SPACE DEVELOPMENT NEXUS

Workshop Proposal For

INTERPLANETARY ROVER

Sharpen Your Skills, Enrich Your Knowledge And Be Ready For The Battle Of Knowledge!

WORKSHOP INTRODUCTION

With growing developments in the field of mechatronics and mathematic modeling, autonomous robotics has come a long way. From an iron piece that could move only a few inches, there are now machines capable of jumping from high-rise buildings, detecting landmines, performing operations and troubleshooting on other planets.
Interplanetary rovers uniquely benefit planetary exploration - they enable regional exploration with the precision of in-situ measurements, a combination impossible from an orbiting spacecraft or fixed lander. In the last two decades, over 300 concepts have been generated and discussed. Quite a few of these multi-functionality concepts have been designed and developed for the deployment of such solo rovers. Typically, most designs now are more or less identified, extensively analyzed and in a few cases even validated.
Lately, there is a shifting trend which is characterized by an increased interest in developing rovers for long-term missions and for missions once a temporary base is set-up at say, Mars. For such missions, in comparison with a solo-mission rover, the environment remains the same, but the deliverables increase: long range capability, higher mobility, lower power consumption, ease of control. We examined and compared existing locomotion mechanisms using concept screening matrix and concept scoring matrix. It was identified that the Shrimp rover is the best option in terms of obstacle climbing capability, capacity to withstand topple, complexity of suspension & ease of control.
Through this workshop, Space Development Nexus wants to provide the exposure for developing Space Missions and Rover Designing.

WORKSHOP INFORMATION

Workshop Title: SDNx Interplanetary Rover Workshop
Length: Two Day Workshop (10 Hours)
Proposed Date:

COURSE HIGHLIGHTS

- ✓ Introduction to Interplanetary Missions
- ✓ Introduction to Rover Technology
- ✓ Introduction to Rover Electronics
- ✓ Introduction to Rover Mechanics
- ✓ Introduction to Mechatronics
- ✓ Introduction to Rover Circuit Designing

This session includes various technological phases of designing an Interplanetary Autonomous Rover. The focus will be on the mechanical structure, electronic interfacing, and use of various sensors, writing application based algorithms, rover dynamics study and process of launching your own space mission.

COURSE STRUCTURE

- ✓ **Lecture:** The lecture helps the participants understand the physics behind an interplanetary rover functioning with interactive sessions. The lecture also covers the use of electronics, dynamic mechanisms and programming to channelize a rover.
- ✓ **Design**: The participants design a mechanical rover under the guidance of experienced instructors. Participants are encouraged to think and come up with innovative designs.
- ✓ **Fabrication:** The participants will give a physical form to their mechanical rover and create a communication module of 30 meter range to detect any atmospheric variations.
- ✓ **Testing:** The designed and fabricated rover would be tested by the participants on different surfaces and physical conditions.

TOPICS COVERED

- ✓ Introduction to Rover
- ✓ Space Payload Astrodymamics
- ✓ Rover Communication Module and Telemetry
- ✓ Electronic Interfacing for Sensors
- ✓ Rover Kinematics
- ✓ Rover Maneuvering

KIT CONTENT

- ✓ Aluminum Rods
- ✓ L-Clamps (8 pieces)
- ✓ 100 rpm Johnson Gear Motor (8 pieces)
- ✓ Printed Circuit Board (1 Sq. Ft)
- ✓ Arduino MEGA (1 Piece)
- ✓ Adafruit Motor Driver (1 Piece)
- ✓ Ultrasonic Sensor (1 Piece)
- ✓ Servo Motors (1 Piece)
- ✓ A - Class Rover Wheels (8 Pieces)
- ✓ Global Positioning System Module (GPS) – 1 Piece
- ✓ Bluetooth Module (HC05) – 1 Piece
- ✓ Temperature, Altitude & Pressure Sensor
- ✓ Sound Sensor
- ✓ 2 Channel Relay Module (1 Piece)
- ✓ Nut Bolts and Spacers
- ✓ Electrical Wires (4 Meters)
- ✓ Jumper Wires
- ✓ Circuit Designing Software – FRITZING
- ✓ Arduino IDE Software
- ✓ Processing Software
- ✓ Lithium Polymer Battery (2200 mAh) *

COSTING

Without Kit –1000 INR per Participant.
With Kit- 2000 INR per Participant
*the kit will be given to the whole team not to any individual.
*each team should have exact five members not more not less.

"*" marked kit contents are not included in the kit to reduce the price factor.

CERTIFICATION

An Industrial Grade- International Class Certificate will be provided to each participants to acknowledge their effort toward, learning engineering practically.

With Regards
Sanjay Rathee
(Founder, SDNx-INDIA)