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The Engineering City Journal

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The purpose of the Journal is to disseminate knowledge, experience, and best practice in engineering & manufacturing.
The articles are written by practicing professionals in the Engineering City (EC) in Yerevan. They cover issues relevant to their projects, operations, and organizations.
The articles address the challenges of the time. As such, the Journal is also a chronicle of the evolution of the EC, its companies, and its individuals.
It is the aim of the Journal to advance the engineering & manufacturing practice, to enrich the engineering & manufacturing community, and to contribute to the worldwide discourse in engineering & manufacturing.

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Editorial

In this edition, we are introducing a new corner to the Journal – Armenology (Հայագիտություն). The purpose of this corner is to ground the engineering practice into the particularity of Armenia. The thought here is that this should create a counterweight to engineering, which is a universal practice. Let's give it a try.

EC News Corner

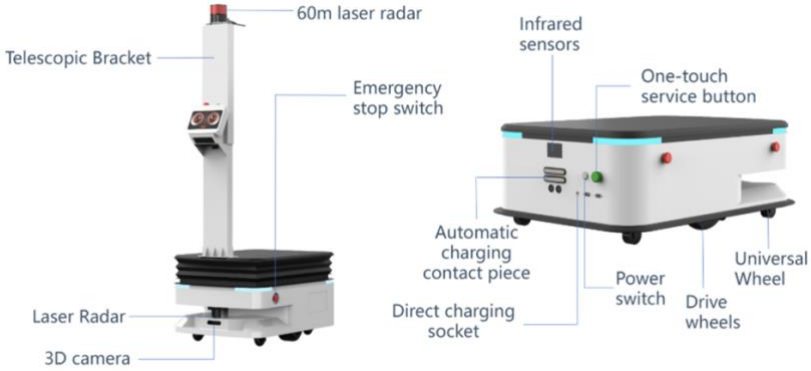
. Industrial Robot Carrier – A New Research Platform in the "Smart Manufacturing Lab"

by Andranik Meliqsetyan, NI

I am happy to inform you that as a part of Smart Manufacturing Advanced Research Lab we just received the first robot, which is an Industrial Transport robot for autonomous delivery on manufacturing floors. You can see below high-level introduction.

Overview

ATEAGO ROBOTIKS S6P ROS AI Robot Carrier 300 KG Payload AGV Logistics Robot Chassis Industrial Transport Robot Base Mobile Delivery Robot Porter Warehouse Dispatching Robot AMR is a one-way backpack handling robot, 300KG large load capacity, equipped with ATEAGO self-research SLAM 2.0 autonomous positioning and navigation system, high precision navigation and positioning, open SDK platform, support secondary development or customization services to meet different robot development needs.





01 Super capacity

The chassis is made of sheet metal construction, with a large capacity of 300 kg, stable and undeformed

02 Intelligent obstacle avoidance

270° autonomous obstacle avoidance, flexible steering,
stable and safe operation

03 Remote navigation deployment

Support for remote navigation to build maps, easy and fast robot installation and deployment

04 Independent suspension structure

Smoother robot movements, smooth steering and less wobbling

05 Autonomous dispatch system

Multi-machine collaboration allows for dynamic adjustment of robot avoidance according to task priority, enabling efficient and stable delivery

06 Automatic recharging

Automatic return to charging when the power level falls below the minimum, no manual operation required

Super load capacity, suitable for various places

Equipped with integrated wheel motor, with super dual drive, its chassis adopts flatbed truck structure, large platform space, strong load-bearing capacity, can be a maximum load of 300KG, to meet the needs of industry scenarios.



Extensive interfaces and scalability

The SDK is open to all users, providing a rich API interface with great scalability, and for customers with certain development capabilities, customised development can be achieved according to the needs of scenario applications, meeting the diverse needs of the market for mobile robot chassis.

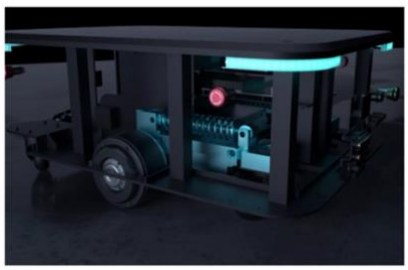




Both side drive wheels with shock absorbing suspension system

During the movement of the robot, the posture is smoother, the steering action is small, and there is no tipping, effectively reducing problems such as slipping of items during delivery.





Equipped with ATEAGO advanced self-developed SLAM synchronous positioning map building system, high-precision navigation and positioning, Laser radar, 3D cameras, all-round perception of the surrounding environment, efficient and stable operation.

