Child-ID
Biometrics for Global Good

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Thales ID eXperience, October 3, 2024

Who is This Child?

Need a low-cost, portable (mobile), ergonomic, trusted ID for infants, toddlers & preschoolers

Infants: 0-12 months; toddlers: 1-3 years; preschool: 3-5 years (CDC)

Need for Child ID

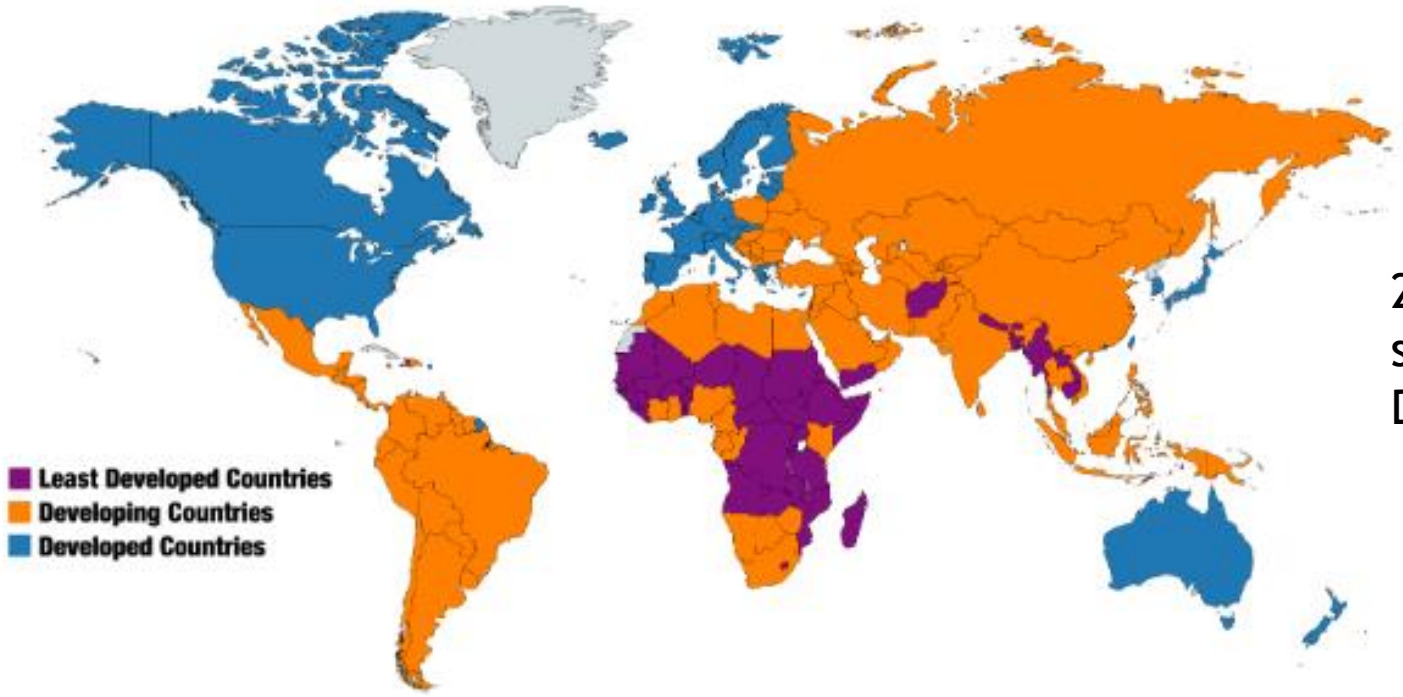
Vaccination Clinic, Benin (Gates Foundation)

Food Distribution, Somalia (WFP)

To ensure reliable and targeted delivery of immunization, healthcare and nutritional supplement and eliminate fraud

