



AproposDrive Technologies Pvt. Ltd.

Specialized Electric Motor Drives

For Consumer Appliances & Automotive OEMS

Who depend on magnets in Motors for high efficiency,

Aproposdrive is a Motor Technology IP company

That designs Motor Architecture and develops Controller & Software Solutions

Unlike BLDC based Motor Drive Solutions

Aproposdrive provides a Magnet free & High efficiency motor Solutions

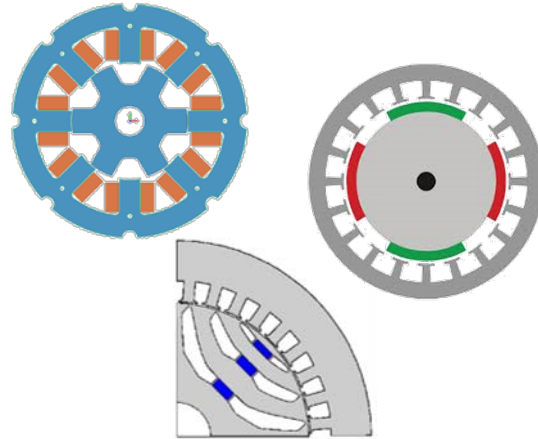


What we do

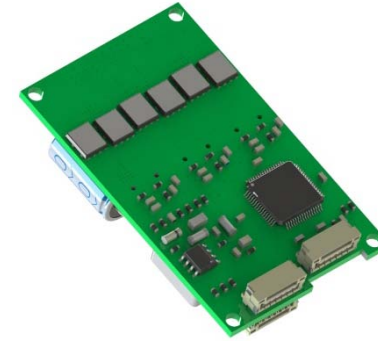
Materials



Electric Motors



Power electronics



Applications



Ideas, IP, Know-how

Analysis

electromagnetic, electronics, thermal, mechanical



Company Profile

- **About Us:**

- Gov. recognized Startup under Startup India, founded in 2016.
- Operates in the area of Specialized Electric Motor drives (SRM, BLDC, PMSM & SynchRM)
- Promoters: Dr Saurabh Nikam, Nimish Kothari & Prof. B. G. Fernandes (EE Dept., IIT Bombay)

- **Vision:**

- To be a technology leader in Specialized Motor Drives and create a difference by developing technologies that will ensure a sustainable, clean and healthy future

- **Mission:**

- Development of Innovative, Efficient and Reliable electric drive technologies
- Strategic collaboration for commercialization of the technologies



Problem



Induction Motor Fans:

- Poor Efficiency
- Wastes 70% Energy

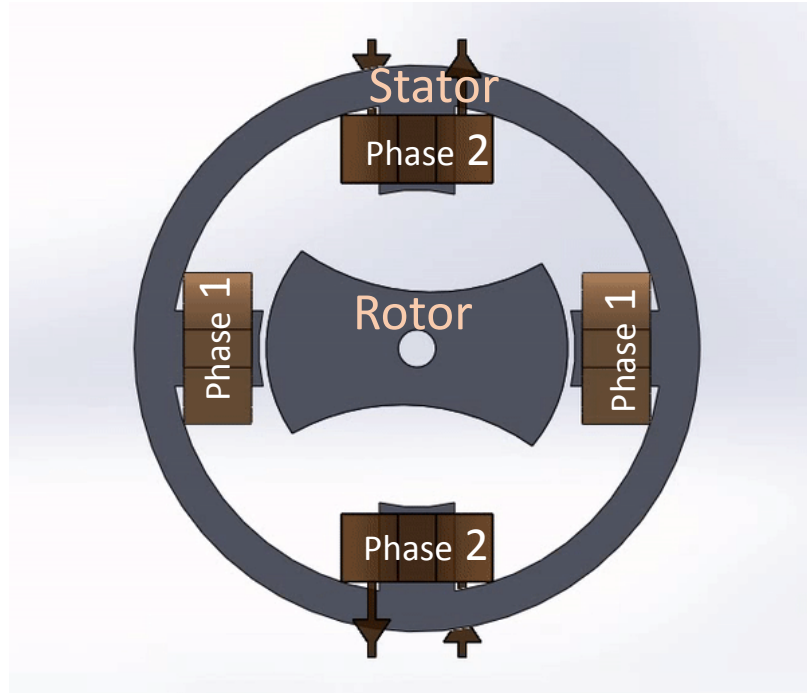
BLDC Motor Fans:

