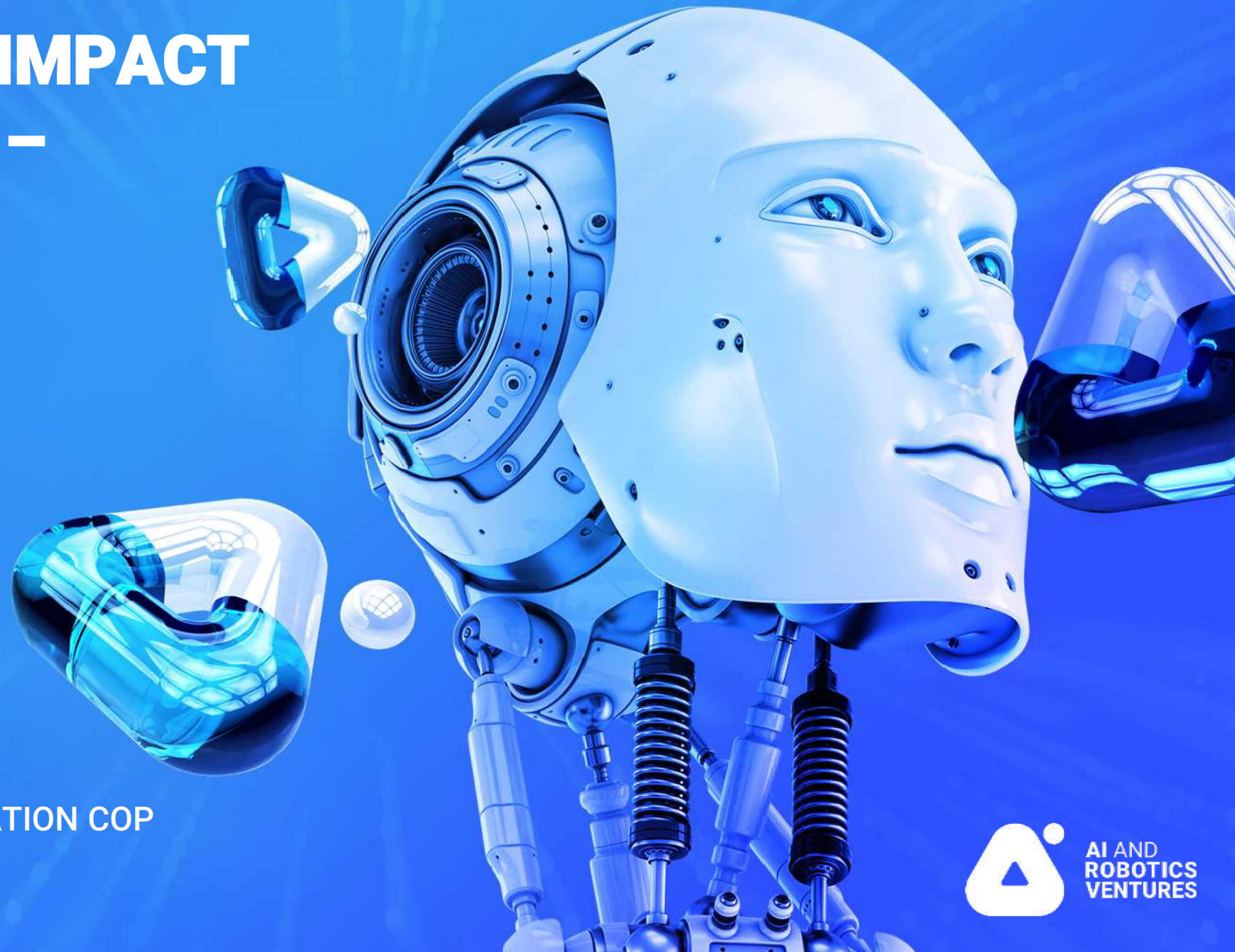


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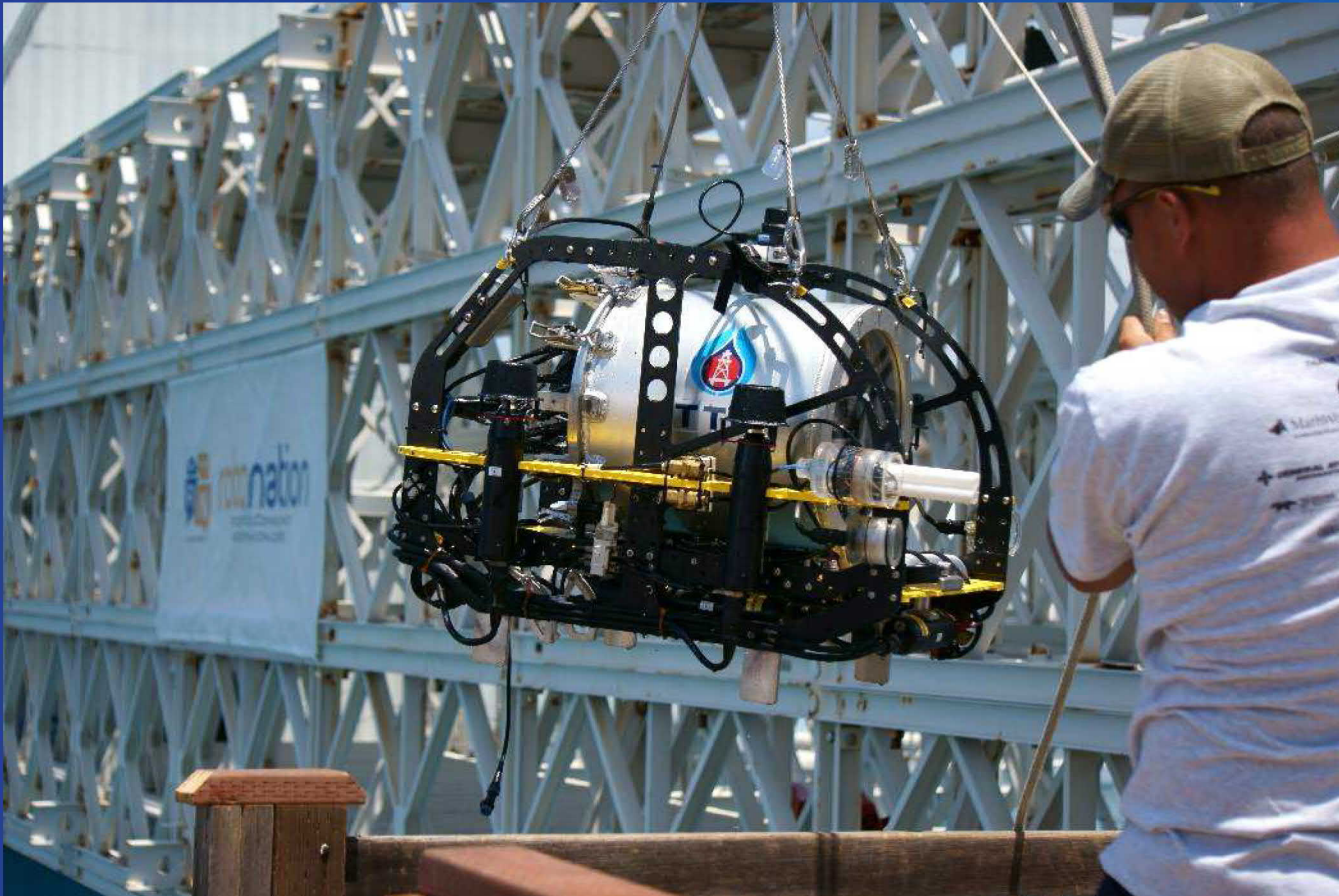
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15 MARCH 2023

Rev 12-03-2023



OBSIDIAN LAB-SCALE AUV PROTOTYPE

PTTEP-KU-MML Subsea Robotic Project
Robosub, San Diego, USA : 2014



ENERGY



The Obsidian robot jointly developed by Kasetsart University and PTT Exploration and Production recently took part in an international submarine robot competition in California.

PTTEP aims to cut costs with robotics

YUTHANA PRAIWAN

PTT Exploration and Production Plc (PTTEP), the only SET-listed upstream energy firm, has teamed up with the engineering faculty of Kasetsart University (KU) to develop an underwater robot for commercial sale, scheduled to be launched on the market in 2017.

The collaboration was initiated in 2012 and a memorandum of understanding inked last November.

Phongstorn Thavasin, PTTEP's executive vice-president for engineering and development, said the co-venture set a target of developing a remotely operated vehicle (ROV) and autonomous underwater vehicle (AUV).

Once the development of the robot is complete, PTTEP will be able to cut operat-

ing costs significantly.