Single line Laser

Detection distance 25m, laser wavelength 905 nm Working area 270°

3D cameras

Vertical angle: 63° Horizontal angle 79°



Multi-machine collaboration and orderly operation Avoid blocking the "machine"

The built-in scheduling system, with multi-machine collaboration, can dynamically adjust robot avoidance according to task priority to achieve efficient and safe, stable and reliable delivery efficiency.



Operating systems	Android 5.1 operating system and above
Whole machine size	791.6mm (L)*560mm (W)*1682 mm (H)
Net weight	65KG
Screen	7 inches (resolution 1024*600)
Travel speed	0.1~1.0m/s
Maximum load capacity	300KG
Charging time	6 hours (with automatic recharge)
Navigation accuracy	±10cm
Battery parameters	Lithium iron phosphate 38.4V/25Ah
Battery life	Full load 8 hours, no load 20 hours
Charging method	Automatic re-charging, direct charging
Motor Drive	5.5 inch wheel motor
Adapter	Input: AC110-240V 50-60HZ Output: 43.2V-5A
Charging Pile Parameters	Overcurrent protection, intelligent power failure, output rated voltage: 43.2V DC Output rated current: 5A



My Observations so far

We received a robot relatively quickly after placing an order to the Chinese manufacture. Robot was delivered in a single box, and I was able to quickly get familiar with the main functionality using the documentation provided by the support team. I was able to bring it up and use it right out of the box, overall had a good experience considering the advanced capabilities which robot has.

Robot's operation system is based on Linux ROS and it comes with the out of the box capabilities need to cover several scenarios that are most common on smart manufacturing type applications.

1. Shelf handling up to 300Kg with the jacking mode, basically it can navigate under the shelf and jack it up (100mm jacking) and move the loaded jack to the specified location on the real time map. This use case is perfect to move heavy packages across facility. Her is the video. I was already able to test this with the demo bench.

2. Route mode. It can also follow the pre-defined route and handle loads as needed on designated locations on the map that is created using the 3 LIDARs that it has on board.

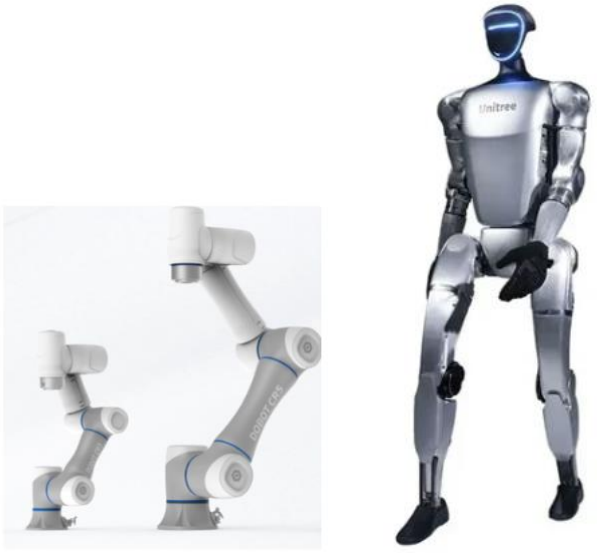
3. QR code-based handling, robot has a QR code reader on board which is used to navigate autonomously in the floor and wait until it's loaded to transport the stuff accordingly.

The scenarios listed above are out of the box and they cover a lot of warehouse handling scenarios. However, robot came with open SDK which has API available for developing custom scenarios.

One of the sophisticated scenarios that future ARC team can research is to use this robot in conjunction with collaborative robotic arms. Basically, cobot can be placed on this robot and it can move it on the manufacturing floor in autonomous manner and let the cobot do its actions, like parts handling. Example video here.

Other robots to be received soon.

We have several other robots on the way to EC to be received by the end of this year. Two cobots are from Dobot brand with gripers, stands etc. and Unitree g1 Edu humanoid robot.



Pic. Robots that the ARC must still receive.



Pic. The EC Manufacturing Team putting claim on the Robot.

. Engineering City in the News



You can watch it here Link.

Armenology Corner (New)

. Armenology – a Particular Science as a Counterweight to the Universal Sciences of Engineering

by Rama, Engineering Association

Armenology (Հայագիտություն) is the science that studies the history, language, culture, and struggles of the Armenians and the structural forces shaping their continuity across millennia.

We, as engineers, are engaged in universal sciences – physics, technology, mathematics, programming. These sciences are universal in the sense that physics is physics everywhere and so are technologies, mathematics, and programming.

However different nations go about approaching, practicing, and internalizing these universal sciences differently.

The stories of nations are the stories of how each nation solves their challenges of survival and progress in their particular way. Each nation faces the world differently and find solutions that are unique to their environment, surrounding, challenges.