- Magnet Dependency
- High Upfront Cost

Magnet is the new Oil for Industrial Growth



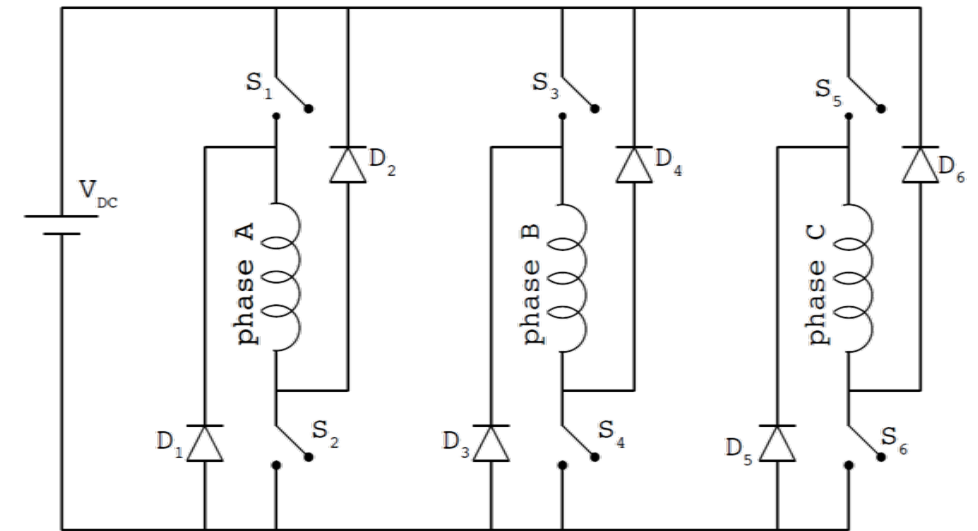
The Switched Reluctance Motor



Two phase SRM concept

- No coils/magnets on rotor
- Simple construction: low manufacturing cost
- High reliability, rugged operation
- Low temperature sensitivity

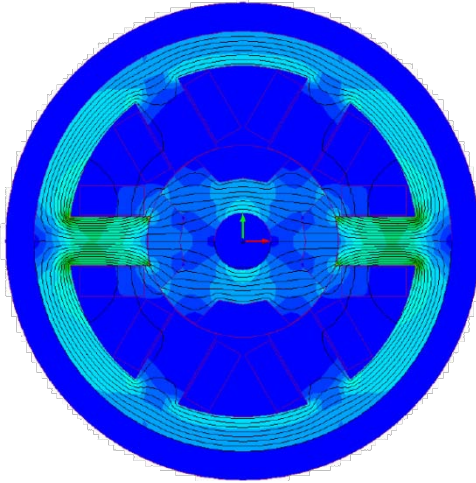
- Unipolar operation
- Fault tolerant converter



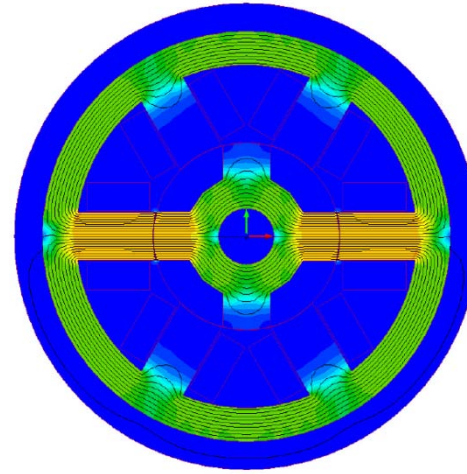
3 phase power electronic converter



Switched Reluctance Motor (SRM) operation



Unaligned position
Minimum inductance



Aligned position
Maximum inductance

- Operates as an electromagnet. When one phase is excited, rotor rotates to align with the axis of excited phase
- Excitation is changed from one phase to other to obtain a rotating magnetic field and thus a rotating motion.
- When a rotor is aligned to stator phase inductance of phase is maximum; its called aligned inductance. When rotor is unaligned to the excited phase inductance is minimum.
- Sensorless/Sensor-based algorithm is implemented to detect which phase needs to be excited and its instance.

