

## 26 May 2020: PIB Summary & Analysis

### 1. Aarogya Setu

#### Context:

Aarogya Setu is now open source.

#### Details:

- The source code of Aarogya Setu has now been made **open source**.
- The source code for the Android version of the application is available for review and collaboration at [https://github.com/nic-delhi/AarogyaSetu\\_Android.git](https://github.com/nic-delhi/AarogyaSetu_Android.git).
- The iOS version of the application will be released as open source within the next two weeks and the server code will be released subsequently.
- Almost 98% of Aarogya Setu users are on Android platform.
- Opening the source code to the developer community signifies the government's continuing commitment to the principles of transparency and collaboration.
- The process of supporting the open source development will be managed by the National Informatics Centre (NIC).
- All code suggestions will be processed through pull request reviews.
- Aarogya Setu's source code has been licensed under Apache License Version 2.0, and is available on "As-Is" basis. Any reuse of the source code with changes to the code requires the developer to carry a notice of change.

To know more about the [Aarogya Setu App](#), click on the linked article.

### 2. Pradhan Mantri Matsya Sampada Yojana (PMMSY)

#### Context:

Pradhan Mantri Matsya Sampada Yojana (PMMSY) aims to enhance fish production to 220 LMT with an investment of over Rs.20,000 crores in the next five years.

#### Details:

- The Union Fisheries Minister said the scheme will result in doubling export earnings to Rs.1,00,000 crore and generate about 55 lakhs direct and indirect employment opportunities in the fisheries sector over a period of next five years.
- Under the PMMSY, thrust will be given towards enhancement of fish production and productivity, quality, sustainability, technology infusion, post-harvest infrastructure, modernisation and strengthening of value chain, standards and traceability in fisheries sector from 'catch to consumer', establishing a robust fisheries management framework, fishers' welfare, enhancement of fisheries export competitiveness.
- The scheme is also expected to create a conducive environment for private sector participation, development of entrepreneurship, business models, promotion of ease of doing business, innovations and innovative project activities including start-ups, incubators, etc. in the fisheries sector.

- The Minister further mentioned that PMMSY, being a fisher-centric umbrella scheme, fishers, fish farmers, fish workers and fish vendors are the key stakeholders in the developmental activities envisaged and enhancement of their socio-economic status is one the core objectives of this scheme.

To learn more about the Pradhan Mantri Matsya Sampada Yojana, check [PIB dated May 20, 2020](#).

### 3. Chamba Tunnel under Chardham Pariyojana

#### Context:

Union Transport Minister inaugurates the breakthrough event of Chamba Tunnel under Chardham Pariyojana.

#### Details:

- The Border Roads Organisation (BRO) achieved this major milestone by digging up a 440 m long tunnel below the busy Chamba town on Rishikesh-Dharasu road Highway (NH 94).
- The construction of the tunnel was a challenging task in terms of weak soil strata, continuous water seepage, heavy built up area on top, thereby chances of sinking of houses, land acquisition issues, restrictions during COVID lockdown, etc.
- **Benefits of the tunnel:**
  - The Rishikesh-Dharasu-Gangotri road in Uttarakhand has a very significant role from socio-economic and religious points of view.
  - Opening of this tunnel will ease out congestion though the Chamba town and reduce the distance by one kilometre and journey through the town will take only ten minutes as compared to thirty minutes earlier.
- BRO is a key stakeholder in the prestigious Chardham project and breakthrough of this tunnel has been achieved by Team Shivalik.
- the latest Austrian technology has been used in its construction.
- The tunnel will be through for traffic by October 2020, almost three months before its scheduled date of completion.
- Under the Chardham Project (also spelled Char Dham), BRO is constructing 250 Km of National Highways leading to holy shrines Gangotri and Badrinath.

#### About the Chardham Project:

- The Char Dham programme is an initiative to improve connectivity to the Char Dham pilgrimage centres in the Himalayas, namely Gangotri, Yamunotri, Kedarnath and Badrinath.
- These four ancient pilgrimage sites in Uttarakhand are known as Chota Char Dham to differentiate them from the bigger circuit of modern-day Char Dham sites namely Badrinath, Dwarka, Puri and Rameswaram.
- These projects are being implemented by three executing agencies of the Ministry of Road Transport and Highways:
  - Uttarakhand State PWD
  - Border Road Organization (BRO)
  - National Highway & Infrastructure Development Corporation Limited (NHIDCL)
- The project objective is to provide roads with paved shoulders, make provisions for landslide mitigation and other road safety measures, which will provide all weather road connectivity for pilgrims and for movement of defence forces.

