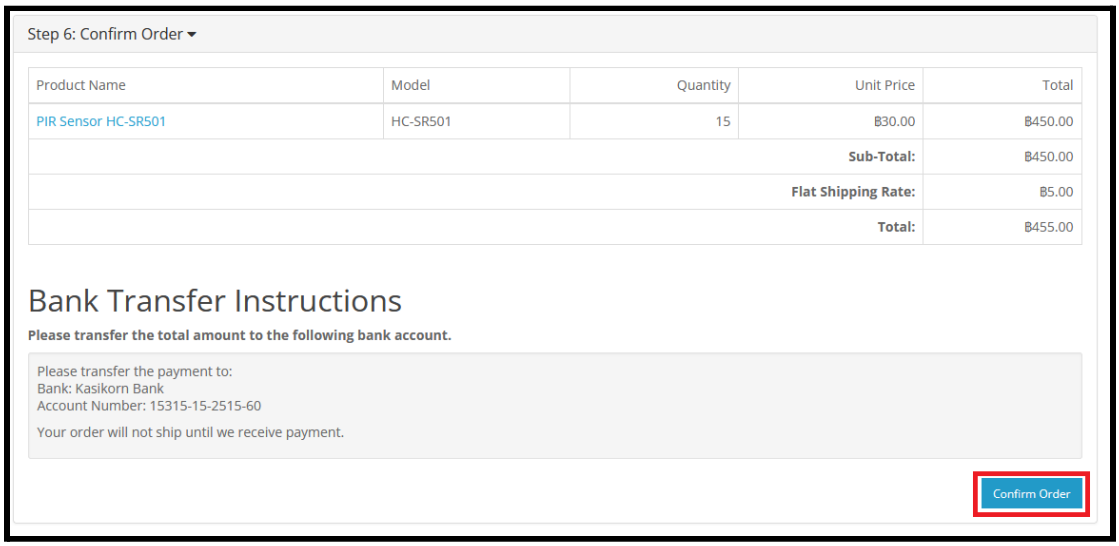


7. Set the shipping method.

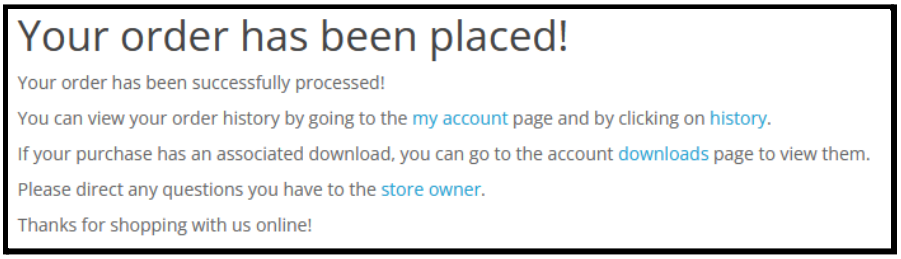
8. Set the payment method.



