# Engineering Matrix

| | Weight | Prototype #1: Manual Launcher | **Prototype #2: Motorized Launcher** | Clay Pigeon Launcher OpticsPlanet (2014) | Cerebra Innovation Centre (2019) | Ball Launcher Ameye et al. (2014) | Eddy (2020) |
|---|---|---|---|---|---|---|---|
| Launching Mechanism | | | | | | | |
| The device must have a range of 20 feet. | 1 | Fail | **Pass** | Pass | Pass | Pass | Pass |
| The device must not put any hazardous moving parts within reach of the client. | 1 | Pass | **Pass** | Pass | Pass | Pass | Pass |
| The device must be able to launch frisbees. | 1 | Fail | **Pass** | Pass | Fail | Fail | Pass |
| The device must be able to launch balls. | 2 | Fail | **Pass** | Fail | Pass | Pass | Pass |
| The device must have an adjustable range. | 2 | Fail | **Fail** | Fail | Fail | Pass | Fail |
| Wheelchair Mount | | | | | | | |
| The client must be able to mount the device to the wheelchair independently. | 1 | Fail | **Fail** | Fail | Fail | Fail | Fail |
| The device must be able to stay mounted to the wheelchair during any routine movements. | 1 | Pass | **Pass** | Fail | Pass | Fail | Fail |
| The device must maintain the balance of the wheelchair during any routine movements. | 1 | Pass | **Pass** | Fail | Pass | Fail | Fail |
| The device must extend at most 2 feet from the side of the wheelchair when mounted. | 2 | Pass | **Pass** | Pass | Pass | Pass | Pass |
| The device must be mountable to multiple different types of wheelchairs. | 3 | Pass | **Pass** | Fail | Fail | Fail | Fail |
| Electronic Control System | | | | | | | |
| The switch must be operable with minimal hand movement only. | 1 | Fail | **Pass** | Fail | Pass | Fail | Pass |
| The device must be powered with at most 1 primary battery. | 1 | Fail | **Pass** | Pass | Pass | Fail | Pass |
| The electronic control system must engage on 90% or more of switch presses. | 2 | Fail | **Pass** | Pass | Pass | Fail | Pass |
| The device must be able to run for at least 20 minutes before needing to be recharged. | 2 | Pass | **Pass** | Pass | Pass | Fail | Pass |
| The system must be able to run under rainy conditions. | 3 | Fail | **Fail** | Pass | Fail | Fail | Pass |
| Universal Constraints | | | | | | | |
| All materials must not exceed $200 in cost. | 1 | Pass | **Pass** | Pass | Pass | Pass | Pass |
| The device must not exceed the size of a 3’ x 3’ x 3’ box. | 1 | Pass | **Pass** | Pass | Pass | Pass | Pass |
| The device must not exceed 30 pounds in weight. | 2 | Pass | **Pass** | Pass | Pass | Pass | Pass |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| There must be documentation with every subsystem with the intent of allowing a future group to continue work on this project. | 2 | Pass | **Pass** | Fail | Fail | Pass | Fail |
| The device must be aesthetically pleasing to stakeholders by majority vote. | 3 | Fail | **Pass** | Pass | Pass | Pass | Pass |

| **Subsystem** | | Electronic Control System (ECS) | | | | | |
|---|---|---|---|---|---|---|---|
| *Requirement #* | *Level* | *Requirement Type* | *Requirement Statement* | ***Does our design meet these requirements?*** | | | |
| 1 | 1 | User | The switch must be operable with minimal hand movement only. | Yes | | | |
| 2 | 1 | Functional | The device must be powered with at most 1 primary battery. | Yes | | | |
| 3 | 2 | Functional | The electronic control system must engage on 90% or more of switch presses. | Yes | | | |
| 4 | 2 | Physical | The device must be able to run for at least 20 minutes before needing to be recharged. | Yes | | | |
| 5 | 3 | Functional | The system must be able to run under rainy conditions. | Yes | | | |
| **Subsystem** | | Universal Constraints | | | | | |
| *Requirement #* | *Level* | *Requirement Type* | *Requirement Statement* | ***Does our design meet these requirements?*** | | | |
| 1 | 1 | Cost | All materials must not exceed $200 in cost. | Yes | | | |
| 2 | 1 | Physical | The device must not exceed the size of a 3’ x 3’ x 3’ box. | Yes | | | |
| 3 | 2 | Physical | The device must not exceed 30 pounds in weight. | Yes | | | |
| 4 | 2 | Documentation | There must be documentation with every subsystem with the intent of allowing a future group to continue work on this project. | Yes | | | |
| 5 | 3 | Physical | The device must be aesthetically pleasing to stakeholders by majority vote. | Yes | | | |