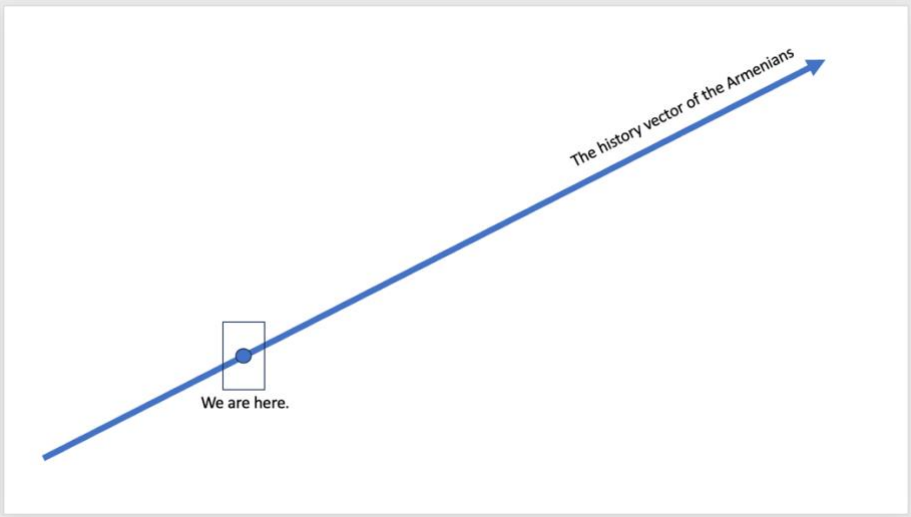
There are no universal solutions here. The problems may be universal, yet each nation has to solve their problems it the the particularity of their conditions.

Each nation does it their way, so do the Armenians do it their way. And as such, every nation enriches the palette of the human experience.

Armenology is the science that studies the story of the Armenians in how they solve their challenges of survival and progress in this wild and hostile world. On the palette of nations, we have our solid place.

Introducing Armenology to the engineering community should provide a counterweight to the engineering sciences, which are universal in nature. It should ground the community into history, give a sense of belonging, and provide a historical purpose – a purpose of continuity, a purpose of contribution, a purpose of ownership.

History is there for the taking. It will be owned by those who claim it.



Pic. The history vector of the Armenians.

. Օտար բառերի հայերեն համարժեքներ

by Rama, Engineering Association

The Armenian language is really beautiful, rich, and flexible. Its structure is such that makes creating new words easily possible – something that few languages posses.

Below are some examples that show how new Armenian words get created and how descriptive they are.

For example, take the word "**եզրաքար",** which in Russian is "бордюр", and in English is "Curb". But see how descriptive the Armenian word is and how it is a simple combination of two other words **եզրա-քար.**

բորդյուր	եզրաքար

Or, take the Russian word "Анкета". In Armenian it easily becomes **հարցա-թերթիկ.**

անկետա	հարցաթերթիկ

In the Ananya Shirakatsi school, there is an initiative of promoting the right Armenian words among students.

Below is an excerpt of an email that was circulated internally. I wanted to share it with you.

"Լեզվի բառապաշարը համեմատաբար հարափոփոխ բաց համակարգ է.

մեր օրերում գիտության տարբեր ոլորտների զարգացումը, մշակութային փոփոխությունները, տեղեկատվական և նորարարական տեխնոլոգիաների ձեռքբերումները իրենց անմիջական անդրադարձն են գտնում բառապաշարում։

Այս զարգացումներով պայմանավորված՝ բառամթերքը շարունակաբար համալրվում է տարբեր լեզուներից փոխառված օտար բառերով։

Հայոց լեզուն՝ ի տարբերություն, օրինակ, անգլերենի և ռուսերենի, հետևողական պայքար է մղում ինքնամաքրման՝ փորձելով յուրաքանչյուր օտար բառի դիմաց ստեղծել դրա համարժեք հայերեն տարբերակները։

Մեր նամակներում հիմնականում առանձնացնելու ենք այն բառերը, որոնք հաստատված են Լեզվի պետական կոմիտեի և Երևանի պետական համալսարանի ժամանակակից հայոց լեզվի ամբիոնի կողմից։"

Անի Մակինյան
Հայոց լեզվի և գրականության ամբիոնի դեկավար
«Շիրակացու ճեմարան»

I will start sharing the below tables as they become available.

Օտար բառեր	Հայերեն համարժեքներ
ակումուլյատոր	կուտակիչ
ադապտացիա	հարմարեցում, ընտելացում
անկետա	հարցաթերթիկ
արխիվ	պահոց
բունտ	խռովություն
բորդյուր	եզրաքար, մայթեզր
բոյկոտ	ընդվզում
բուլյոն	արգանակ

All this makes Armenia a living language capable of creating new words and of expressing the most modern sophisticated concepts.

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For feedback on the *Journal*, its content, and its articles please send to info@engineeringcity.am.

To submit articles, please send to info@engineeringcity.am. Articles can be in any language.