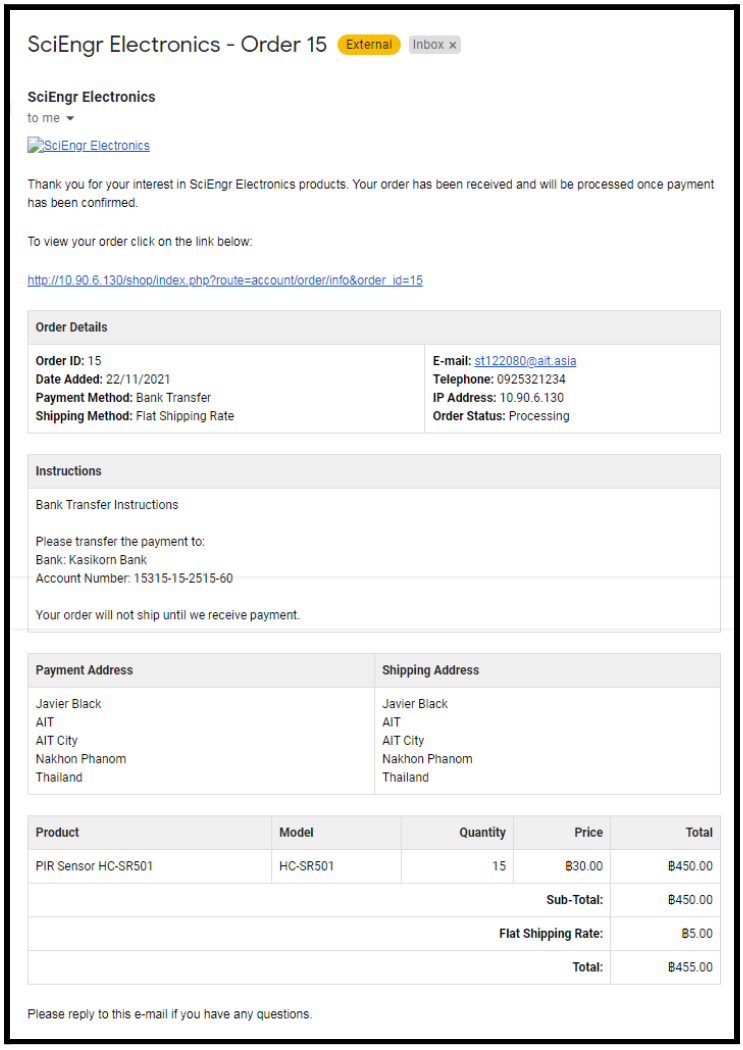
9. Confirm the order.



10. See the confirmation message.



11. See the confirmation email.



SciEngr Electronics - Order 15 External Inbox ×

SciEngr Electronics
to me

SciEngr Electronics

Thank you for your interest in SciEngr Electronics products. Your order has been received and will be processed once payment has been confirmed.

To view your order click on the link below:

http://10.90.6.130/shop/index.php?route=account/order/info&order_id=15

Order Details

Order ID: 15
Date Added: 22/11/2021
Payment Method: Bank Transfer
Shipping Method: Flat Shipping Rate

E-mail: st122080@ait.asia
Telephone: 0925321234
IP Address: 10.90.6.130
Order Status: Processing

Instructions

Bank Transfer Instructions

Please transfer the payment to:
Bank: Kasikorn Bank
Account Number: 15315-15-2515-60

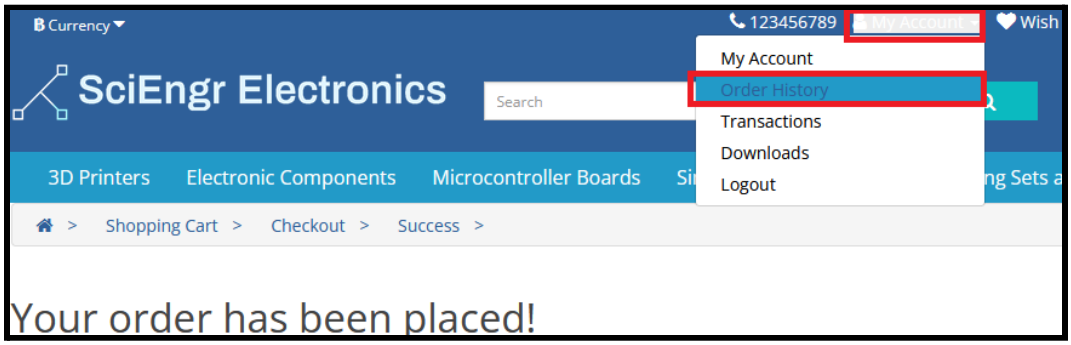
Your order will not ship until we receive payment.

