

# R.E.A.C.H. Mk0 Outsourcing Requirements

## Objectives of R.E.A.C.H.

1. Develop & Test a Cost Effective Solution for Experimental Testing of New Concepts
2. Mk0 aims To test a Novel Recovery Method
3. Set Amateur Asian Record for Altitude (Apoapsis) and Eurasian Record for Range of an Amateur Rocket
4. Breach the Kármán Line

## Requirements of R.E.A.C.H. Mk 0

We hope that the Indian Space Research Organization and/or the Defence Research & Development Organization provide us access/assistance to the following:

Field Of Assistance	Details	Specifics
Long Range Communication	Required Due To Non-availability of Conventional Connectivity @ 100+Km	Satellite Communications or Microwave Transceivers
Parts Fabrication Machines	Required Due To Non-availability of Fabrications Tools for Students	Fabrication of Recovery System & Final Assembly of Rocket
Launching Arena (Guide Rails, Bunker, Remote Ignition etc.)	Required Due To Illegalization of Rocket Launches in Populated Areas	Guide Rails to Fly Things Right
Trajectory Simulation & Thermodynamic Simulation	Required For Preflight Testing & Validation	Expert Guidance & Simulation Software

## Benefits of R.E.A.C.H.

### 1. Concept Testing Framework

*The Project provides a framework to test new concepts safely, as it has a very minimal cost & simple operation. It can also validate test concepts as it can successfully reach altitudes to simulate the environment of space accurately.*

### 2. Scalability

*The Project is extremely scalable. The Mk 0 can be upscaled into a vehicle to launch payload upwards of 40Kg in stable Low Earth Orbit, with most of launch apparatus being recoverable. This upscaled model would be under 10m tall with a similar radar with a slightly sophisticated multi-ignition motor & internal gimbal control.*

### 3. Recoverability

*The Project, with Mk 0, aims to test a minimal system to recover the rocket along with all of its essential parts in working order. While it is not viable to recover everything under given budget constraints, this system of Hybrid Parachuteless Recovery is applicable to any spacecraft (or part thereof) with symmetry. The Recovery is exceptionally stable due to gyroscopic effects on its body & its internal axis of rotation.*

#### 4. Versatility

*The Project is applicable in many scenarios, including but not limited to Earth. One of the objectives is to apply the Recovery concept to massive, conventionally non-recoverable parts of spacecrafts, which cannot use parachutes due to practical limits & cost barriers. The Concept can also be morphed into a landing strategy, finding applications for Martian Landings where use of prolonged retro bursts are usually required.*

#### 5. Cost Effectivity

*The Project is very cost effective, with the Mk 0 costing less than 40,000INR. A fully recoverable prototype which can launch payloads into Low Earth Orbit is possible in under INR 4,00,000. Hypothetically, **The Concept can bring down costs of PSLV Launches by 40% (approx.) by making all parts except the 3<sup>rd</sup> stage recoverable in working condition**, while not adding any new shielding for reentry or new major costs.*

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