Face Recognition
for Telegram Passport

Decentralized Service for TON and other blockchains

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Introduction

Cryptocurrencies and other blockchain-based technologies have the potential to make the world more secure and self-governed. While there was initial challenge with customer adoption of the new tech, this may change as the new blockchain projects are being developed by some of the world's leading messenger companies - TON (Telegram Open Network), Klaytn (Kakao), LINK Chain (LINE).

Potential customer base of these projects is projected to grow from current 500 million to more than 2 billion in 2022, thus paving the way to mass adoption of blockchain technologies.

The key feature of these projects is Self Sovereign Digital ID, secure digital identifier of a user. Self-sovereignty means that, unlike traditional approach where user identifier is owned, stored and controlled by some intermediary (such as Google, Facebook, or the government), blockchain-based Digital ID will be owned and controlled only by user and stored securely on a decentralized ledger in a way that no third party can tamper with it. As soon as billions of people will have blockchain based Digital IDs associated with their digital wallets, businesses around the world that currently interact with their customers face-to-face on a daily basis will be looking for a simple, secure, and cost effective solution to recognize holders of Digital IDs.

This paper outlines a vision for a new **decentralized biometric service** for face recognition of Digital ID holders.

There is no coin in this project, and no ICO is planned.
Project is sustained by a fair, usage based fee.

Problem Statement

Face recognition technology is the most natural way of automation in customer-to-business interaction. With the recent advancements in deep learning, it becomes much more accurate and fast. But despite the great potential of face recognition technology for businesses, there are some obstacles to its widespread adoption:

Privacy concerns of customers

High cost of compliance for businesses (as a result of GDPR and similar regulations)

Accuracy limitations, still cannot be used as a single factor identification method

Lack of reliable liveness detection to protect against photo or video spoofing.

Several companies are working to solve these problems; several have already completed record ICOs and raised money for developing independent face recognition solutions on blockchain. Ironically, all these solutions add unnecessary complexity to the final solution (coins, miners, etc).

Hence there is a great opportunity to introduce to the market a simple, secure, and cost effective solution to recognize holders of Self Sovereign Digital IDs.

What is TON and Self Sovereign Digital ID

Our solution is a decentralized service for Telegram Open Network (TON) and other similar new generation blockchains. One of key components of such blockchains is the Self Sovereign Digital ID bundled with a digital wallet. Self-sovereignty means that, unlike traditional approach where user identifier is owned, stored and controlled by some intermediary (such as Google, Facebook, or the government), blockchain-based Digital ID will be owned and controlled only by the user and stored securely on a decentralized ledger in a way that no third party can tamper with it.

Self-sovereign Digital ID solves problem of the anonymous nature of the Internet. Together with other components of TON, it allows a secure peer-to-peer transfer of value between customers and business entities, opening a business opportunity comparable only to the invention of Internet.

Because Digital ID can be shared and verified electronically with any third party (including verification by government), it may create simple yet secure identification and payment infrastructure on a national scale. TON is the project of Telegram team, supported by $1.8 Billion investment. Telegram Passport (TON Digital ID) was launched in 2018. Other services of TON will be launched in 2019.

Similar projects are developed by Klaytn (Kakao), LINK Chain (LINE). Potential customer base of these projects is projected to grow from current 500 million to more than 2 billion in 2022.

Outline of the Vision

We introduce Decentralized Service for Telegram Open Network (TON) to let any business entity to recognize the faces of customers (holders of Digital ID) at POS in a fast, accurate and cost effective way. When TON and other similar projects go live in 2019-2020, Digital IDs will be coupled with digital wallets. Using our service, business entities will be able to provide personalized and secure checkout experience (human-free).

Key Features of Face Recognition Service:

Based on free TON infrastructure

Service uses free TON infrastructure for storing, managing of Digital IDs, Bot service to enable secure data exchange between users, business entity and 3DiVi software components.

"Two factor authentication" by design

Provide peace of mind to your customers with zero expense. No recognition event is triggered until person confirms it via Telegram message.