## 4. Nanostructures

### Context:

INST scientists find route to fabricate precisely controlled nanostructures of desired geometry & location on 2D materials.

### Details:

- Researchers at the Institute of Nano Science and Technology (INST – Mohali), an autonomous institute under the Department of Science & Technology (DST), have found a straightforward and unique route to fabricate precisely controlled nanostructures of desired geometry and location on 2D materials, through a rapid one-step low power laser writing process.
- Approaches used so far to achieve the controllability over hotspots distribution, which involves the synthesis of complex morphologies, limit their potential to be used for large area substrates.
- In order to overcome this, the INST group developed a hybrid Surface-enhanced Raman spectroscopy (SERS) platform of Molybdenum disulfide (MoS<sub>2</sub>) nanostructure decorated with gold nanoparticles, where direct laser writing is used to engineer the artificial edges on the surface of MoS<sub>2</sub>. This created localized hotspots with remarkable precision and control.
  - Surface-enhanced Raman spectroscopy (SERS) is a technique for molecular detection and characterization that relies on the enhanced Raman scattering of molecules that are adsorbed on SERS-active surfaces, such as nanostructured gold or silver.
- A focused laser beam of meagre power of a conventional Raman spectrometer was used to do nanostructuring on 2D flakes of desired feature size and geometry just by playing with the laser power and exposure time.
  - Using this technique, they achieved the minimum feature size of 300nm, which is close to the diffraction limit of the laser used (i.e., 532nm laser line).
- In SERS sensing, producing SERS substrate of controllable hotspots distribution with desired geometry and location is the main challenging task.
  - Several efforts have been made by researchers to attain the controllability over hotspots distribution via employing various synthesis procedures, hotspots engineering, defect engineering, and so on.
  - However, the random distribution of hotspots and precision over geometrical nanostructure has limited the progress in the field of SERS sensing.
- The hybrid SERS platform developed by the INST group offers controlled formation of localized hotspots for ultrasensitive and reproducible detection of analytes.
- Low power-focused laser irradiation technique was employed to create artificial edges on atomically thin 2D MoS<sub>2</sub> sheet, which enables the superior deposition of AuNPs along the artificial edges, and enhances the local electromagnetic field leading to formation of hotspots.

Also read: [Nano Mission](#)

## 5. Molecular shock absorbers buffer axonal tension of nerve cells

### Context:

Scientists from Raman Research Institute (RRI), an autonomous institute under the Department of Science & Technology, along with IISER Pune and Paris Diderot University, have found out that spectrin, which are

flexible rod-shaped molecules present in axons, act as ‘shock absorbers’ to protect axons from stretch-induced damage.

### Details:

- The study can help in understanding and treatment of concussion from head injuries as well as stretch-induced nerve injuries.
- **What are Axons?**
  - Axons are long tubular extensions of nerve cells that transmit electrical signals across long distances and can be up to a meter long in the case of humans.
  - At such lengths, they are subjected to large stretch deformations during limb or other bodily movements.
  - Axons in the brain too undergo significant deformations, even during normal activities like jumping (the human brain is as soft and wobbly as edible jelly).
- Probing into what special strategies axons adopt to protect themselves from damage during such stretch deformations, the scientists zeroed in on the molecule spectrin, a cytoskeletal protein.
- The research team showed that neuronal cells may have evolved a clever strategy using an etched optical fiber attached to a piezo drive as a force-sensing cantilever to stretch live axons and to measure the resultant tension.
- Piezo drives attached to optical fiber is used to stretch on axons where optical fiber acts as a force-sensing cantilever.
- The resulting tension measured along the axon comes from the axonal cytoskeleton (consisting of biopolymers), of which spectrin is a part.
- Earlier single-molecule experiments had shown that spectrin molecules contain several folded regions which can unfold when the protein is stretched and refold when released, thus acting as molecular bellows.
- By comparing detailed tension measurements on axons with a mathematical model that describes such a mechanism, the RRI team showed that this process helps axons to buffer tension and dissipate excess elastic energy.
- Unlike a linear spring, where the tension increases proportionally with stretch, axonal tension exhibits a plateau-like region where tension is only weakly dependent on stretch, due to the unfolding process.
- This suggests that spectrins can act as axonal ‘shock absorbers’ to protect axons from stretch-induced damage.
- **Significance of the study:**
  - The brain undergoes significant shear deformations (up to 5% of strain) even under normal activities such as jumping.
  - In contact sports, brain concussion occurs and is a leading cause of injuries.
  - This study will have significant implications to our understanding of concussion that result from head impacts as well as stretch-induced nerve injuries.

