

Automated Pet Feeder

A smart solution to automate and regulate
the feeding of common household pets

CMPE 495 Independent Risk Investigation

Microcontroller Options

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Overview

Like any embedded system a microcontroller that is cost effective and provides adequate hardware for the requirements of the system is needed. These requirements being to operate the mechanical communication aspects of the feeder. It must have available documentation and easy to use toolchains, with useful SDKs, for efficient development.

Risk specification

Marketing requirements for microcontrollers:

1. Must be lightweight.
2. Must be able to control remote vent valves for propellant and pressurant tanks.
3. Must be able to depressurize the rocket independent of the launch controller.
4. Must have remote electronic pressure instrumentation for tank pressures.
5. Must have remote electronic temperature instrumentation for tank temperatures.
6. Must ignite only from an electrical ignition source with a key lock-out on the pad and with the same key lock-out at the main launch controller.
7. Must be able to open the helium press valve before and keep it open during flight.
8. Must be able to fire the main pyro valves for takeoff.
9. Must be safe to operate in a flammable environment.

The relevant specifications can be found in Table 1.

Table 1: Engineering Specifications

Marketing Requirement(s)	Engineering Requirement	Justification
1	A. Must weigh less than 1 lb	The rocket cannot weigh too much or the height goal is not achievable.
2,3	B. Must be able to open the release valves	The relief valves allow the launch to be scrubbed, as well as the air released during filling.
4	C. Must be able to read from a pressure transducer	The propulsion team needs to be able to monitor tank pressure before liftoff to determine whether to scrub the launch.
5	D. Must be able to read from a thermocouple	The propulsion team needs to monitor tank temperature to determine whether to scrub the launch.
6	E. Must not ignite the engine	The rocket launch, per range safety rules, must be initialized by a keyed system.
7	F. Must be able to power the press valve for at least 30 minutes at 24 V and 0.4 A	The helium valve is opened on the ground and may need to remain so for an extended period of time.
8	G. Must be able to power the two pyro valves for 1 second at 24 V and 1 A	The pyro valves are the main engine valves the release the propellants into the chamber and cannot be closed via electrical means.
9	H. Must not produce any sparks during operation	Sparking around flammable materials in a high oxygen environment could lead to RUD (rapid unscheduled disassembly)

Many of these specifications, such as A, do not appear directly connected to the power system, but must be kept in mind, as they make options such as more batteries infeasible.

Risk investigation

Risk mitigation design

Parts List

Testing strategy

Uncertainties

Appendices