Best in class face recognition algorithm

Algorithm developed by 3DiVi is the top-ranked, according in NIST Face Recognition Vendor Test (FRVT) 2017.

3D Face Liveness

Industry-leading protection against photo or video spoofing developed by 3DiVi (Similar technology is used in iPhone X).

GDPR Compliance by design

Personal data is stored by users on the secured blockchain platform TON. Our software components do not store any non-encrypted personal data. Personal data is encrypted by business entity with whom a user shared a Digital ID, 3DiVi does not have access to these data.

White labeled

Key components of solution are available as open source and can be white labeled to ensure maximum transparency of its operation.

No Coins

The project does not require any coins and no ICO is planned.

3DiVi Face recognition service can become the world's most adopted face recognition service for interacting with Digital ID holders.

A Brief History of 3DiVi Inc

3DiVi is a revenue generating developer of Human-centric AI algorithms, covering face & skeletal tracking, spatial understanding and object recognition.

Started in 2011 with a traditional machine learning (ML) approach, we developed Nuitrack (3D skeletal tracking library), which is currently the most popular replacement to Microsoft Kinect SDK globally, with commercial clients Intel, Orbbec, Orange, LG. When deep learning and neural

networks started to show advantages over the traditional ML approach (2013), we sought expertise in this new area, 3DiVi is currently in top ten globally with its Face Recognition algorithm, according to NIST FRVT 2017.

Solution Architecture

Solution consists of software components, supplied by 3DiVi, that any business entity can deploy into its own IT infrastructure (on-premise or on-cloud). Software components are provided in containers with explicitly defined APIs that guarantee data integrity (from the point of view of the business entity).

Solution is completely white labeled – users interact with business entity via business' own bot service. It uses free TON infrastructure for storing, managing of Digital IDs, bot service to enable secure data exchange between users, business and 3DiVi software components.

3DiVi software components (Face Recognition)

- **FRS Server** Component.
  Enterprise server hosted by a business entity (on-premise or on-cloud). As users share Digital ID data with a business entity, it stores three pieces of data for each user: Telegram ID, face image (Selfie photo), and Biometric ID of face image. All data is encrypted by business (not 3DiVi) twice: in transit via TLS encryption using strong cipher suites and at rest with military-grade 256 bit AES encryption. Because data is encrypted by the businesses' private key, nobody can access this data. To protect privacy of users, users during registration with a business may chose the option to be asked a confirmation on all subsequent recognition events.

