

VIGYAN PRASAR

DREAM

2047

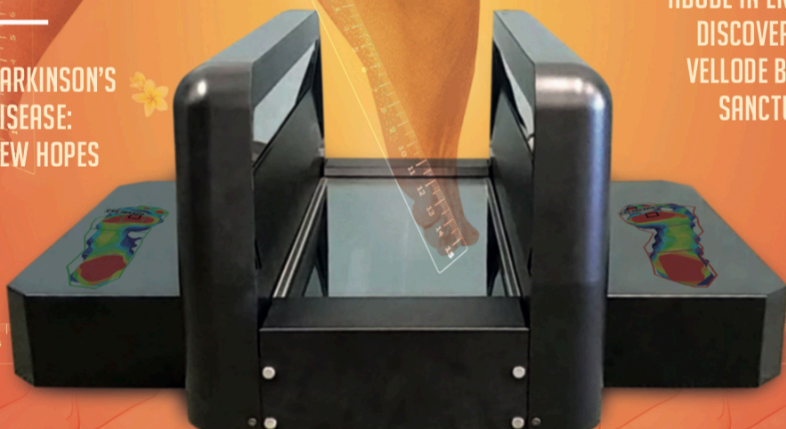
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**NITROGENOUS FERTILIZERS:
AN INTRICATE RELATION
WITH POPULATION,
PRODUCTIVITY AND
POLLUTION**

**PARKINSON'S
DISEASE:
NEW HOPES**

**SRINIVASA RAMANUJAN:
A GIFTED GENIUS**

**WINGED VISITORS'
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DISCOVER THE
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SANCTUARY**



FOOT SIZE 'HINDUSTANI'

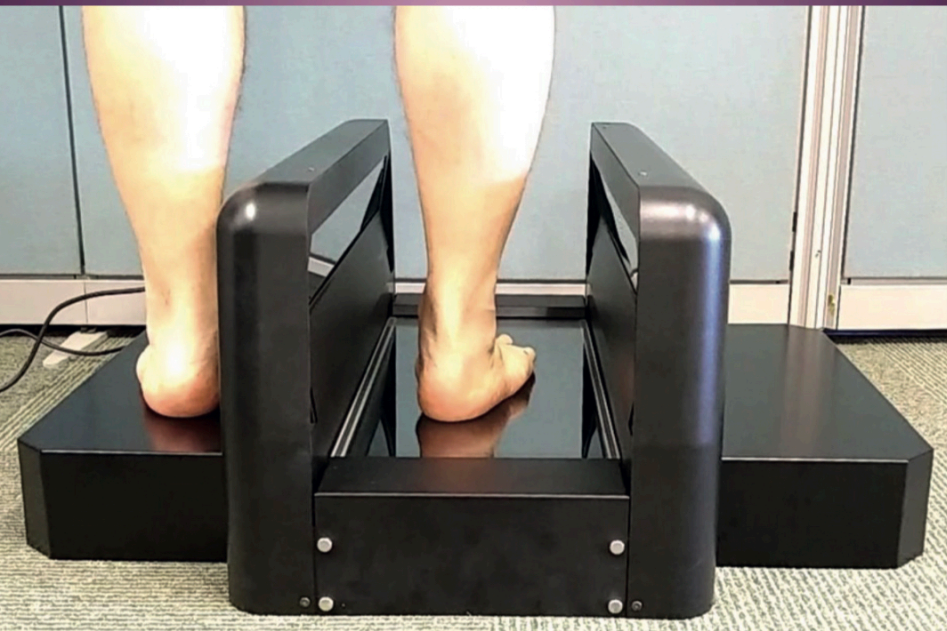


COVER STORY

NEHA TRIPATHI

FOOT SIZE 'HINDUSTANI'

Do you have any idea about how your shoe size is determined? Moreover, do you know your shoe size varies with the country? It is different in America, Europe, London, Japan, etc. And what about India? When you shop for footwear online, options are provided, for example, US/UK/Europe. It becomes difficult to choose the size.



