Paper ID: 33764
oral
student

45th STUDENT CONFERENCE (E2)
Student Team Competition (3-GTS.4)

Author: Mr. Juan Carlos Mariscal
Facultad de Ingeniería-UNAM, Mexico, jc13@comunidad.unam.mx

Ms. Ana Buenrostro
Facultad de Ingeniería-UNAM, Mexico, anaschettino93@hotmail.com
Mr. Erik Gutierrez Rosas
Facultad de Ingeniería-UNAM, Mexico, gutierrez.rosas.erik@gmail.com
Mr. Genaro Marcos
Universidad Nacional Autónoma de México (UNAM), Mexico, genaromarcosac@outlook.com
Mr. Bryan Perez Ramirez
Facultad de Ingeniería-UNAM, Mexico, bryanperezram@gmail.com
Mr. Luis Gerardo Gutiérrez Trejo
Facultad de Ingeniería-UNAM, Mexico, luis.ger.unam90@gmail.com
Ms. Yessica Reyes
Facultad de Ingeniería-UNAM, Mexico, denn.29@hotmail.es
Mr. César Augusto Serrano Baza
Facultad de Ingeniería-UNAM, Mexico, cesar.a.serranob@gmail.com
Mr. EDUARDO SOLÍS
Facultad de Ingeniería-UNAM, Mexico, luigiberto_eduar2@hotmail.com
Mr. Luis Ángel Castellanos Velasco
Universidad Nacional Autónoma de México, Mexico, angelo@comunidad.unam.mx

UNAM SPACE IN SAMPLE RETURN ROBOT CHALLENGE: CREATING AN EXPLORING ROVER FOR NASA

Abstract

UNAM Space is a mexican multi-disciplinary team founded in 2012 by students from the School of Engineering of the National Autonomous University of Mexico with the purpose of promote and impulse the development and scientific innovation of robotics and space technology by competing in contests convened by the National Aeronautics and Space Administration, representing Mexico.

Having attended the Fourth Annual Lunabotics Mining Competition (2013 – Kennedy Space Center, Cape Canaveral, Florida) and Sample Return Robot Challenge (2015 – WPI, Worcester, Massachusetts) with great achievments, team's next step is Sample Return Robot Challenge 2016.

The challenge is to find, collect, store and transport, in an autonomous way, different samples from an uknown open field. To achieve this, the team is developing an autonomous rover which combines precise mechanics with efficient control and coding.

The team has identified three critical areas to design and build the rover:

• Mechanics • Control and Electronics • Artificial Intelligence

The mechanical scope of the rover includes the design and building of a Three-Tire Traction Arrangement, Aluminium Chasis, Sample Container (also aluminium, which can store up to seven samples independently) and a Robotic Arm to collect the samples.

The Control and Electronics module is the bridge that connects mechanics with coding (AI). It is responsible for ensuring the receipt and processing obtained by the AI module. Its componentes are:

• Power Stage • Control Stage • Interface with AI module

Finally, the Artificial Intelligence module is the one in charge of the decision making process. The activities/components of this module are:

• Retreive data from environment (Artificial Vision) • Route planning and location • Communication with Control and Electronics module

The Artificial Vision is implemented with a stereo camera to retreive environment data, while the route planning and location is implemented with a Simultaneous Location And Mapping (SLAM) algorithm customized for the competition's purpose. Finally, the communication with Control module is implemented with an exchange of data between Control main processor and AI main computer.

The rover is the result of a four-year work and experiene of a team who wants to become a world reference in space technology.