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Module EN1190: Engineering Design Project

Design analysis stage 1 – Multi Socket Electrical Extension Cord

Group EN-13

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Multi Socket Electrical Extension Cord

Need of the product

Electrical extension code is used mostly in day today life. Multiple devices which take different powers are connected to the electrical extension code while using it. **Connecting multiple devices may cause to an overcurrent.** So, it is useful to know whether it may cause to an overload. Devices connected to the extender and extension code both can be harmed when an overload happens. Therefore, it is useful to have an ammeter to measure the current drawn by the electrical extension code and some protecting circuit which protect from a sudden transient overload.

Research:

When multiple devices are connected to the sockets this may lead to an overcurrent situation. So a mechanism to find the amount of current drawn would be useful.

In Electrical Extension Cords the cord is vulnerable to external mechanical stresses. This would cause damages and **leakages in wires so residual current protection** would be useful in these cases if it was embedded in the extension.

Sources: (<https://ieeexplore.ieee.org/document/8733331>)
(<https://ieeexplore.ieee.org/document/8752427>)

How critical the issue is?

There may be expensive equipments which need constant current supply. For protecting them we need to ensure MCB of the plug doesn't switch off due to over currents. By using the **ammeter**, we can see how much current is drawn therefore we can protect our devices. Since there is a built in overcurrent circuit breaker connected to the extender device will be protected from overloading as well as transient high currents. Since there is a built in overcurrent circuit breaker we will be able to make sure our devices are protected even though it doesn't exceed the current limit of MCB in consumer unit.

Cost/Benefit Analysis

If this unit absent extender may use high currents near to the maximum current for a long time. Thereby wires may be heated and cannot be used for a long time and could cause insulation damages resulting accidents. There will be a cost benefit as we can use this extender for a longer period than a normal extender. By using this equipments we can use the extender for years. Since there is an MCB in the extender it will be easier to switch off and on the MCB without going to the consumer unit which would be at a greater distance.

Since this device adds an extended protection for expensive devices and reduce possible accidents there is a clear overall cost benefit.

Testing

The equipment can be tested by using a standard accurate digital voltmeter and phase current can be accurately measured by using clip on meter and by comparing. We should check the accuracy of the MCB by passing an overcurrent and RCCB by leaking a current.