

CATCHING BREATH

Tuberculosis (TB) causes the highest mortality rate with 1.7 million deaths yearly (WHO). In Indonesia alone, it has caused approximately 50% of deaths occurred yearly.

Concerned by the manual technique of bacteria counting, Dr. I Ketut Eddy Purnama and his team develops TB Analyzer: a tool applying smart system to automatically counts TB bacteria on a sputum smear.

One of the possible reasons of the high mortality rate of TB is caused by the inaccuracy of diagnosis of the severity, conducted by counting the number of bacteria under the microscope with bare eyes. While the traditional method is time consuming and subjectively inaccurate, TB Analyzer uses integrated hardware and application which utilizes color-based and shape-based microscopic image to count the bacteria.

To count the acid-fast Tuberculosis bacteria, diagnosed patient's sputum is collected, dried, and stained using Ziehl Neelsen stain which makes them visibly pinkish-purple to the naked eyes. Staining process includes burning the slide to melt the layers of wax of the coccus shaped-bacteria and to allow the stain to move into the cell. Then the slide is examined microscopically. TB-analyzer allows the reel moves the slide systematically, allowing the camera to snap the images of 100 grids before they are integrated into one picture to know the number of bacteria and reducing the inaccuracy that might occur in manual reading.

TB Analyzer is a patented, unique tool developed to count the number of Tuberculosis (TB) bacteria automatically, quickly, and reliably, to help medical practitioner to save time and, hopefully, save more lives.

TB-Analyzer INVENTORS

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Dr. I Ketut Eddy Purnama



COFITER:

From Palm Fiber to Rooftop

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As the biggest producer and consumer of palm oil which supports more than half of the world's supply, Indonesia faces many challenges on palm waste. The lack of knowledge and awareness on palm waste management cause people to burn the palm fiber, add more pollution to the air, water, and soil pollution. Proposing a solution to the problem, a team of students from Institut Teknologi Sepuluh Nopember (ITS Surabaya) created **Coco Fibers Converter (COFITER)** to convert palm fiber into green concrete rooftop and won Green Wave Environmental Care Competition 2018, Singapore. The team of four Marine Transportations Engineering Department students hopes to help solving environmental and economical problem, and more importantly one great social problem in Indonesia: population and housing.

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**The
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CommTECH Highlight 2018: Exploring Indonesian Ocean, Coastal System, and Maritime



Institut Teknologi Sepuluh Nopember (ITS) Surabaya conducted the 11th Community and Technological Camp (CommTECH) Highlight this July 2018. The Director of ITS international Office, Dr. Maria Anityasari, mentioned that as many as fifty two participants from fourteen countries namely Australia, Taiwan, China, Myanmar, Pakistan, Poland, Sweden, the Philippines, Cambodia, Vietnam, Aljazair, Thailand, and Russia participated in the first maritime-based CommTECH Highlight. In this opportunity, CommTECH Camp introduced national marine recoveries and its archipelago. The course supported by three departments, including Geomatic Engineering, Biology, and Naval Architecture, and each ran different sub-course. The first sub-course, Exploring the Ocean: Mapping Sea Surface and Seabed Surface, provides the participants with the experience to visit a remote island in Madura. Throughout their three days exploration, they are asked to map the location and observe the local potential of the island. In the second course, Exploring the Biodiversity of Coastal System, participants are taken to a mangrove plantation in Surabaya. The target is to take samples and investigate the biodiversity of the ecosystem. This includes visiting Environmental Services and birdwatching!

The participants of the third sub-course, Build Your Own Boat: Designing, Building and Operating Unmanned Surface Vehicle, are invited to be directly involved in the ship construction of an unmanned vehicle in the laboratory of Naval Architecture. They are challenged to contribute ideas on the design and construction. CommTECH Highlight 2018 is not only a testimony of ITS' diverse influence in marine technology, but also ITS' effort to raise issues about Indonesian maritime sector, hoping to shed light and provide significant contribution to the marine development of the country.





ITS at the Global Stage



Institut Teknologi Sepuluh Nopember (ITS) Surabaya, the best technology and research university in the Eastern part of Indonesia has won two world competitions simultaneously in June, 2018. Here are the brief stories of Ichiro and Barunastra.

Ichiro, World RoboCup 2018 Winner Montreal, Canada

Success is counted sweetest and ITS Humanoid Soccer Robot Club, Ichiro, has tasted it. Ichiro has brought home four winnings on the World RoboCup 2018 in Montreal, Canada, on June 15, 2018. The awards include the first champion of RoboCup in the category of Humanoid Teensize League, second place of Technical Challenge in Teensize category, third place in Drop In Games Teensize category, and third Best Humanoid for all category.



ITS Ichiro Team

The winning was the real definition of *hard work pays off* and *a dream come true*. Ichiro was pronounced the winner after successfully scoring three shots into Iran team's MRL HSL goalpost, a seemingly unbeatable team that score 20 when Ichiro only achieved 9 in the qualify round. Two days before the competition, Ichiro encountered big problem. One of the important elements was charred but the team did not surrender. They battled with time and, eventually, win.

