Memorandum of Understanding

For

IRNSS Navigation Receiver Field Trial and Data Collection

Between

Space Applications Centre
Indian Space Research Organization
Department of Space, Government of India
Ahmedabad - 380015

And

ACS College of Engineering,
207, Kambipura, Mysore Road,
Bangalore - 560074.

BETWEEN

Space Applications Centre, Jodhpur Tekra, Ambawadi Vistar P.O., Ahmedabad, 380015, a centre of Indian Space Research Organization, Department of Space, Government Of India (hereinafter called "SAC" which expression shall where the context so admits include its successors and permitted assignees) of the one part,

AND

ACS College of Engineering, 207, Kambipura, Mysore Road, Bangalore -74.

1.0 Preamble:

Whereas, Space Applications Centre (hereinafter referred to as "SAC" which expression shall where the context so admits include its successors and permitted assignees) of the one part and "ACS College of Engineering" (hereinafter referred to as "ACSCE" which expression shall where the context so admits include its successors and permitted assignees) of the one part ACSCE, both are parties to this MoU;

Whereas, SAC is involved in design and development of space-borne instruments for ISRO missions and development and operationalization of applications of space technology for national development. The applications cover communication, broadcasting, navigation, disaster monitoring, meteorology, oceanography, environment monitoring and natural resources survey. SAC designs and develops all the transponders for the INSAT and GSAT series of communication satellites and the optical and microwave sensors for IRS series of remote sensing satellites, Navigation payloads for IRNSS and GAGAN programme. Further, SAC develops the ground transmit/receive systems (earth stations/ ground terminals) and data/image processing systems;

ACS College of Engineering (ACSCE) established in 2009, under the banner of Moogambigai Educational and Charitable Trust which was founded by Mr.A.C.Shanmugam. ACSCE situated on National High way of Mysore Road, 03 minutes drive from Nice Road Junction, Bangalore. The campus is spread over an area of 26 acres. The college is located at a distance of 25 Kms from Bangalore City Railway Station and 55 Kms from Bangalore International Airport. ACSCE is approved by AICTE and Government of Karnataka, and is affiliated to VTU Belgaum. The management is keen to develop this college into an Institution of Excellence in Engineering Education.

The college offers,

B.E - Aeronautical Engineering,
B.E - Bio-Medical Engineering,
B.E - Civil Engineering,
B.E - Computer Science Engineering,
B.E - Electronics and Communication Engineering,
B.E - Electrical and Electronics Engineering,
B.E - Mechanical Engineering.
M.Tech - Software engineering,
M.Tech - Digital Electronics and Communication Systems,
M.Tech - Structure Engineering
M.Tech - Product Design and Manufacturing.

2.0 Effective Date and Duration of MoU: This MoU is effective from the date of its signing and is valid for a duration 2 (Two) years from the date of signing. It may be extended further in writing based on mutual consent.

3.0 Scope of MoU:

Scope of the MoU involves Site identification, site preparation, and Installation of the IRNSS receiver. IRNSS Navigation Data collection and analysis to be carried out on regular basis for verification and for other mutually agreed topics of research for both parties. Depending upon the requirement certain scientific experiments can be planned and executed within overall MoU umbrella. With mutual consent, both the Parties can extend the period of data collection and observation locations (sites).

4.0 Methodology:

- 4.1 Suitable Site Selection
- 4.2 Installation and commissioning of IRNSS Receiver
- 4.3 Continuous IRNSS and GPS data logging, analysis of the data
- 4.4 Transmission of IRNSS and GPS data to SAC as and when demanded by SAC

Data transmission mechanism can be mutually worked out.

5.0 Deliverables:

5.1 SAC deliverables { i, ii & iii through DATA PATTERNS (INDIA) Pvt. Ltd}

i. IRNSS receiver and data processing systems as detailed in Annexure-1. (Delivery @ site)

ii. Number of receiver units allocated as per SAC receiver Allocation committee's recommendation in view of your response to EOI for IRNSS Receiver deployment

iii. User and operations manual (Delivery @ site)

iv. Format for Quarterly (Every Three months) status report

5.2 ACSCE deliverables

i. All necessary logistics so that IRNSS Receiver shall be established to collect positional data in raw and RINEX format received from IRNSS, GPS constellation with 1 sec update rate

ii. Send a Quarterly status Report on usage/performance of receiver to SAC in a prescribed format.

iii. Send the Receiver data to SAC as and when asked for

6.0 Guidelines on Receiver / Data Usage:

The data is to be used strictly for internal research purpose only. The Receiver is for experimentation and field trials only and should not be used for any operational purpose. IRNSS constellation is evolving and has not been declared operational for Position Navigation and Time services. So the results/performance of IRNSS should be viewed in that context.

