PLAKSHA TECH LEADERS FELLOWSHIP

# CAPSTONE REPORT

## ENTREPRENEURIAL CAPSTONE WORK

# Fotu


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# Acknowledgements

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- Nischay Chabhra (World Through Lens Photography)
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- Nishant KT (Freelance Photographer)
- Ram Rohit (Freelance Photographer)
- Rahul (Plaksha Photographer)
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# Introduction

We started with the goal of solving the problem of guests not being able to access the photo- graphs of theirs that were clicked at various events they were part of. With the world moving towards social media, people had a desire to share their event pictures instantly on social platforms to share the joy with their friends and family. Conventionally, photography for events was done with the end goal being printed hard copies of the photographs for the memory /remembrance of the host and the attendees but this has undergone a transition in the digital age. People now want their picture on social channels for others to see and they too revisit only digital copies as the hard copies are increasingly difficult to mange and store logistically. Though mobile phone photography has improved considerably to cater to some part of the change and enable attendees to share photos directly captured through phone cameras but a large number of people still prefer professionally clicked photographs taken by skilled camerapersons. This is what we wanted to play on and enhance the experience of events for our customers be it family events like weddings or inaugurations or community events like food and music festival or corporate gatherings and tech events/ conferences.

Currently, people wait for weeks to get their photos. **Most don't even get it at all**

- Photographer/ Photo agency transfers all the photos to a laptop
- They are edited and then uploaded to a disk drive or a cloud service
- Photos are shared with event hosts via a physical drive or cloud link
- Event hosts browse through all photos; share some with close people

How we want to change it with our product. **Your Photos Delivered in Real time**

- Event host books high quality & affordable photographer through us
- All photos clicked at the event are uploaded to the cloud in real-time
- Event attendee's photos are delivered instantly using Face Recognition
- Photographers use our platform for managing all images from the event
- Event hosts receive all photos in real-time; edited photos delivered in a day

# Users & Market Studies

## Market Landscape

*Listing Platforms*

Weddingz.in
India's Largest Wedding Company

ShaadiSaga

WedMeGood

*Studios and Agencies*

FOTOBAR
ART . BEYOND . INFINITY

SNAPSOUL
STORIES

*Cloud Storage Service*

PIXIESET

Photographer Booking Platforms

snappr

pinpic
memories for life

Canvera
preserving memories

*SaaS for Photographers/ Others*

waldo

spyne

# User Study & Validation

We spoke to the stakeholders involved in the ecosystem:

## Event Hosts

*We spoke to friends and family as well as Event Attendees at Shiv Nadar University E-Summit.*

- Most people we spoke to **validated the problem of not being able to get the photos** that were clicked during events. However, most of them never really asked the photographer or host for the photographs
- Either **they did not expect to get those given the mental model** arround it or **they didn't care** as they had photos from phone cameras which they could use to post on Facebook
- **Elderly age group** was more interested in getting the photos, probably due to low technology exposure

## Event Guests

*We spoke to the hosts of Shiv Nadar University E-Summit and two people who had hosted their weddings in February 2020.*

- Most of the hosts would have been happy to have such a feature at their event, primarily because they saw it as an opportunity **to boost their societal status**. **Willing to pay extra**
- Some hosts were **apprehensive of photos being shared without them having a look first**
- Some hosts wanted them to be **shared but only with limited people**, not with all people
- Additional Insights, there were two-way photographers were hired, either through referral from a relative/ event manager or through a known photo agency/ freelancer (seeing portfolio of work/brand)

## Event Agencies

*We were in touch with Grog Entertainment, Spectal Entertainment and OML for insights.*

- Event Agencies had fixed set of photographers that they referred. Most of them were freelancer from who they charged commission, very few on roll. They were open to third part photographers
- Event Agencies did not feel the need to be involved with photography as long as there was no additional production/ logistical requirement that they are supposed to meet for photography

Event Venues

*We got in touch with founder of Venue monk, a start-up in this space and through it reached out to banquets and hotels*

- Event Venues had fixed set of photographers that they referred. Most of them were freelancer from who they charged commission, very few on roll.
- Event Venues did not feel the need to be involved with photography as long as there was no additional production/ logistical requirement that for them to meet
- Most of them expressed concerns in terms of network cost for such a service.