Payment Address	Shipping Address
Javier Black AIT AIT City Nakhon Phanom Thailand	Javier Black AIT AIT City Nakhon Phanom Thailand

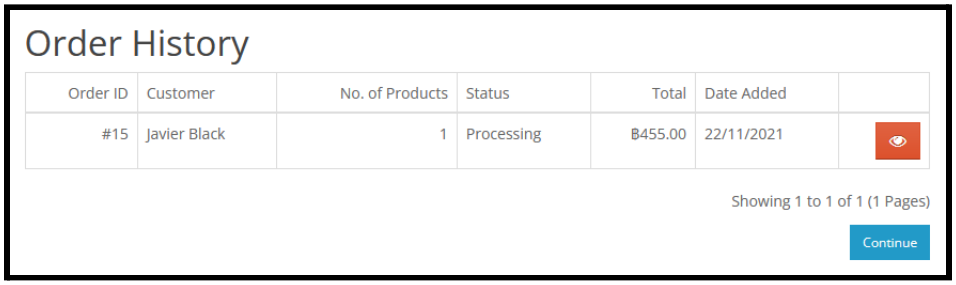
Product	Model	Quantity	Price	Total
PIR Sensor HC-SR501	HC-SR501	15	฿30.00	฿450.00
			Sub-Total:	฿450.00
			Flat Shipping Rate:	฿5.00
			Total:	฿455.00

Please reply to this e-mail if you have any questions.

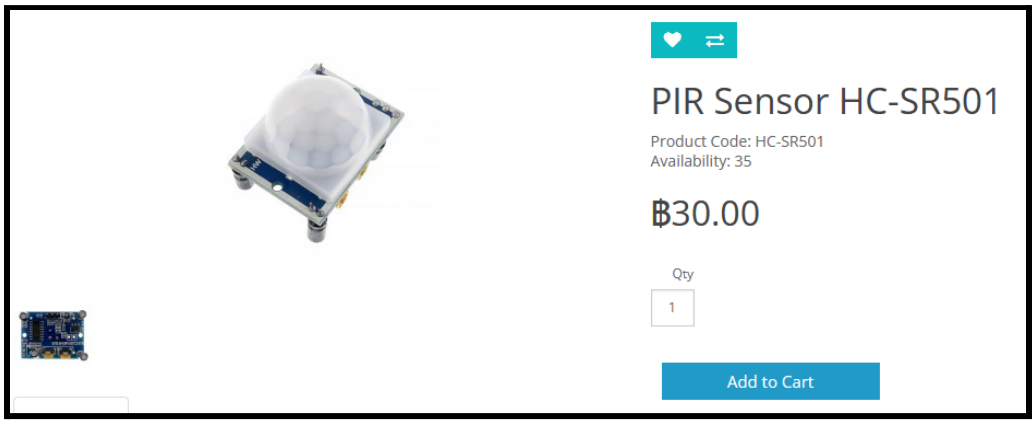
12. Go to the order history.



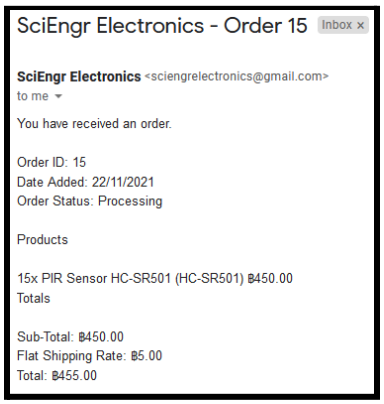
13. See that the new order has been added to the order history

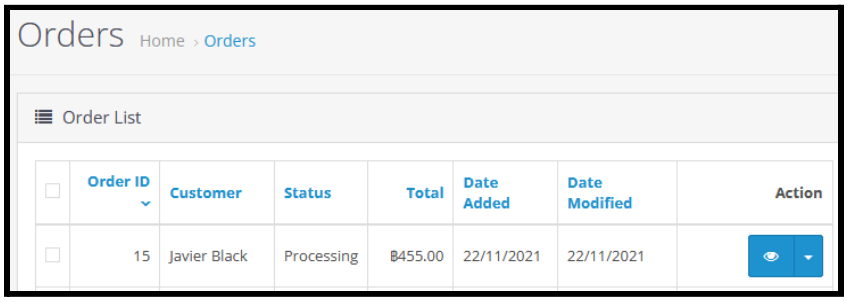


14. Return to the PIR sensor product page and notice that the available stock has been reduced by 15.



When a customer makes an order, the store admin also receives an email alert and can use OpenCart to see the information for the new order, as shown below.