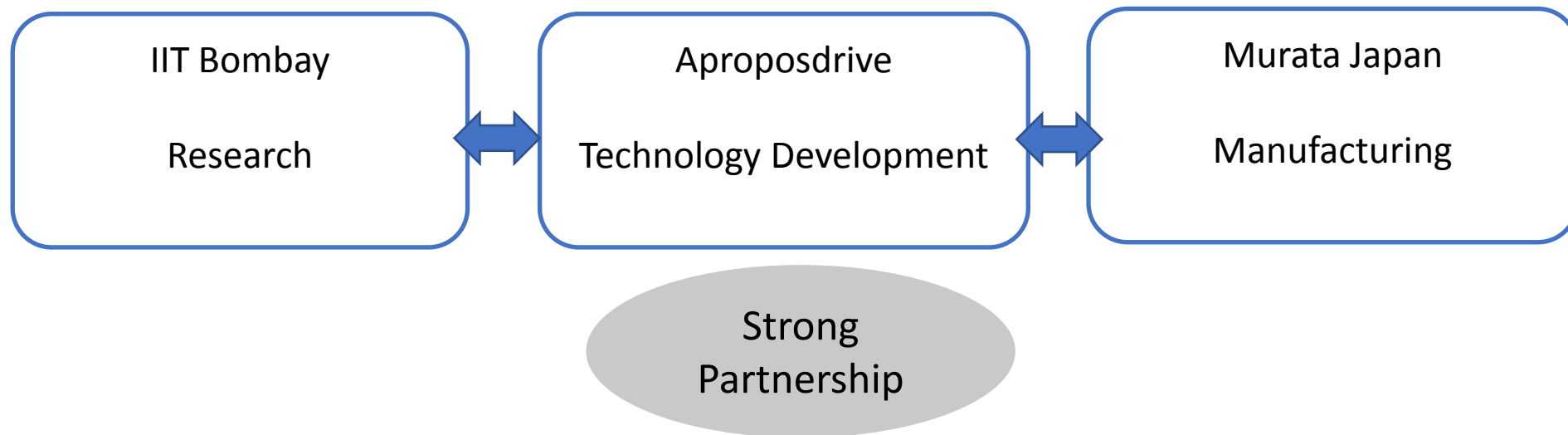


What's Unique

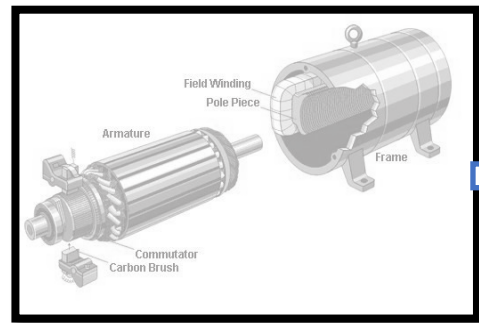
- Achieved high Power Efficiency with New Design – **Patent Granted!!**
- Cracked Key Challenges : **High Power density for low Power Applications**