- **VideoMOD client software** component.
  It is installed on edge devices with video sensor, located at PoS where business entity interacts with clients face to face. It may be computer with webcam or tablet. VideoMOD synchronizes with FRS Server Component to receive the most recent data: Telegram ID, and Biometric ID for each user in database.
  VideoMOD works in real time to provide the following: face detection on video, biometric id calculation, matching to local database, sending notification of recognition events. To protect privacy of users, if user chose to be asked confirmation of each recognition event, VideoMOD first will send notification to identified user to his Telegram account and, only if user confirms via return message, VideoMOD notifies business entity that person with the particular Telegram ID is present at a particular PoS.
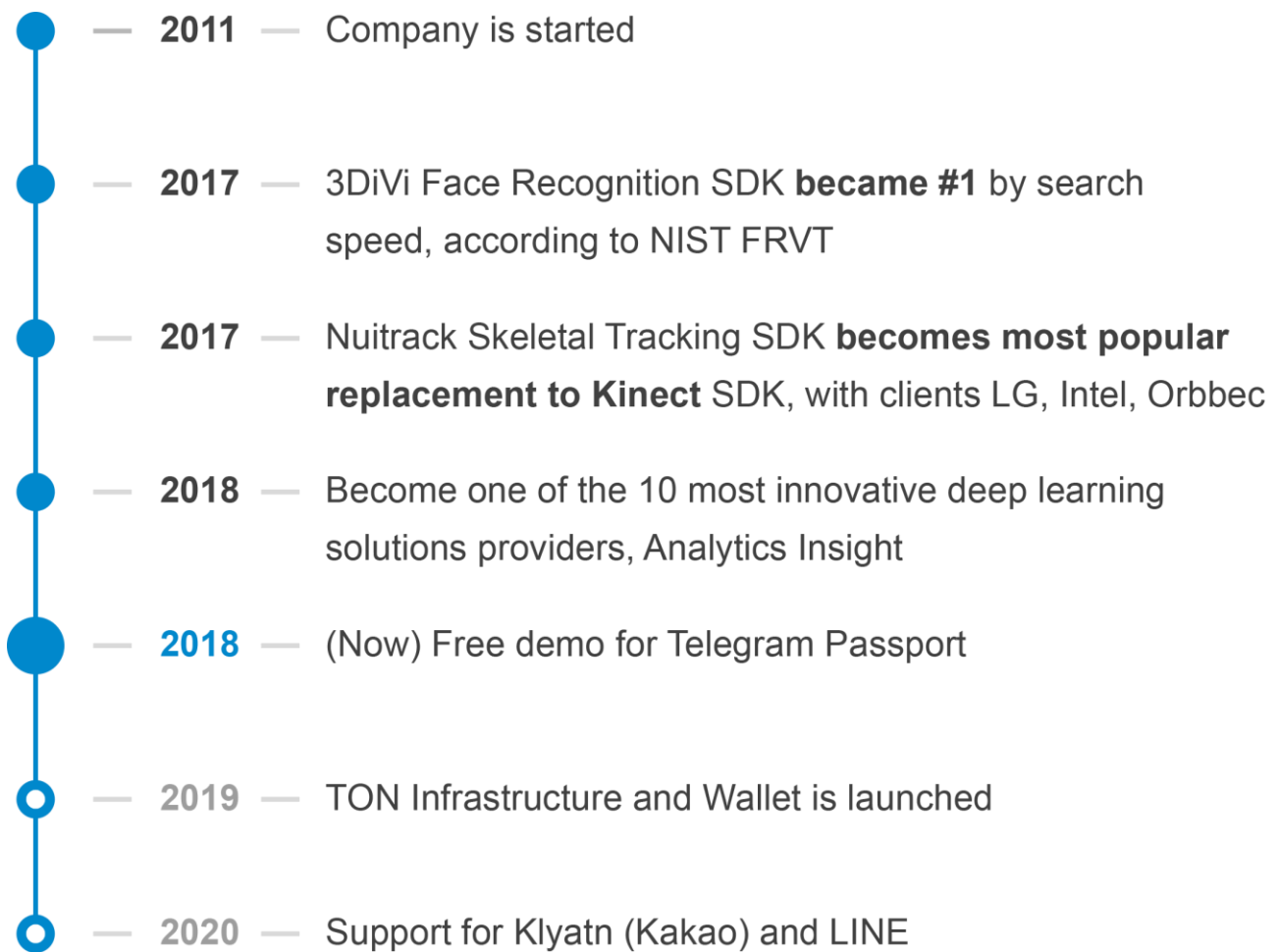
Overview