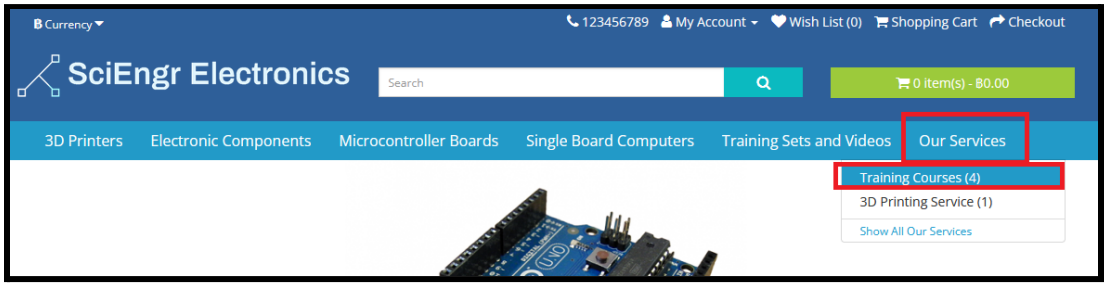




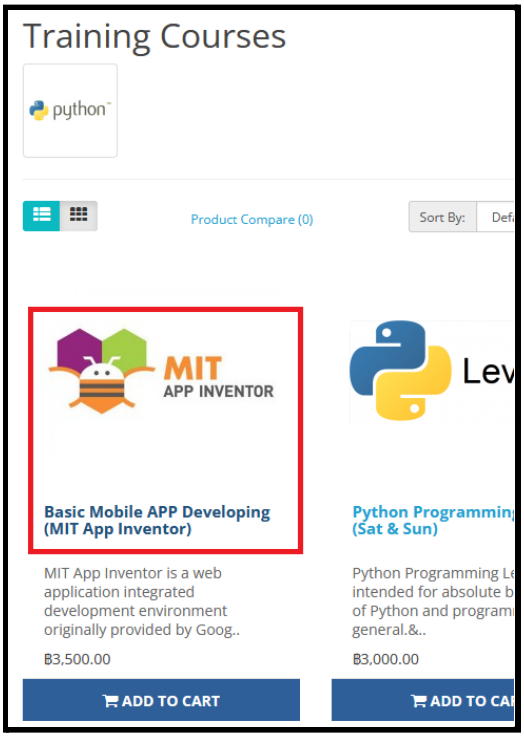
Customer reserves a seat in a course

The steps below are an example of the steps performed by a customer order to one seat in the MIT App inventor course.