Mitigated inherent Motor Noise

Developed Novel Control Software Algorithm

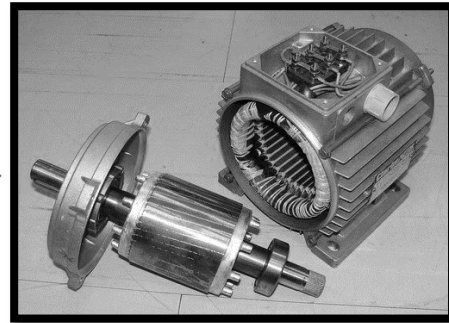


Next- Gen Motor Tech



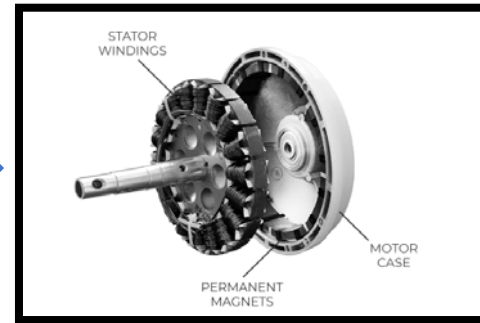
DC Motor

Efficiency	✓
Control	✓✓✓
Robust	✓
Magnets	✗



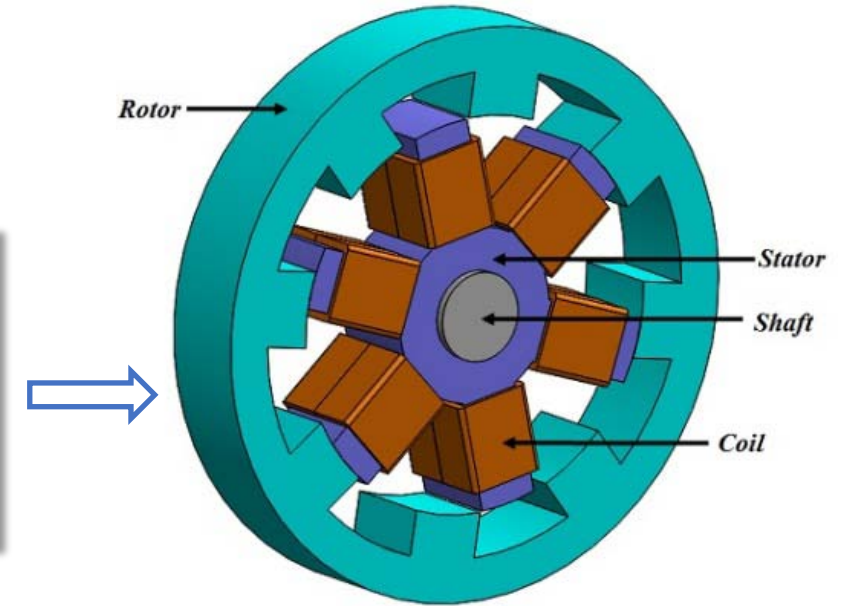
Induction Motor

Efficiency	✓✓
Control	✓✓
Robust	✓✓✓
Magnets	✗



BLDC Motor

Efficiency	✓✓✓
Control	✓✓✓
Robust	✓✓
Magnets	✓



SR Motor

Efficiency	✓✓✓
Control	✓✓✓
Robust	✓✓✓
Magnets	✗



SRM based Ceiling Fan

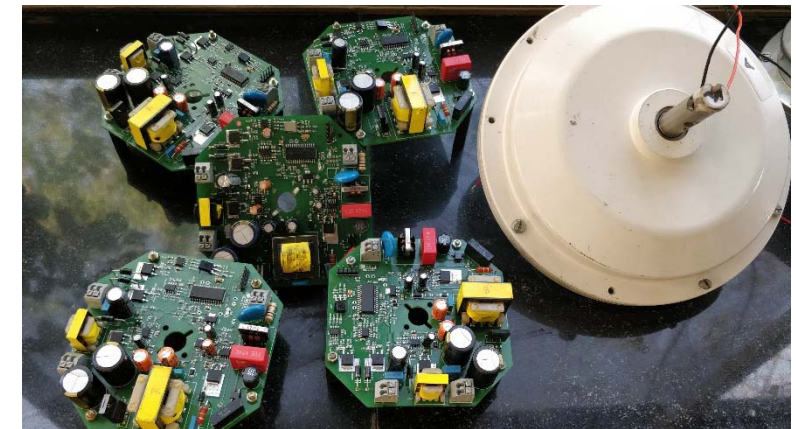
Energy saver & Permanent Magnet Free ceiling fans
with more than 55% lower energy consumption

- 35 W @ 225 cmm
- Effective Noise Cancellation
- Active Power Factor > 0.95
- Wide Voltage Operation Range (AC : 120 V to 300 V)
- Accurate Speed Control irrespective of Voltage Fluctuations
- Proprietary Hardware & Software
- Indigenous Technology, **Eliminates Magnet dependency**

Patent Granted
“ World’s first high efficient SRM Ceiling Fan”