Don't get surprised if you find a team visiting your doorstep with a 3D machine to scan your feet. The foot survey has already begun from 2 December 2021. This is part of a very interesting nationwide survey which will help to develop an indigenous footwear sizing system.

HOW IMPORTANT IS THE FOOTWEAR INDUSTRY?

India is the second largest global producer of footwear after China. It produces 2065 million pairs of different categories of footwear annually and exports about 115 million pairs. Thus, nearly 95% of its production goes to meet its own domestic demand.

WHY IS AN INDIAN SIZING SYSTEM NEEDED?

The size that you think is right for you is actually derived from English footwear sizing system. However, our foot characteristics are very different from the English feet and the size varies with brands. It is 7 with some brands and 6 with some other manufacturers. This is because our foot size has never been measured and footwear were never customised as per Indian feet.

Indian Standard Specification for Sizes and Fitting of Footwear (IS 1638-1969) was given in 1969 by the Bureau of Indian Standards (BIS).

The new footwear sizing system will fall under Rules and Criteria that define the best fit-IS 1638:2021

Shoes are much more popular, and important to people now. "From owning 0.5 to 0.6 pairs/person many decades ago, Indians now own 1.5 pairs/person on average.

Dr K.J. Sreeram, Director, CSIR-CLRI is quite enthusiastic about the project. He says, "This project is one-of-its-kind endeavour of Government of India, coinciding with the Azadi Ka Amrit Mahotsav to ensure the better health of Indians through better fit footwear."

THE MEASURING TECHNOLOGY

The measuring method may range from a fully manual to a well-mechanised approach. The manual (or traditional) methods are based on drawing the plantar projection of foot on a sheet of paper and taking its dimensions using simple tools such as liners or measuring tapes. Semi-mechanised methods use mechanical devices for determining dimensions of feet. The modern measuring technology takes advantage of high-tech optical, electronic, and computer-aided techniques.

FEATURES OF THE 3D FOOT SCANNER:

1. Fast scanning of the foot;
2. Foot parameters with high accuracy;

3. Efficient data of 3D foot with measuring points;
4. Retrievable historical foot data storage based on Foot ID;
5. The scanner is compact and easy to carry around.
6. The scanner takes 3 to 5 minutes per person and can scan 12 to 20 persons per hour.

WHAT ARE THE DIMENSIONS OF THE INDIAN FEET?

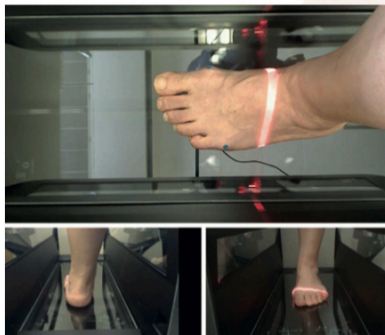
Designing footwear is complex and requires scientific and engineering expertise. The 3D scanner in this case is going to take 30 different measurements of a human foot to support developing Indian Footwear Sizing System.

Md Sadiq, footwear sizing project team member clearly

FOOT MEASURING ITEMS



0	Foot Length
1	Ball Girth circumference
2	Foot Breadth
3	Instep circumference
4	Heel Breadth
5	Instep Length
6	Fibulare Instep Length
7	Height of Top of Ball Girth
8	Height of Instep (Default: 50% of foot length)
9	Toe #1 angle
10	Toe #5 angle
11	Toe #1 Height
12	Toe #5 Height
13	Height of Navicular
14	Height of Sphyrion fibulare
15	Height of Sphyrion
16	Height of the most lateral point of lateral malleolus
17	Height of most medial point of medial malleolus
18	Arch Length
19	Angle of heel bone
20	Heel Girth circumference
21	Horizontal Ankle circumference
22	Calf circumference (height 230mm)
23	Foot Breadth 2 Breadth perpendicular to foot axis
24	Heel-Sphyrion length
25	Heel-Sphyrion fibulare length
26	Heel-Navicular length
27	Horizontal distance: Lateral malleolus-Achilles tendon
28	Horizontal distance: Medial malleolus-Achilles tendon
29	Horizontal distance: CP of L&M malleolus-Achilles tendon