"We spend more than 1 billion baht each year on outsourcing service providers to check our underwater exploration and production facilities. If we have our own technology, we can save a lot of money," said Mr Phongstorn.

KU has received 11 million baht from PTTEP to support the pilot robot project. The robot recently took part in an international submarine robot competition in California.

KU's submarine robot, named Obsidian, made it through to the semi-final round, which was held from July-August. The gold medal was taken by a team from Cornell University in Ithaca, New York.

Mr Phongstorn said exploration activity was getting tougher due to the depletion of resources worldwide.

"These days we're digging deeper and deeper, at depths of over a kilometre underwater where no human being can dive. But the robot is our future if it is able to handle the intense pressure at those depths," he said.

Demand for ROVs and AUVs has been rising globally for 10 years, with inventors working hard to make the marine robot commercially in the US and Scandinavia.

Mr Phongstorn said economy of scale was a matter for the company, as its initial exploration fields were only in a few areas. But the company has now expanded to 12 countries.

Producing its own ROVs and AUVs is commercially viable.

"Initially we had to depend on service providers, but as our scale of operations has expanded, we actually use more than 100 of these robots, so it makes more sense to invest in our own technology," Mr Phongstorn said.

KU Assoc Prof Yodyiam Tipsurwan said the pilot Obsidian robot would require further development to ensure it worked in real situations and could cope with harsh conditions such as heavy storms and extremely cold water.

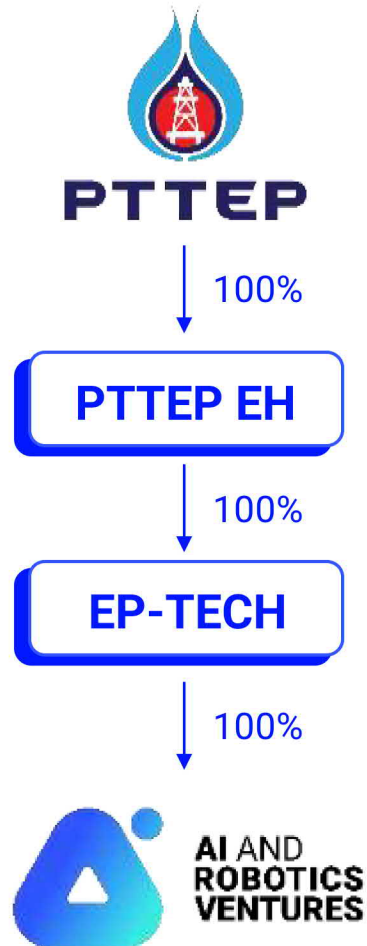
"It will bolster the knowledge of our students and prepare human resources for the high-technology sector," he said.

Assoc Prof Yodyiam said the cost of equipment to develop ROVs and AUVs was too high for KU to shoulder alone, and the state budget had not approved procurement.

PTTEP shares closed yesterday on the SET at 152 baht, down one baht, in trade worth 966 million baht.

ABOUT ARV

Established September 2018



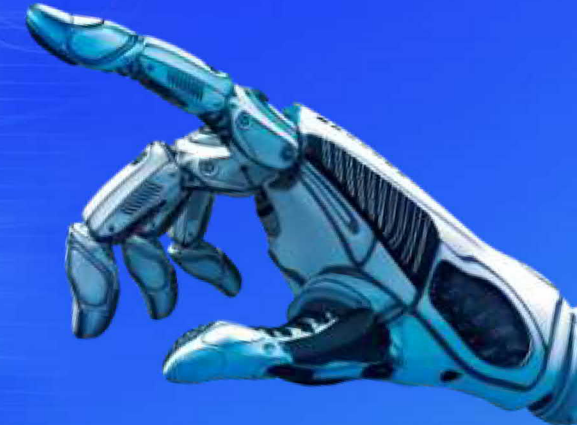
VISION

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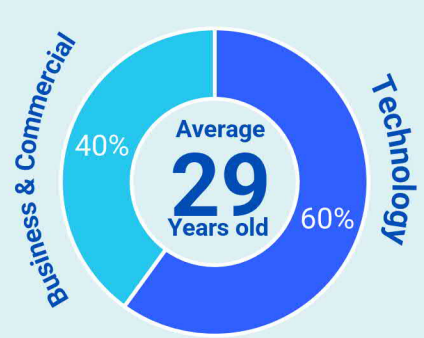
MISSION

Leading AI and Robotics Solutions Platform to business enterprises and governments which enable them to capitalize on emerging AI & Robotics technology.