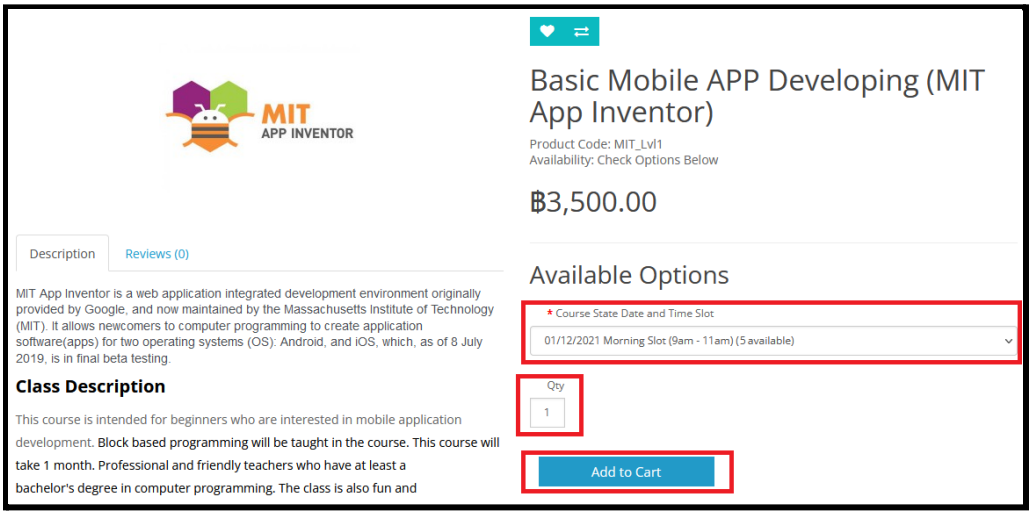
1. Going to the training courses catalog



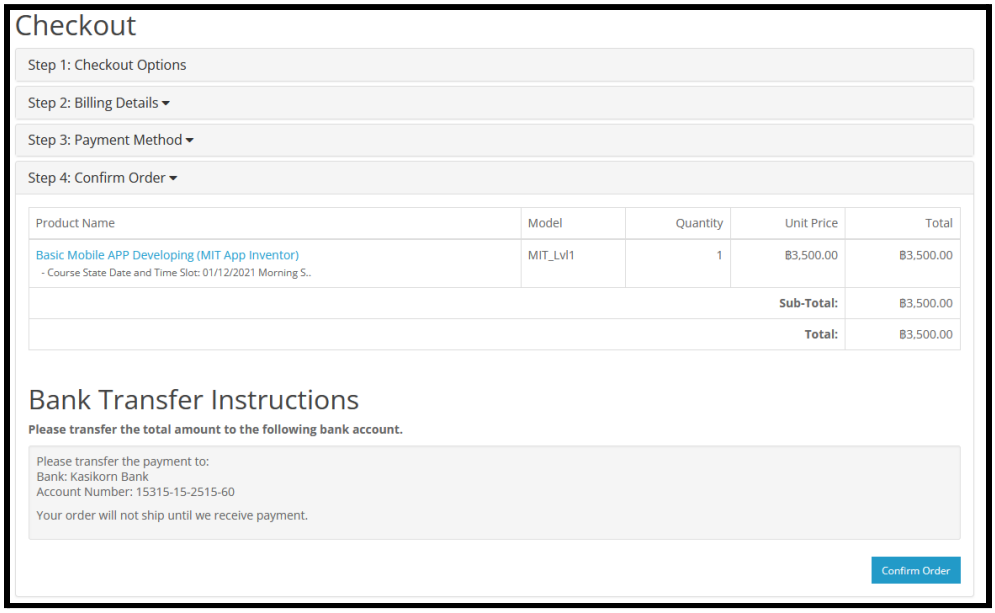
2. Going to the MIT App inventor course page