Barunastra RoboBoat Championship 2018 Daytona Beach, Florida, USA

Barunastra, ITS RoboBoat Team, has an epic winning over thirteen prominent universities competing in International RoboBoat Competition 2018 taking place on 18-24 June 2018 in Florida, USA. After standing on the fourth place in 2017, team were showing constant outstanding performance in the 2018 run even since the qualification run.



ITS RoboBoat Team

Barunastra smoothly outperformed other contestants by achieving the highest score 3118 in the first round. Before the final run, they encountered several fatal obstacles affecting external component including GPS, compass, and computer error. With dedication and optimism, the team has successfully conquered the final run. Nala Heroes, the autonomous unmanned boat, swiftly waded and won the run only in 8 minutes from allocated 20 minutes. They swiped the highest score by 4996, and claimed the first rank. Well-done!

Share what you think about our teams at this following address: wcu@its.ac.id





Jalapatih ITS

Third Place Solar Sport One In the Netherlands

Institut Teknologi Sepuluh Nopember (ITS) Surabaya Marine Solar Boat Team Jalapatih has won the third place in the category of Top Speed Record of the Solar Sport One 2018 competition in Groningen, the Netherlands, on Monday July 7, 2018. This is the fourth victory that ITS achieved in the past two months, following Ichiro, Barunastra, and Sapuangin.



Solar Sport One 2018 is a competition for solar-powered boats held by the Solar Sport One Foundation. Twenty nine teams from eight countries competed in the event. Year 2018 was the third time for Jalapatih in the competition. The four days competition was held in several cities in the Netherlands and competed several different categories. Top Speed Record category was held in Groningen in which Jalapatih successfully accelerated up to 23.5 km/hours which surpassed teams from the Netherlands, Poland, Belgium, and Portugal. Though only scoring third place, Jalapatih ranked the fastest among other teams from Asia. In the Stage category, despite the cloudy weather, Jalapatih was able to sail for 39 hours nonstop from Esonstød to Leeuwarden. During the sprint category that was conducted twice, Jalapatih finished the run in 15 seconds and ranked in sixth and finished in two minutes and ranked top ten.



YES!

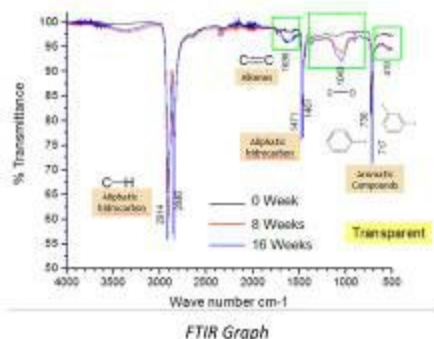
The Wonorejo Mangrove Sediments Have Diverse Plastic Degrading Microbes

Nowadays, plastic plays important role for daily human activities for many purposes. But its waste remains a significant environmental problem since it contains long inert polymeric hydrocarbon chains—does not dissolve in the water and is non-biodegradable. Many ways have been done to solve the problem. One is by using microbes. Microbes, micro-shape organisms, act as eco-friendly environment cleaners through their metabolisms and they are surely interesting target to be explored!

One of Institut Teknologi Sepuluh Nopember (ITS) Surabaya research groups from the Biology Department, **Biodiversity and Biodegradation**, is currently working on the exploration of microbial diversity and their function in the environment. The team isolated many types of microbes including bacteria, fungi and yeast from Wonorejo mangrove sediments that are capable to degrade plastics. Presented in this article are *Pseudomonas*. After a 16-weeks incubation, the microbes successfully reduced approximately 12% of plastic dry weight. The Fourier-Transform Infrared Spectroscopy (FTIR) data in the figure below shows chemical groups changes on the plastic compounds, as a strong indicator that plastic degradation occurred.

The FTIR results showed that there was transmittance attenuation for particular peaks; this indicated those peaks changed their chemical compounds. They were peaks for unsaturated aliphatic hydrocarbon ($-CH_3$ - or $-CH_2-$) between 1200-1500 cm^{-1} ; aliphatic phosphorous compounds between 990-1300 cm^{-1} and undefined compounds between 450-600 cm^{-1} .

Further works are still under performances to figure out other related aspects to achieve higher potency of *Pseudomonas* and many other microbes in plastic degradation, including influenced abiotic factors, synergisms in consortium form, and enzymatic exploration.



Pseudomonas cell

Biodiversity and Biodegradation Team

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SAPUANGIN

Won Shell Eco-Marathon Drivers' World Championship 2018

SAPUANGIN, the fuel-efficient car of Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia, won the Shell-Eco Marathon World Driving Championship (WDC) at Queen Elizabeth Olympic Park, London, on July 9, 2018. The hard-fought race added another international-level trophy for the technology-based university after Barunastra and Ichiro won RoboCup and RoboCup 2018 in the United States and Canada in this past June.