Photographers

*We got in touch with – Nischay Chhabra (World Through Lens), Laxmi Digital Studios and Freelancers – Nishant KT and Rahul Baghel*

- Most photographers seemed positive of this however they felt that since **hosts had hired them, permission from them would be** necessary. Only then will they use such a technology
- Some of them expressed concerns about **privacy and copyrights of photos**
- Expressed concern arround **sharing raw photos with everyone before payment**
- They felt this could be help them for **lead generation with the guests** at the event
- **Ergonomics of handling** this was an important factor for photographers to use it

# Why Now?

1. **Google Photos**: 1 billion plus users, 1.2 billion photos are uploaded every day to google photos, with the grand total of all uploaded content measuring over 13.7 petabytes of storage.
2. **Facial Recognition Tech**: In 2018 test, NIST - US department of commerce, found that facial recognition failure rate has reduced from 4% to 0.2% over 4 years, which is 20x improvement. A study published in June 2019, estimates that by 2024, the global facial recognition market would generate $7 billion of revenue, supported by a compound annual growth rate (CAGR) of 16% over the period 2019-2024.
3. **Camera Technology**: The Wi-Fi camera market is expected to reach $30k million in 2024 from the current market size of $14k million. (CAGR ~ 13.6%) Reported by Industry research
4. **Social Media:** Long gone are the days when people used print as a medium for photo sharing, today it's all digital. Instagram is wildly popular with 100m + photos shared per day, more than 50b + photos till date and 1b + monthly active users.

# Approach

## Synthesizing Feedback

**Event Hosts**

- Booking photographer for event is a hassle
- Post event delivery of services is stretched
- Real-Time sharing is nice add on feature

**Photographers**

- What they need is lead generation
- Sorting & Selection – Consuming & Boring
- Doubtful of real-time photo sharing

**Event Guests**

- It's problem for them and they would be happy to get photos
- However, it's not a need so they won't pay for it

## Exploring Product Market Fit

**SaaS Model** (Single Player Mode)

- Cloud Storage Services
- Photo Sorting and Culling Software
- Real Time Photo Sharing Device
- Lead Generation through Photos
- Easier & Faster Delivery to Client

**Revenue:** Subscription Model

**Market Place Model** (Multi-Player Mode)

- Photographer Listings
- Uber for Photography
- (Matching based on Demand)
- Fast Delivery Commitment
- Real Time Sharing as Novelty

**Revenue:** Subscription + Commission Model

## Narrowed Down problems:

- **Hosts:** Booking a photographer for an event is a Hassle
- **Photographers:** Managing & Sharing Photos is Tough
- **Guests**: Most of them are unable to access their event photos

## Solution

Tech Enabled Platform for Photographers
***Goal: Enabling Better & Faster Client Service***

## Value Proportion

**Photographers:**

- Real-time Cloud Backup of photos enabling faster delivery to clients
- Cloud based software for managing, editing and sharing photos with clients
- Enable Lead Generation through photo sharing

**Event Hosts:**

- Realtime access to all event photos and novel feature for their event
- One-day delivery of edited digital copies of all the photos

**Event Guests:**

- Hassle Free and Real-Time access to digital copies of individual and group photos for instant social media sharing

## Business Model

*SaaS for Photographers*
Store, Sort, Cull & Edit Photos Share Photographs Easily with Clients and Real Time Photo Sharing
***Subscription-based Model***