SRM fans: Pilot Deployment

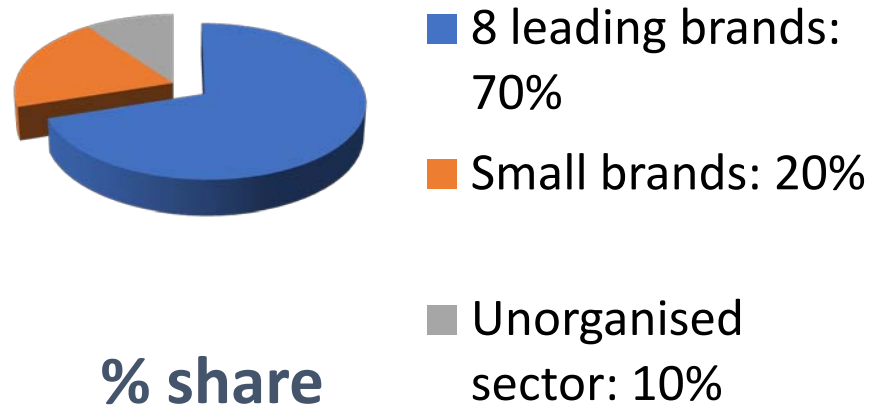


Controller



The energy saving potential in ceiling fans

- The Induction Motor based fans are only 25 -30 % efficient
40 million sale per year (10% growth/year)



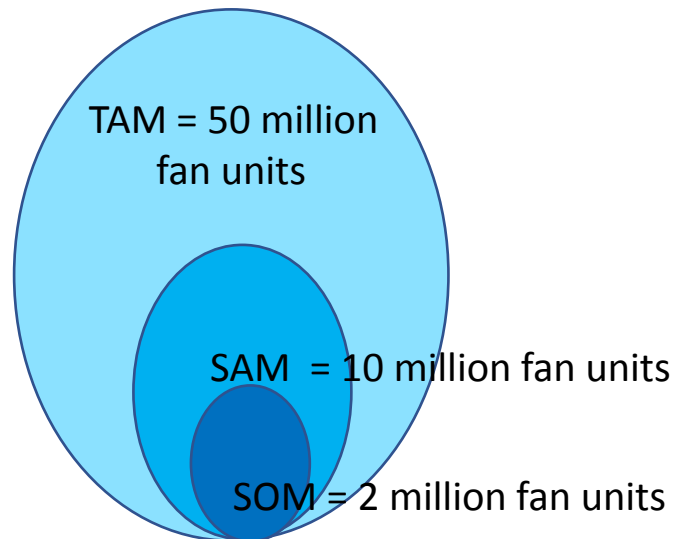
With 350 million existing IM ceiling fans in INDIA, the energy saving potential of the efficient ceiling fans is about 35 TWhrs



