

Free Falling Object Safety

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This project is aimed at the aircraft sports that can provide a safety free falling subjects (humans and objects). The system will trigger a particular mechanism such as parashot after the subject reaches a 35 meter from the ground, automatically without any control from user.

The project consists of three circuits without any power supply (battery) and one software programmed on Atmega328.

Demonstration of electronic circuits:

We have three circuits: 1. Power 2. Timer 3. IC circuits.

All circuits are circles with radius 20mm and are attached with each other's by connectors.

1. Power Circuit: using wind turbine the circuits are consumes current through LM2576 which provide a stable 5V. The enable pin of the regulator is attached to a circuit with a Zener diode. The purpose of that is to achieve a delay time after turning on the system.

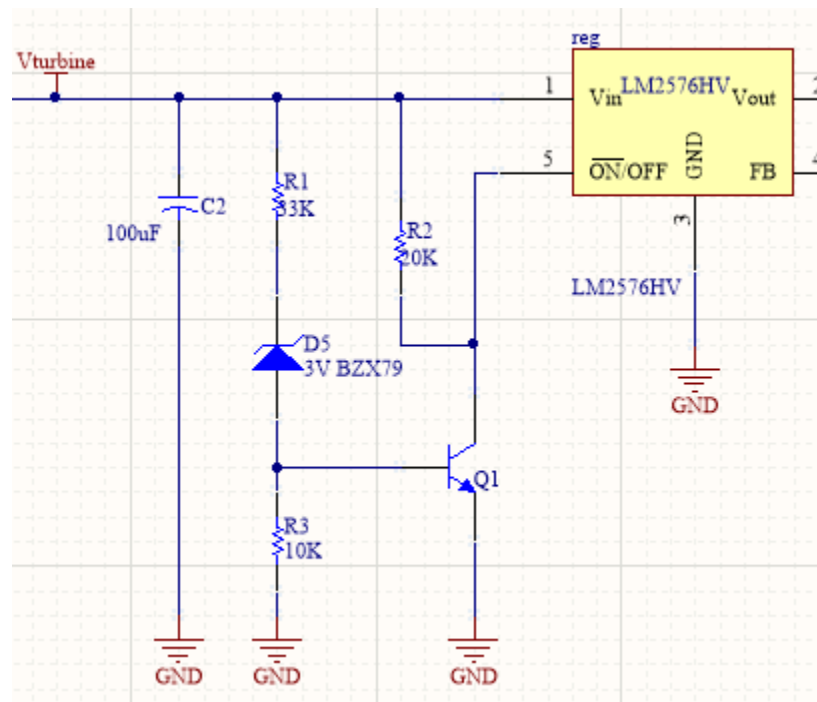


Figure 1: Zener diode with regulator LM2576 which is enabled when input is greater than 6V for safety

$$V_{\text{turbine}} \geq (R1/R3 + 1) * V_{BE} + V_z$$

2. Timer Circuit: using IC 555, A clock signal of frequency of 514 Hz is created. After 1 second, the main capacitor will begin charging. The main capacitor is responsible for triggering the mechanism when Atmega328 ordered.

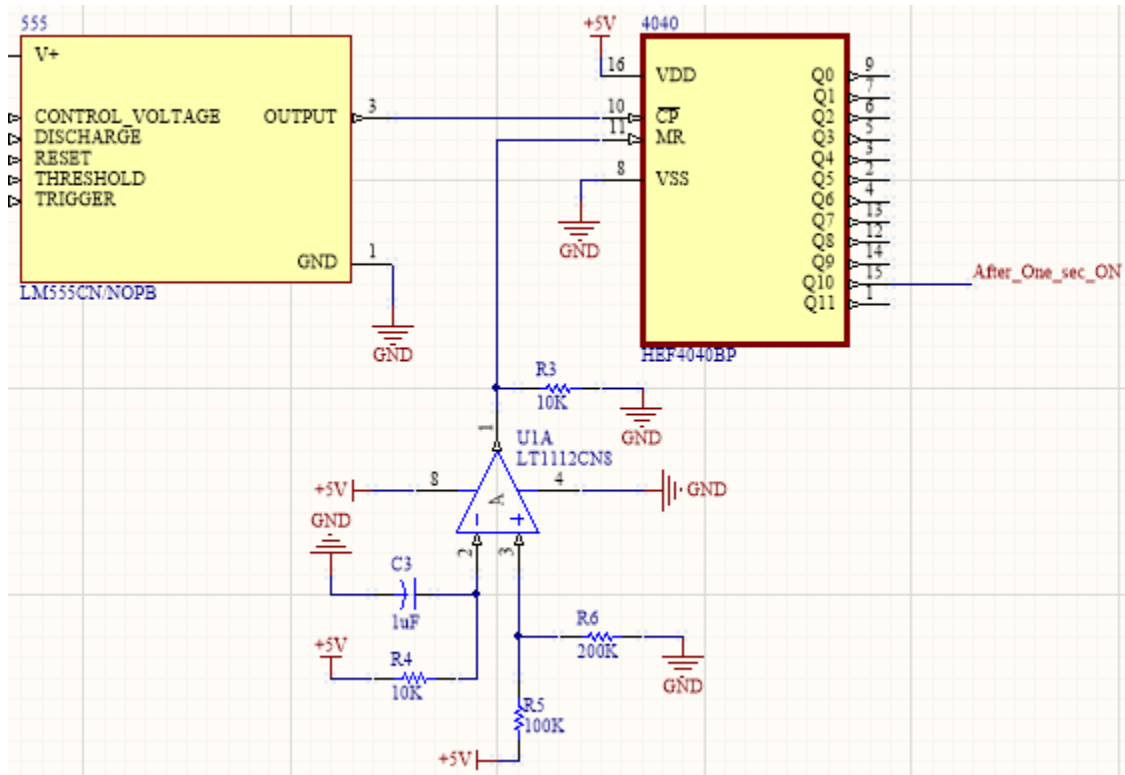


Figure 2: After 1 second, HEF4040 and IC 555 will freeze in high level state.

The op amp is used as comparator to delayed 4040 about RC second.

3. IC circuit: Atmega328 and its peripherals.

We recommend using a natural Power Wind Turbine Alternator Generator 3000 RPM, Rated power: 0.5-5W, Output Voltage: 2-22V, Output current: 0.002-0.5A.