## Planned Expansion

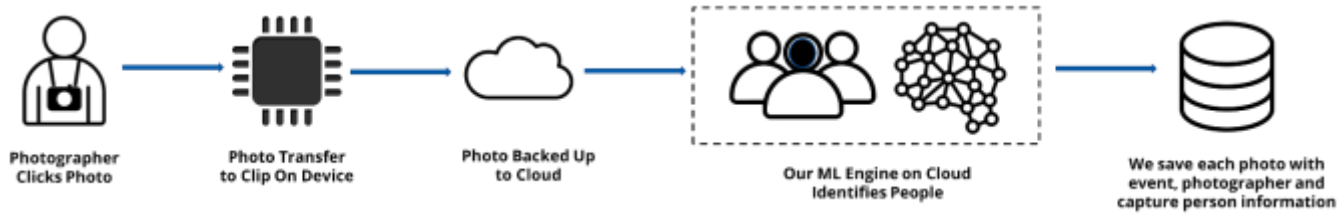
- Drive higher incomes for photographers through a simple commission model & more client
- Hosts can connect with photographers at affordable prices and avail standard services

*Photographers Marketplace*:
Connecting event hosts to superior quality as well as affordable photographers for any event
**Commission-based Model**

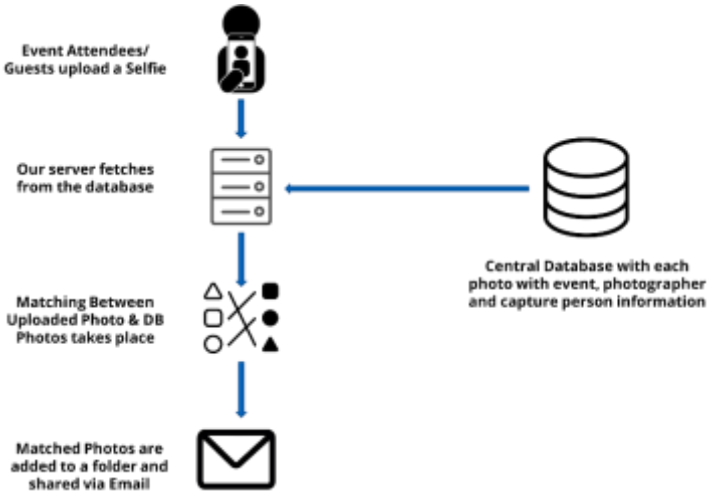
**Note:** Initially we start with single player mode than gets us the supply of photographer and gradually move to multi-player mode where we generate demand for the photographers as well.

# Design & Implementation

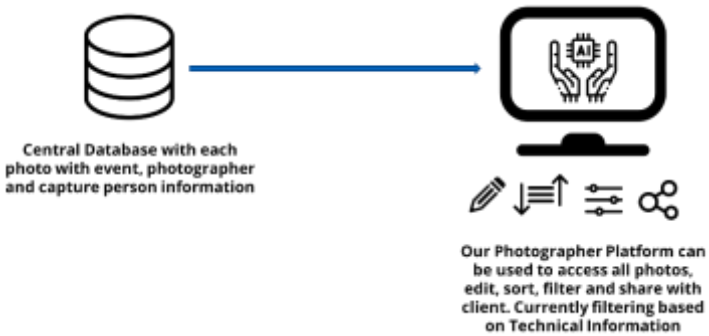
## Backend Process Design




## Event Attendee System Interaction Design




## Photographer/ Event Host System Interaction Design



# Technology Stack

*Hardware*

The nature of the problem we are trying to solve, there was some significant dependency on hardware which consisted of us working on:

**Raspberry Pi**
As our prototyping board so that we could quickly hack our way and test the MVP in action

**Routers**
Since, internet connectivity was a challenge we tested the use of local network to transfer pictures from peripheral devices (DSLRs to the local system which connected to LAN was used to transfer pictures)

**DSLR Camera OS**
Different DSLRs brought about different challenges which had to be mapped to a uniform data structure for the device to interact.