Legend

Enabled by Telegram

Enabled by Company

Enabled by 3DiVi
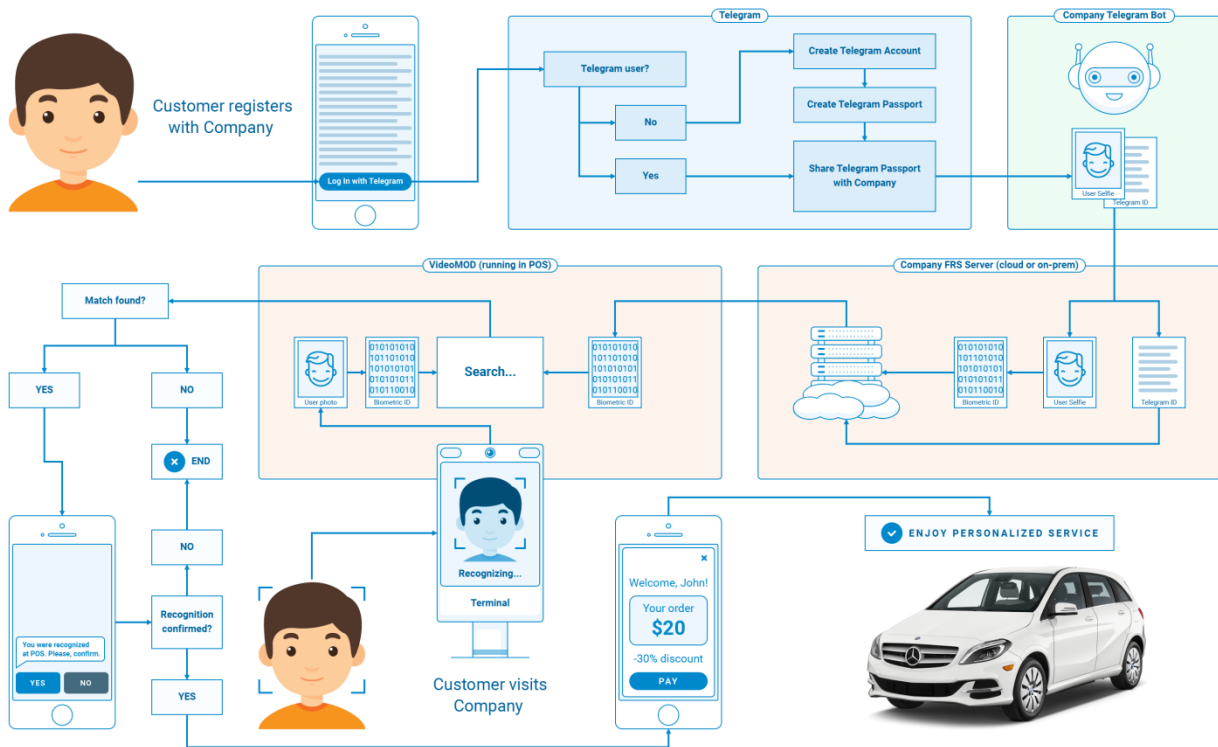
Roadmap

The 3DiVi Free Face Recognition for Telegram Passport technical roadmaps includes the following milestones:

2011 — Company is started

2017 — 3DiVi Face Recognition SDK **became #1** by search speed, according to NIST FRVT

2017 — Nuitrack Skeletal Tracking SDK **becomes most popular replacement to Kinect** SDK, with clients LG, Intel, Orbbec

2018 — Become one of the 10 most innovative deep learning solutions providers, Analytics Insight

2018 — (Now) Free demo for Telegram Passport

2019 — TON Infrastructure and Wallet is launched

2020 — Support for Klyatn (Kakao) and LINE

Business Model

There is no coin in this project, and no ICO is planned. Project will be sustained by a fair, usage based fee.

Before TON launch, we plan to generate revenue by providing Architecture and Technical support services.

Team

Co-founders Paul Zaytsev, Andrey Valik and Dmitry Morozov have a synergetic combination of skills. Paul is a successful entrepreneur, founder of Papillon, one the leading biometric companies with $20M in annual sales.   Andrey has 15+ years of experience in hardware/software development. Dmitry holds two US patents and MBA from the Owen Graduate School of Management that facilitates international marketing. Paul and Dmitry both graduated from the leading Russian tech university - Moscow Institute of Physics and Technology (MIPT). Director of Sales, Alexander Pazin, is former head of sales at VisionLabs and NTech Labs.

Our engineering team consists of 20+ engineers with experience in deep learning, computer vision, and application development. To attract, retain and train the best engineering talent we host 3DiVi Computer Vision School, started in 2014.

Risks

Service relies on TON infrastructure for operation. TON infrastructure is scheduled to be launched in 2019. If TON launch is delayed or an adoption rate is lower than projected, our service may be useless.