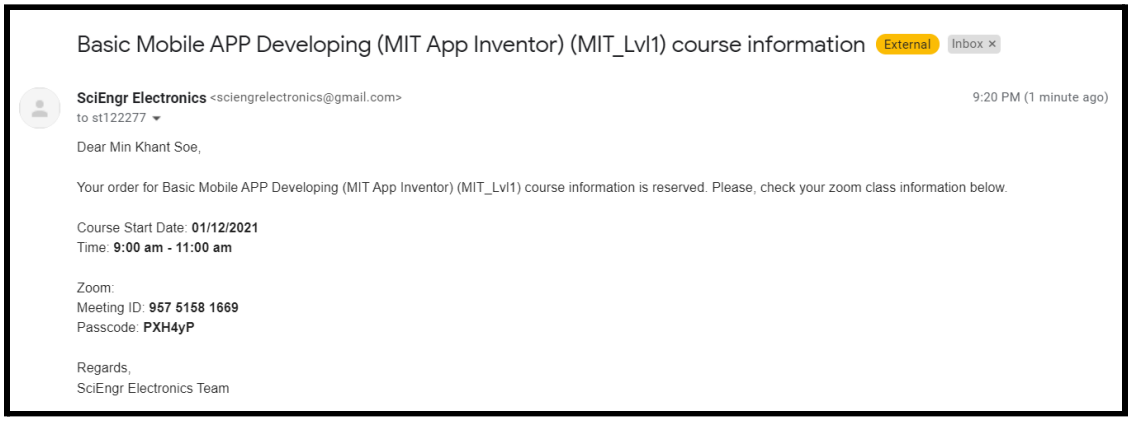
3. Adding the course to the cart, reserving 1 seat on



4. Checkout the order. Since there is no physical product, the shop does not request any address information.

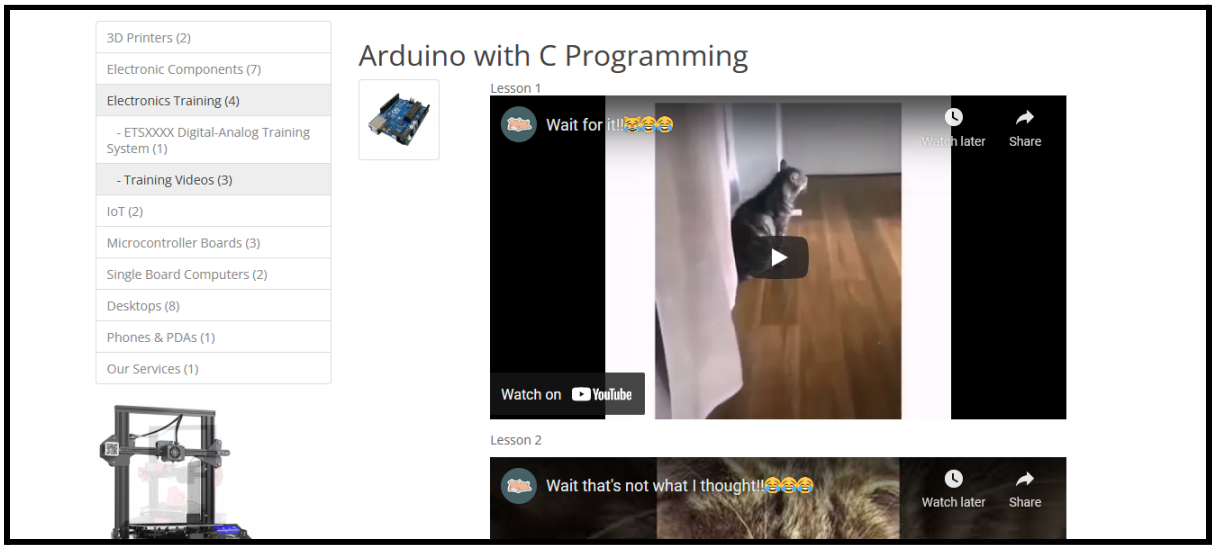


5. Once the payment is received, the shop sends a confirmation email to the customer with the details of the course.



Website user views the free tutorials

Along with the paid courses, we also provide free programming tutorials for using Arduino with C Programming, represented below using cat videos.



Conclusion

In this project we have created a store called “SciEngr Electronics”. Our business model is both B2B and B2C, since our target customers are electronics training schools and engineering students. We implemented our store’s website on a local server using the OpenCart e-commerce platform. Finally, we used our technical skills to customize free OpenCart extensions for our purposes, rather than paying for specific premium extensions that meet our desired capabilities.

References

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OpenCart. (2021, Aug 27). OpenCart - Previous Downloads. https://www.opencart.com/index.php?route=cms/download/history

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