*Software*

There were 3 broad components to it:

**Shell commands and Camera Interfacing:**
Task was to automate image download from cameras (Realtime) and push to the local server (connected over Wi-Fi) which further pushes the images to the cloud

**Backend ML Engine**

- Event listener for a photo upload
- On photo upload creation of backups, compression of the image and detecting faces using custom trained model to create thumbnails of faces
- After creating thumbnails, identifying the person in the image which had 3 cases:
    - Face detected and matches with an existing face -> Create Database entry for the thumbnail with existing face_id
    - Face detected, but does not match with an existing face -> Add face in the collection & Create Database entry for the thumbnail with new face_id
    - Face Not detected -> Pass

Metadata of the image with various data points like:

1. Age
2. Gender
3. Emotions
4. Moustache
5. Eye position

| | | | |
|---|---|---|---|
| AgeRange | dict | 2 | {'Low':22, 'High':34} |
| Beard | dict | 2 | {'Value':True, 'Confidence':81.48898315429688} |
| BoundingBox | dict | 4 | {'Width':0.07823340594768524, 'Height':0.16005289554595947, 'Left':0.2 ... |
| Confidence | float | 1 | 100.0 |
| Emotions | list | 8 | [{'Type':'CALM', 'Confidence':33.661563873291016}, {'Type':'ANGRY', 'C ... |
| Eyeglasses | dict | 2 | {'Value':False, 'Confidence':98.88448333740234} |
| EyesOpen | dict | 2 | {'Value':True, 'Confidence':99.77056121826172} |
| Gender | dict | 2 | {'Value':'Male', 'Confidence':97.63258361816406} |
| Landmarks | list | 30 | [{'Type':'eyeLeft', 'X':0.3114334046840668, 'Y':0.3281424045562744}, { ... |
| MouthOpen | dict | 2 | {'Value':False, 'Confidence':94.062255859375} |
| Mustache | dict | 2 | {'Value':False, 'Confidence':91.0393295288086} |
| Pose | dict | 3 | {'Roll':1.0515834093093872, 'Yaw':1.6555945873260498, 'Pitch':0.181568 ... |
| Quality | dict | 2 | {'Brightness':85.35833740234375, 'Sharpness':86.86019134521484} |
| Smile | dict | 2 | {'Value':True, 'Confidence':50.23537063598633} |
| Sunglasses | dict | 2 | {'Value':False, 'Confidence':99.7066650390625} |