states, "For me the most important aspect of the project is been the harnessing of the expertise gained by CLRI in implementing a foot measurement survey with a lesser sample size of 10,000. It was also challenging to successfully carrying out children's foot survey with both exercises resulting in the development of "Last" for footwear manufacture with perfect comfort and fit. In this project we have been guided by NSSO who have shared their expertise and have narrowed down the number of locations as well as the number of measurements pan India to design a statistically robust foot measurement survey. Synergy Partners drawn from leading institutions across the country are a source of great help in the smooth data collection process and in the successful completion of the project."

SURVEY PLAN FOR THE PROJECT

The places of measurement are selected based on geographical, ethnic, and social variables. The Survey teams will travel to

identify schools, offices, groups of households, CSIR labs, and defence institutions.

Director, CLRI appeals to the people at large that "In spite of the pandemic, people attending schools and colleges, and those who are working in industries, parents etc. need to voluntarily come forward to help the project team when they approach them for the survey of foot size. This will be a highly safe procedure spanning less than 5 minutes and following all COVID protocols."

As per the plan till now, for the Pan India survey, the country is divided into 4 Zones: North, South, East (further split into North East and rest of East), and West. Based on the foot growth parameters the population is divided into various age and gender groups which can be classified as:

C-GROUP	Children (boys and girls aged 4-11)
G-GROUP	Girls (only girls aged 12-18)
B-GROUP	Boys (only boys aged 12-18)
W-GROUP	Women (only women aged 19-55)
M-GROUP	Men (only men aged 19-55)

Dr D Suresh Kumar, Scientist and Co-Project In-charge at CLRI opines, "This project is very useful because footwear developed based on adapted sizing systems can never fit the Indian population, and therefore it becomes imperative to conduct an anthropological foot survey to arrive at Indian footwear sizing system based on which we can develop comfortable footwear with proper fit."

The Pan India survey will help us find out something that has never been factually discussed; if there are differences among various ethnic groups and geographic areas or if it proves that no differentiation is needed when a footwear is produced and supplied to any part of the country. Once the survey is completed and the report is submitted by CLRI, it is expected that the standards for footwear sizes would be updated by the Bureau of Indian Standards.

Data is to be protected at CSIR-CLRI and to be revised every 20-25 years to accommodate lifestyle changes.

R Selvam, Executive Director, Council for Leather Exports says, "The Survey currently being undertaken by CSIR-CLRI for development of India-specific foot sizing system is utmost essential and would play a pivotal role in having our very own Indian Standards. The leather and footwear industry wholeheartedly welcomes this survey and would render all necessary support as well as participation in the survey."

INHERENT CONNECTION OF RIGHT FOOTWEAR SIZE AND HEALTH

Foot pain, ankle pain, back pain, headaches etc. are very

common these days. We curse our lifestyle for these pains. However, in many cases, footwear might be reason for the suffering. Experts deduce that one of the obvious reasons is usage of ill-fitting footwear that is a major concern and cause of aggravation of foot problems. Bad footwear fits can cause injuries, more so in those above age 40, women and diabetics.

Dr Rajesh Malhotra, Professor and Head at Department of Orthopaedics, AIIMS alarms that shoes have tremendous impact on foot health and well-being in health and disease. Every part of the shoe (toe box, sole, counter, heel, and upper) can bite into comfort and result in disorders. He answered a couple of questions as well.