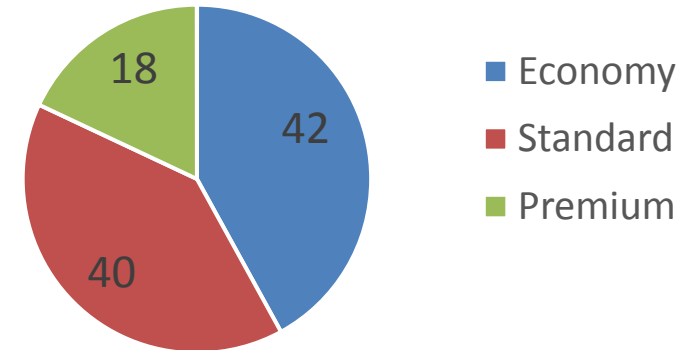
Market Potential

- Price Segment

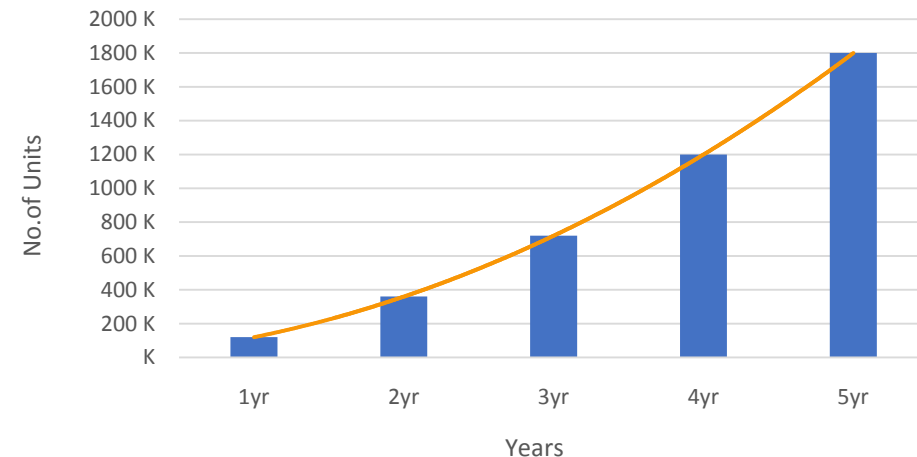
- ❖ Economy : Price of fan < 1500
- ❖ Standard : 1500 < Price of fan < 2500
- ❖ Premium : Price of fan > 2500



Market Share (Total \$1.25 B)



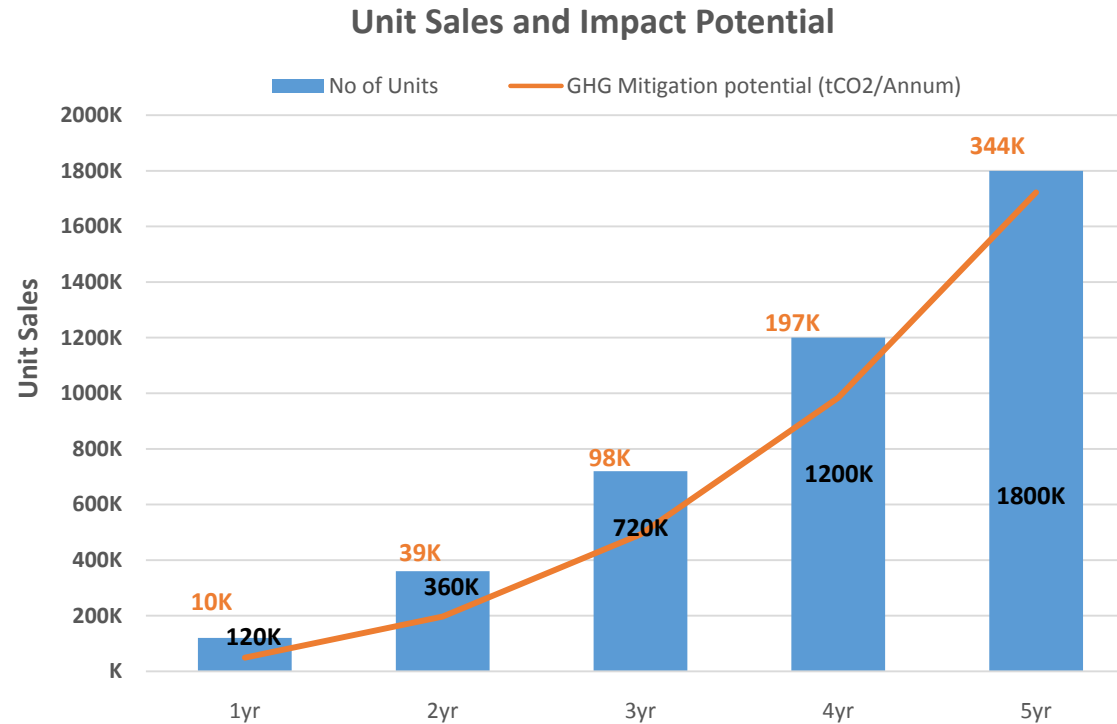
Ceiling Fan Sales Target



- The Premium market growth = 20 % (https://ww2.frost.com/wp-content/uploads/2018/09/Dynamics-of-the-Indian-Fan-Market_EDT.pdf)