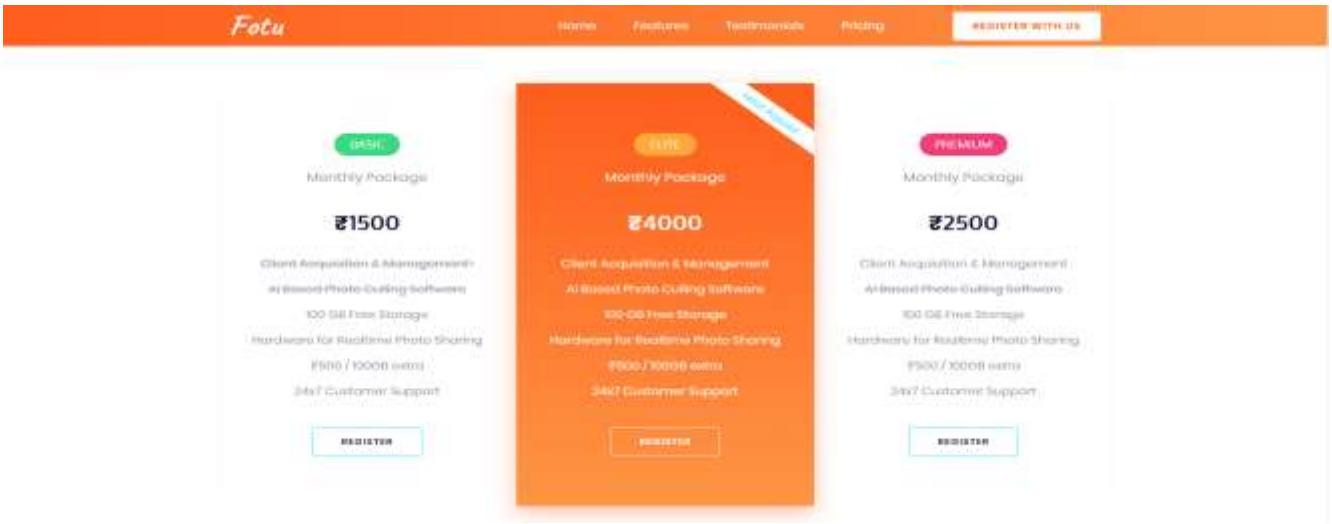
**Software Development:**

- For website development we used Flask for backend and Bootstrap for Frontend.
- Hosting and cloud functions were deployed on AWS.
- Database: Dynamo DB, File Storage: S3

We also tried building our own custom facial recognition model through custom and available architectures like DeepFace and FaceNet. However due to the unsupervised nature of the problem, we couldn't get a great performance through it and hence used Amazon Recognition

## Frontend Website Design


## Pricing Strategy



# Challenges Faced

## Paying Customer

- We struggled in finding out our paying customer. We were clear that the user is an Event Attendee although as for him it was a customer delight feature only, he would never pay for it. So, we had to look into the ecosystem for other stakeholders
- Event host can be one possible paying customer but since our product was dependent on a photographer, a photographer had to be on boarded. Also, the additional margin we could charge for real time sharing was not consistent
- Ultimately, it had to be photographer who was a key for our product to reach events and hence we had to build sufficient value proposition for him to ensure he buys our product which in turns serve the goal of customer delight for the attendee
- The challenge however which we realized late was that the margins were low and fragmentation amongst photographers was high. So, they are not an ideal customer for a SaaS like service, they would have mostly remained in the free bucket
- What mattered more to photographers is if we could do client acquisition for them

## Network Effect

- We always felt that the Uber for Photography model could have worked as it had some component of network effect which have helped in scaling but there were a few issues
- Most networks/ marketplace models initially need a single player mode that is focussed on supply to help bolster it. Only once sufficient supply is ensured, can we focus on demand. (This is what we kept in mind while we started with SaaS)
- One of the other problems we could see with a market place model was that it's a low frequency event. There are very few instances when a person books a professional photographer. Generally, marketplace models have high frequency
- We thought of corporates as a possible place where frequency could have been higher

## Product Market Fit

- We realised early on that the problem statement we had set out with was resulting in customer delight and not an actual need.
- We studied the market in depth to understand the overall problems so that we could achieve a fit
- Finding a need was important but equally important was to see if we have customers willing to pay for the need
- Probably we also made the mistake of trying to scale without building by thinking to many options and not executing enough

## Logistical Challenges

- We faced a challenge arround network connections at event venues and how we could overcome that. Explored multiple possible solutions for that. Tried our hands at lossless compression also
- Another major hurdle was the hardware we had was bulky and photographers required something very light. This was possible only with custom hardware, where we lacked both funds and expertise

## COVID 19 Pandemic

As COVID hit the entire industry by the second week of march, we were affected majorly as we had to test our product in the market and suddenly, we couldn't do it at all given the lockdown situation. What has unfolded since is pretty evident.

# Future Plan

As the world is struggling with COVID, one of things that going to become very important in the times to come, when all countries emerge out of a lockdown is tracking the movement of people at all public places – malls, showrooms, markets amongst others.

Since we already have the facial recognition and the associated pipeline ready, we have a possible new use case for the technology we built. We are also planning to integrated Thermal Cameras with this for better results.

We are looking for our first customer.