WHAT WE DO



Human Resources



- Data Science
- Machine Learning
- DevOps
- MLOps
- Cloud Computing
- Geospatial Big Data
- Cybersecurity
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- Robotics
- Artificial Intelligence

Facilities

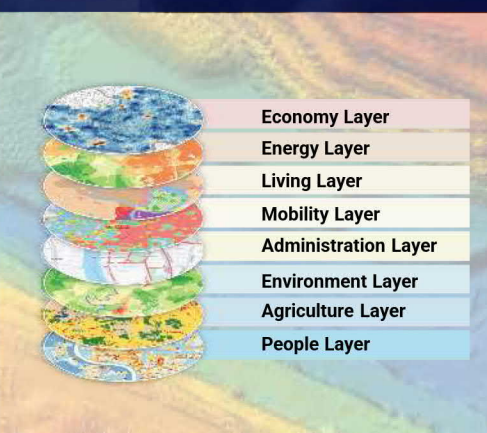


Deep Tech Development



AI-Enabled Robotics

Blockchain and Geospatial Data Intelligence

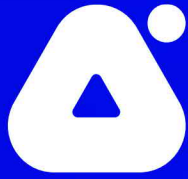


Partnership Ecosystem



Business Units





AI AND ROBOTICS VENTURES

VENTURES BUILDER

ARV is a Ventures Builder principally engaged in the research, development and provision of solutions using Artificial Intelligence and Robotics technologies, as well as ventures ideation, incubation, development and commercialization.

BUSINESS UNITS

ARV has successfully spun-off start-ups into separate legal entities focused on further commercialization and development of their respective deep-tech domains.



ROVULA

Unmanned Robotic Technologies and Data Analytics for Marine, Offshore and Underwater Assets



SKYLLER

AI-driven and Autonomous Aerial Drone Technologies, Operations and Data Analytics for Various Industries and Operations



varuna

One-Stop Agriculture and Climate Technology Solutions



CARIVA

Health Solutions Platform that Simplifies Data Access, Manage Security and Accelerates the Creation of Digital Health Solutions



bind

Software Solutions for Security, Privacy, and Data Controlling in the Web 3.0



bedrock

Geospatial Location Intelligence Platform and AI Technology to provide advanced location insights



XGATEWAY

Unmanned Surface Vehicle for Hydrographic Survey and Surveillance



XPLOER

Autonomous Underwater Vehicle for Subsea Pipeline Inspection



NAUTILUS

Underwater Robotic System for Inspection, Repair & Maintenance of Subsea Pipelines



XSPECTOR

A cloud-based data management platform specifically tailored for subsea inspection and survey operations



HORRUS

Autonomous Nested Drone Systems for Asset Inspection, Surveillance and Mapping



SKYLLER PLAFORM

Data Platform for Fleet Management, Data Visualization and Analytics



SKYLLER AI ML

AI-Assisted anomalies detection for fast and accurate decision making



UAV LOGISITIC

Drone Delivery Solutions for intra-city, long range and remote delivery of critical cargo and parts



AiANG SPRAYER UAV

UAV for blanket and precision-spraying services for various crops



SMART FOREST

Green Area management platform and carbon credit solution



KANNA

Carbon Farming and nature Based climate action



MAKARA

Data management platform with satellite analytics



HEALTH APPLICATIONS

Variety of completed health applications for Health and wellness solutions



HARDWARE SOLUTIONS

Seamless integrate to software with IoT and Robotics solutions



BUILDING BLOCKS

Data management and software API platforms for building the custom-made digital health solutions.



Digital Corporate ID

Automatic and Seamless Verification of Digital Signature with with E-Power of Attorney and National Identities of the Singers in any corporate transactions with global interoperability



TRUSTME

Secured Wallet that keeps all identities and personal data



CITY DIGITAL DATA PLAFORM

Platform to supporting cities to operate urban infrastructure components and services efficiently with data connectivity



MUNICIPAL TAX PLAFORM

One-stop tax collection & valuation intelligent system to facilitate citizens for submission of online petition form, payment check and status tracking



BUILDING PERMIT PLAFORM

The integration of AI and GIS to streamline rive accurate, quick and convenient permission processes for officer and citizen



ASSET MANAGEMENT PLAFORM

Allows government offices to monitor, review and update assets' status for informed evaluation and decision making



**AI AND
ROBOTICS
VENTURES**
A COMPANY OF PTTEP GROUP