7.0 Responsibility of Each Party:

SAC and ACSCE shall jointly work towards IRNSS system verification using data collected from IRNSS receivers. In addition, following are the specific responsibilities.

7.1 ACSCE:

7.1.1 All the logistics support, site identification, site preparation, required for setting up of IRNSS Receiver will be provided by ACSCE.

7.1.2 Installation of the IRNSS Receiver at the site will be carried out by DATA PATTERNS

7.1.3 Utmost care to be taken in handling the IRNSS Receiver.

7.1.4 Send the Receiver Data to SAC when asked for

7.1.5 Safety and security of the IRNSS Receiver

7.1.6 IRNSS data reception, processing, archival to be done by ACSCE.

7.2 SAC:

7.2.1 SAC will provide IRNSS Receiver Unit(s) and Receiver operation manual(s) on returnable basis (As detailed in Annexure-1)

7.2.2 SAC will provide technical assistance to ACSCE in working out modalities of Data collection, data sharing, etc.

7.2.3 SAC will provide technical assistance to ACSCE in proper operation and maintenance of IRNSS Receiver

7.2.4 SAC will provide technical assistance to ACSCE in identifying appropriate research areas considering capabilities of this Receiver

8.0 Project schedule:

8.1 Selection of Suitable Site(s) within 10 days from the date of signing MoU by ACSCE

8.2 Installation and Commissioning of IRNSS Receiver by M/S DATA PATTERNS.

8.3 Regular data collection and analysis will be carried out for the duration of the MoU from the date of Installation and Commissioning of IRNSS Receiver

9.0 Training:

M/S DATA PATTERNS will provide necessary training and guidelines for site identification, receiver operations. SAC will provide guidelines for data collection, processing and data transfer

10.0 Project Monitoring:

10.1 SAC and ACSCE shall identify focal person(s) who shall be responsible for organizational matters and interfacing for day to day operation, such as functioning of IRNSS Receiver, security etc. Each party shall pursue its independent research using data from these IRNSS Receiver, with mutual consultation.

10.2 A periodic Quarterly status report should be generated by ACSCE regarding Receiver operations. A User meet to share results, experience will be held at SAC every six months.

11.0 Functionaries (Typically 2)

1. **Prof. R. Elangovan**, Professor, Department of Aeronautical Engineering.
2. **Dr. R. Mukesh**, Associate Professor, Department of Aeronautical Engineering.

_____ (ACSCE Focal persons)

_____ (SAC Focal persons)

12.0 Confidentiality:

12.1 During the tenure of MoU and thereafter both parties undertake on their behalf and on behalf of their employees/representatives to maintain strict confidentiality and prevent disclosure thereof of all the information and data exchanged/generated pertaining to this agreement. However, the data may be published and shared jointly for scientific publication after mutual consent in writing.

12.2 ACSCE will not disclose any research result and Foreground information, generated out of or involving the data, its derivative or information thereof from the IRNSS Receiver established (at given site) as per terms of this MoU to any third party without seeking prior written permission.

13.0 Intellectual Property Rights :

All the research results and foreground information as well as foreground Intellectual Property Rights, generated out of or involving the data, its derivative or information thereof, from IRNSS Receiver and sites established as per terms of this MoU whether or not legally protected, shall be owned by SAC. ACSCE will be free to use such data for their internal R&D purposes with intimation to SAC.

Notwithstanding any provisions mentioned above or any future licensing agreements, SAC shall be deemed to have all rights including non-exclusive, irrecoverable and royalty-free license for the unlimited development and use of any and all Foreground information and Foreground Intellectual Property Rights, generated out of or involving the data, its derivative or information thereof, from the IRNSS Receiver established (at given site) as per terms of this MoU, whether or not legally protected, for the purposes of its own applications.

14.0 Change In Scope of Work:

Any change in scope of work would be with mutual consent of both the parties in writing.

15.0 Modifications to MoU:

15.1 Any amendment or modifications of this MOU shall be in writing by both parties.

15.2 The modifications/changes shall be effective from the date on which they are made/ executed, unless otherwise agreed to.