https://bit.ly/1oIVAOf

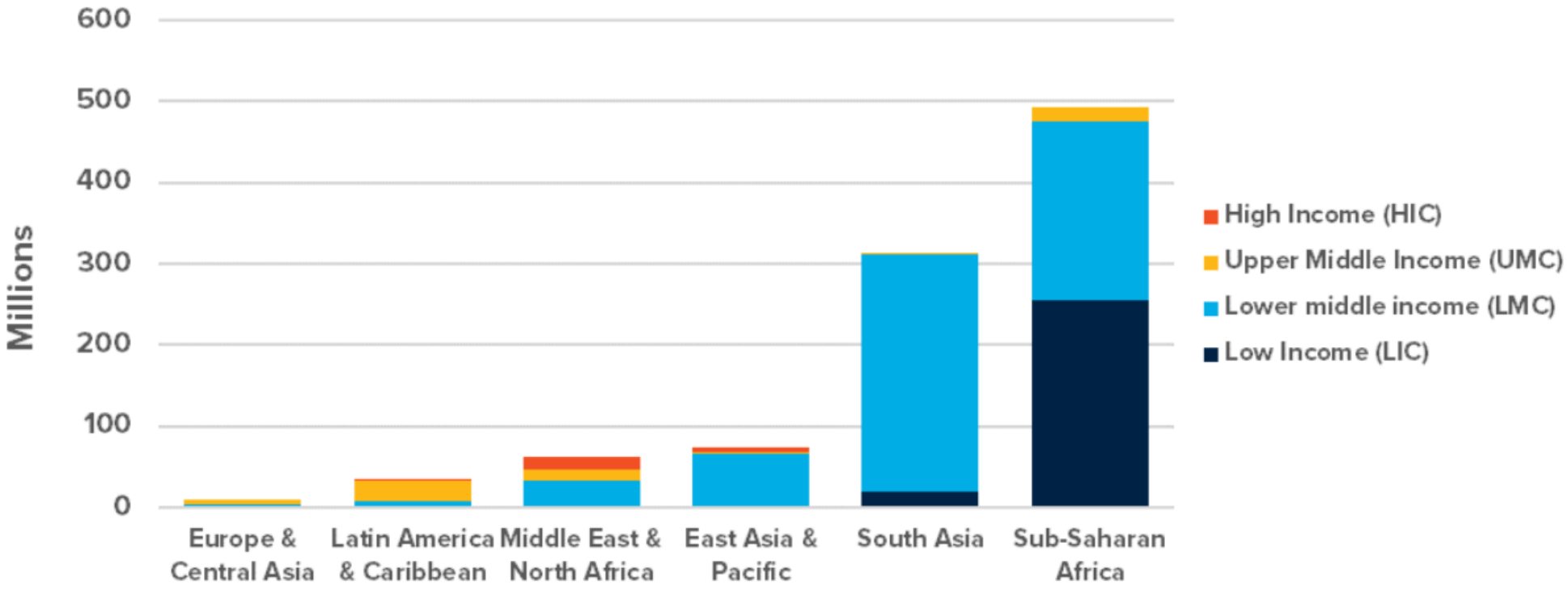
Greatest Need for Child ID is in LDC



21 African countries are French speaking (largest is the Democratic Republic of Congo)

- LDC: GNI per capita < USD 1,025; lack of nutrition, poor health, low literacy rate, high birth rate (47 per 1000 in Nigeria)
- Infant mortality per 1,000 live births: Low-income countries: 49; High income countries: 5

Unregistered Population by Region



Source: *ID4D Global Dataset (2018)*

- World Bank's ID4D reports there are 1 billion people worldwide with no ID documents; half are children whose birth is not registered. Many lack ID that is useful and trusted.
- Inclusive and trusted—i.e., "good"—ID systems are crucial for ending extreme poverty.

Which Biometric Trait?