1. HOW DO YOU SEE EFFECTS OF FOOTWEAR SIZE AND FIT ON HEALTH?

Size and fit issues can lead to corns and callusities, foot strain and ache, toe deformities such as Hallux valgus or bunion, pain on plantar aspect of space between foot bones due to nerve friction and irritation (Morton's metatarsalgia). Over three-fourth of the adult patients, without any foot deformity by birth, face problems that are caused by ill-fitting shoes.

Dimension	Left	Right
Foot length	223.5 mm	0.0 mm
Ball girth circumference	228.5 mm	0.0 mm
Foot breadth	93.6 mm	0.0 mm
Instep circumference	229.7 mm	0.0 mm
Heel breadth	63.2 mm	0.0 mm
Instep length	160.9 mm	0.0 mm
Fibular instep length	143.5 mm	0.0 mm
Height of Top of Ball Girth	35.3 mm	0.0 mm
Height of instep	57.6 mm	0.0 mm
Toe 1st angle	12.9°	0.0°
Toe 2nd angle	10.8°	0.0°
Height of navicular	30.6 mm	0.0 mm
Angle of heel bone	9.1°	0.0°
Heel girth circumference	289.7 mm	0.0 mm
Horizontal ankle circumference	231.3 mm	0.0 mm
Foot size	22.5 ZE	

2. WHAT IF WE DON'T WEAR THE RIGHT FIT (TIGHT OR LOOSE) SHOES/SANDALS/SLIPPERS ETC.?

Apart from not being able to walk properly or the risk of losing balance, falling, and hurting oneself, all or some of the problems enumerated earlier can result. A shoe bite/wound caused by ill-fitting shoe in a diabetic or person with impaired sensation can even lead to amputation.

3. DOES DESIGN OF FOOTWEAR PLAY ANY ROLE?

Footwear design features are extremely important. A narrow toe box will cramp the toes and cause corns, callusities, deformity, pain, and inability to walk without discomfort. A

high heel will cause callusities at the base of toes on sole and constrict the nerves on the plantar or sole side of the foot. Hard sole, especially in overweight persons or those who have to stand for long or walk far, can cause heel pain or plantar fasciitis. Tight fitting counter at the back can cause friction and cause pain on the back of the heel by causing retrocalcaneal bursitis, the most common heel inflammation.

Thus, optimal comfort and foot health can be expected only with appropriately sized footwear. All the footwear brands should market shoes that are made as per Indian standard fittings, which will help their customers to have perfect fitting shoes in order to safeguard the feet.

STAGE II OF INDIAN FOOTWEAR SIZING SYSTEM PROJECT

While the Stage I is all about anthropometric survey, statistical analysis, and development of an Indian footwear sizing system, Stage II involves foot biomechanics and gait study, materials identification, 'last' fabrication, development of design patterns and comfort parameters, wear trials, generation of specification, etc.

V Muthukumar, Global Business Head of Leather Products at Tata International and President of Indian Shoe Federation says, "This is going to be very important for our organisation as we are looking at India as a great opportunity to supply shoes for domestic market and we are following now only either French/UK/US sizing system that are more based on their feet. What CLRI is planning to do, Indian Sizing system will help the country and we can make good products with perfect fittings based on Indian's feet."

Similarly, Ketan Sanghavi, Managing Director at Indian Footwear Components Manufacturers Association highlights, "Once CLRI comes up with the standard sizing systems, we shall incorporate these by developing reference lasts and last bottom profiles and keep into our model library. As and when any domestic shoemaker places orders, we can try to advise them about the new standards. Whether the shoemakers are willing to adopt them, that

is not in our control. It is the domestic shoemakers who can make the new sizing systems reach the common man if they take it seriously."

So, as they say, the best is yet to come. The foot survey, jointly carried by Central Footwear Training Institute (CFTI) and CLRI, has begun. Measurements are being taken and hopes are booming. It is said that people notice your shoes before they look at your face, it is better to be little obsessed with your footwear.

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