Impact Potential

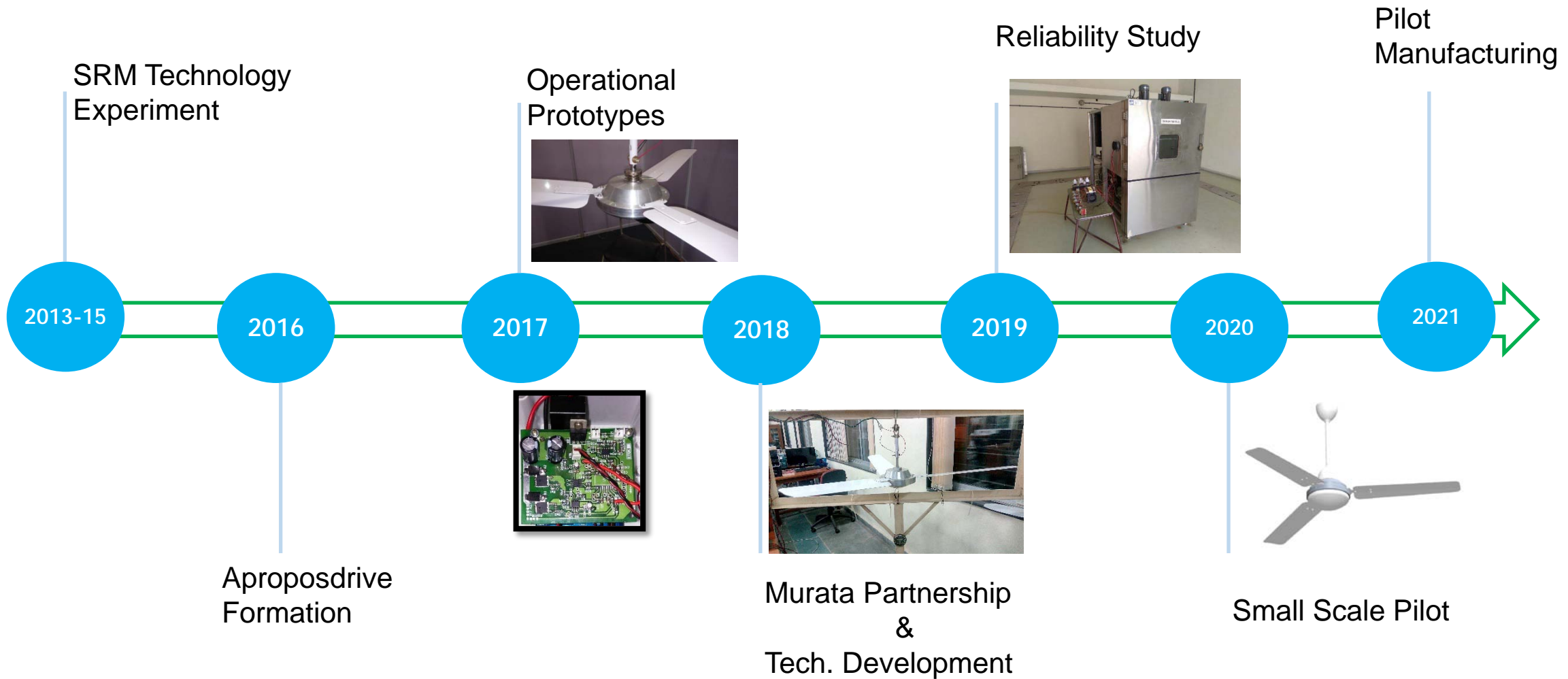


High GHG emissions from mining of magnet material : **1kg of ceramic magnet production generates 130 kg of CO₂**

(Ref: Comparative LCA of NdFeB and ferrite motors used in the microfabrication industry by Julio Navarro et al)



Journey So Far



Founder Team

Nimish Kothari

Expertise: Power Electronics

Role: BD, Electronics Dev.

Education: M. Tech (IIT Bombay)

Email ID: nimish@aproposdrive.com



Saurabh Nikam

Expertise: Electric Machines

Role: Machine Design & Software Dev.

Education: PhD (IIT Bombay)

Email ID: saurabh@aproposdrive.com



Prof. B. G. Fernandes

Expertise: Machines & Electronics

Role: Mentoring

Email ID: bgf@ee.iitb.ac.in



Aproposdrive is a **8** member multidisciplinary team from backgrounds in Machine Design, Power Electronics, Electrical, Mechanical Design & Manufacturing

Thank you!!