Palmprint

Fingerprint

Face

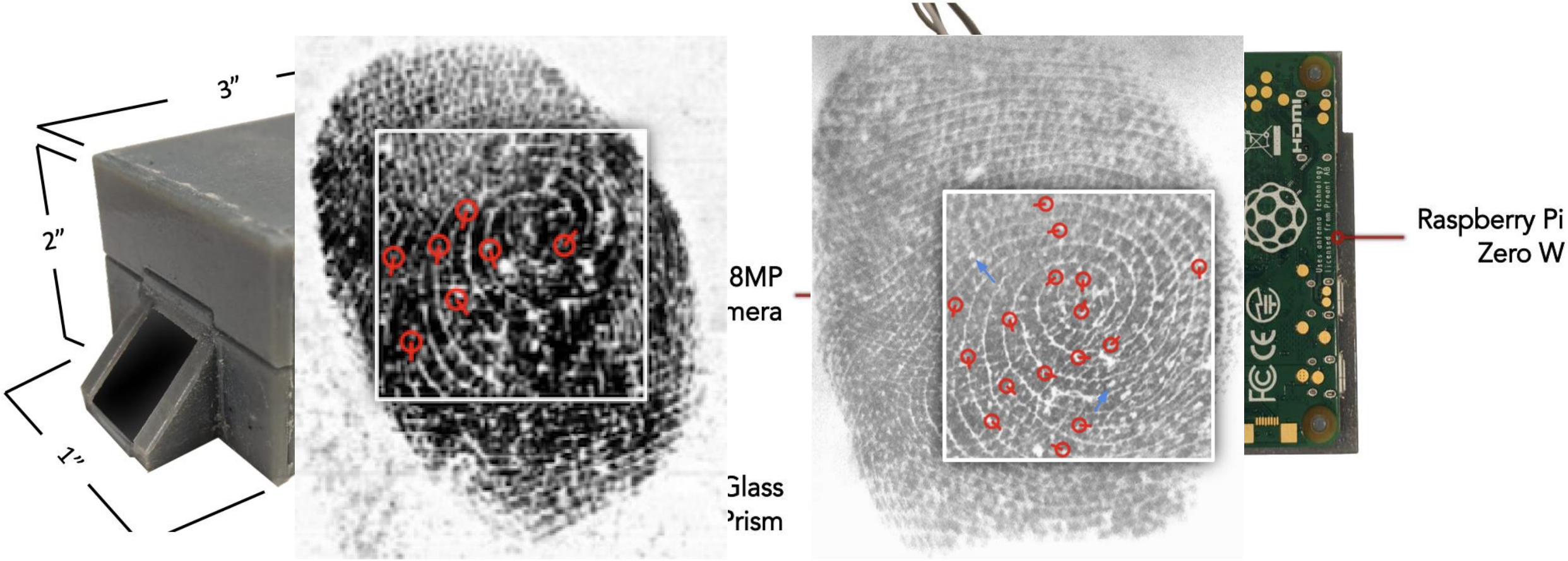
Iris

Footprint/ballprint

Infant: 0-12 months; toddler 1-3 years; preschool (3-5 years)

Ease of capture, acceptability, persistence (template update), low cost, mobile SDK

MSU Infant-Prints Reader



500 ppi infant-print
(13 days old)
Digital Persona U.r.U

1,900 ppi infant-print
(13 days old)
MSU Infant-Prints Reader

Reader: 1,900 ppi; cost: $85; assembly time: < 2 hours

Open Source: *https://bit.ly/31s2TQT*

Challenges: Blur, distortion, small ridge gaps, wet/dry finger

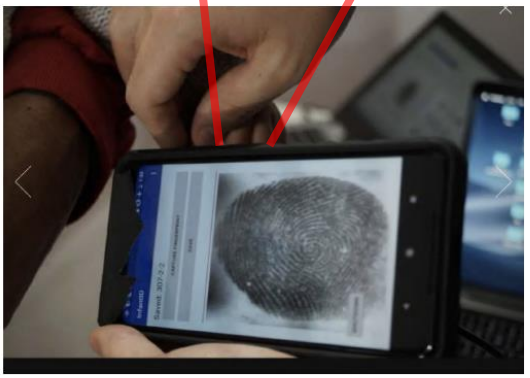
Data Collection

Dr. Anjoo Bhatnagar's clinic, Saran Ashram Hospital

Longitudinal Fingerprint Collection

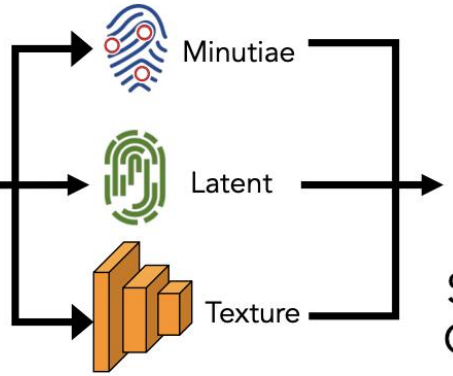
(a) 13 days old (b) 15 days old (c) 3 months and 5 days old

MSU Infant-Prints Pipeline



Fingerprint Capture

Age Transformed & Enhanced



Feature Extraction

Search Gallery

InfantID App

- Image capture: Reader to smartphone over bluetooth
- Preprocessing: Enhancement and aging
- Matching: Minutiae, latent and texture matchers

Evaluation

Enrollment: 12 weeks Probe: 64 weeks

True Match (score: 0.3): 1-year time lapse

Enrollment: 9 weeks Probe: 61 weeks

False Non-Match (score: 0.02): 1-year time lapse

Time Lapse	3 Months	9 Months	12 Months
Infant-Prints	95%	90%	85%

- **Reporting TAR @ FAR = 0.1% (threshold = 0.1)**
- **Infants enrolled at 2-3 months of age**

J. J. Engelsma, D. Deb, K. Cao, A. Bhatnagar, P. S. Sudhish and A. K. Jain, "Infant-ID: Fingerprints for Global Good", *IEEE Trans. on PAMI*, 2021.

Child PalmID: Contactless Palmprint Recognition

a) Child face images from Child-PalmDB2

b) Contactless child palmprints from Child-PalmDB2

88% TAR @ FAR=0.01% for 9-month time-separated data

A. K. Jain, A. Godbole, A. Bhatnagar and P. S. Sudhish, "Child PalmID: Contactless Palmprint Recognition", arXiv:2212.07299, 2022.

Summary

- We built two prototype for child ID, one using fingerprints and the other using palmprints
- Empirical results showed the feasibility of recognizing children when enrolled at 6 months