This 10-lap race aims to find the quickest and the most energy-efficient driver. Sapuangin started well from the pole position. The car was maintaining a constant speed throughout the early laps, staying at the top four. During the final lap, calculating the remaining fuel and a good chance of winning, the team accelerated and was the first to cross the finish line. However, Sapuangin did not simply win. Sapuangin was considered by the lacking one lap and was put in the 9th place. The team, supported by other Indonesian teams, attaché, journalists, and the LO of Shell in Indonesia, protested and showed the racing footage. The Canadian team initially, declared the winner, also gave their honest testimony of the race. The competition was emotional but eventually, Sapuangin was declared victorious.

SHE IS

The Beauty of Science

“Dr. Sri Fatmawati is an Indonesian-based bioenvironmental scientist from Institut Teknologi Sepuluh Nopember (ITS), Surabaya. Her wonders of *jamu*, traditional medicine from Indonesia, has taken her to reach many awards, including Elsevier Foundation Awards for Women in Science 2016 and L'Oreal-UNESCO for Women in Science, and driven her to discover more about sponges to cure malaria, cancer, and Alzheimer's disease.

The 37-year-old researcher is well-known for her expertise in the research of natural products. The exposure of the benefits of *jamu* that she experienced in her childhood has driven her to build the interest into knowing the science behind natural products. She manifested her childhood wonder through her Bachelor degree thesis and started her career doing research on plants and mushroom.

She began to develop interest in sponges after a visit to a local beach, *Kenjeran*, where she encountered sea creatures like sea cucumber and sponges and speculated their huge undiscovered benefits. Sponges are a unique creature with huge benefits, but dealing with sponges has its own challenge. Accessing the sponges was the biggest challenge after all as they can only be gathered in the depth of 100 meters below the sea surface.

At the moment, the potency of sponges in Indonesia, a maritime country with approximately 70% of sea area, had not been popularly discussed and only a small number of research covered the topic. Fatmawati's persistence and hard work met luck. In an international congress of natural product, she met a professor from France and scored a research collaboration.

Regardless all the challenge, Fatmawati has proven that she has much bigger urge to strive. Being able to discover something new and different, being the first to discover, and giving benefits to the society excite her to do more research.”

**DR. SRI FATMAWATI**

SMEs : Economy, Society, and People Empowerment through Short Programs

In line with the spirit of achieving Sustainable Development Goals 2018, Institut Teknologi Sepuluh Nopember (ITS) Surabaya has been working closely to empower Small and Medium Enterprises (SMEs) and eradicate poverty and to support people empowerment and economic development.

Since 2012, ITS has been scouting SMEs by involving them in every short program that ITS conducts. During the visit, all participants of the program are taken to the entrepreneur villages to observe the production stages, discuss with the entrepreneurs, have a taste of the product, and give feedback for the SMEs improvement through questionnaire. The result of the questionnaire is used to improve the quality of the business.



Kampung Tempe
(soy-bean based products village)



Kampung Kue
(traditional cake and cookies village)

The progress of SMEs scouting has been significant. These days, the entrepreneurs are able to create promotional materials and website to reach international consumers, make innovations on new product, increase product quality, even export their product. The people are motivated to actively communicate, both in local language and in English. More importantly, the improvement brings good effect to the environment as the people's awareness on cleanliness rises.

Below are several examples of ITS-scouted SMEs *kampung* (villages).

- *Kampung Tempe* (soy-bean based products)
- *Kampung Bordir* (embroidery)
- *Kampung Kue* (traditional cake and cookies)
- *Kampung Batik Jumpt* (Indonesian style tie-dye batik)
- *Kampung Herbal* (herbs)
- *Kampung Kerang* (sea shell)

ITS commits to endeavor the development of SMEs for better establishment and employment in Surabaya. We invite you to join the tremendous efforts by sending a reply at wcu@its.ac.id.



ITS – SIT Japan Collaborative Efforts to Learn and Enhance City Development



Insitut Teknologi Sepuluh Nopember (ITS) Surabaya is responding to the challenges of Industry 4.0 by expanding its collaborative efforts with universities worldwide. These collaborative efforts take a variety of different forms, one of them being short programs. On Monday (29/10) ITS has just recently launched its second Global Project Based Learning (GPBL) initiative with Shibaura Institute of Technology (SIT) Japan. This short program, ran and coordinated by the Directorate of International Partnerships of ITS, is not merely a follow up program to previous ITS - SIT collaborations. With the assistance of ITS students from the Architectural Program and Urban City Planning Program, GPBL is designed to be a hub for discussion, collaboration and cooperation between students from both of these universities. This year's GPBL program invites students to observe, evaluate and provide a solution to address real life issues that occurs in the city of Surabaya. By learning from each other, students from both universities are challenged to bring different facets of understanding towards problem solving. Japan, a developed country, might not have as many of these issues as Surabaya, but Surabaya's unique characteristic and diverse communities provide a challenging preposition for both ITS and SIT students. The ultimate goal of this program is to contribute to Indonesia's perpetual development while also providing the students from both institutions an opportunity to face real world problems in their fields.