Akshay Sonandkar

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Education:
B.E (Hons.) Mechanical Engineering.
BITS Pilani, 2013 - 2017
Thesis: Injection moulding.

An engineer with rich R&D experience of conceptualization and execution of complex ideas. I am a mechanical engineer by training, amateur programmer and electronics geek by interest. I have designed machines, mechanisms, circuits and softwares for applications across versatile fields of consumer electronics, medical robotics and quantum technology. Being an essential member of the founding team of two tech startups and founder in one myself, I am very passionate about new technology and look forward to widening my perspective with new and challenging projects.

Skills:

Mechanical:
DFM • CAD • Precision manufacturing • GD&T • Product design • Rendering • Package design•Functional and failure testing• Additive manufacturing • Linkages

Electronics:
Embedded systems •TI Ble 4.0 • ESP 32 • STM32 • Raspberry Pi • Motor drivers • PCB design • Control systems • Thermal cooling •MEMS •Communication protocols • LabJack T7

Programming:
Python • JavaScript • Tkinter • App development • MATLAB

Experience

Atomionics, Singapore (Mechanical Design Engineer) Founding Engineer
Quantum sensing, Gravimetry
https://www.youtube.com/watch?v=X7Y7MikUS4M

Atomionics performs interferometry of Rubidium atoms cooled sufficiently by lasers to exhibit quantum mechanical behavior. Unlike photons, atoms have mass and also a very short wavelength which is exploited to build a gravity detector 100x more sensitive than the next best device. We use this gravity data in pinpointing mineral reserves and monitoring climate change.
I am the lead mechanical systems designer in Atomionics. I am in charge of planning the system architecture, stability requirements, design and integration of all major subsystems, i.e. lasers, electronics and vacuum assembly.

- Miniaturized 300 Kg lab based interferometry set-up into a 23kg portable package for airborne gravimetry. This enables us to cover large pieces of land by collecting data 10x faster than land survey vehicles.
- Developed a compact titanium vacuum chamber for pressure < 10nTorr. The unique modular design has in-built atom trapping retroreflectors and anti-helmholtz magnetic coils.
- Enhanced the magnetic field strength to trap 15% more atoms which increases the Signal to Noise Ratio. Achieved this by building a liquid-cooled magnetic coil setup that can withstand the heat generated by driving high currents.
- Designed custom optics, lens assemblies, glass cells and alignment tools for laser guiding set up by considering the effects of thermal expansion, flexure and vibration while designing.
- Fabricated an automatic tilt correction mechanism to align the sensor with the gravity axis for payload capacity of 200 Kg and angular range of +/- 8°.
- Improved vibration isolation performance by 2x by integrating voice coils as force controllers in the feedback loop of a negative stiffness spring platform.
- Created a 2-DOF flexure flange periscope for laser beams. Used DetasFlex for simulation and Titanium for fabrication.

Analysis| Simulation:
Mechanism design
• Motion study•
Stress & Strain analysis
•Vibration analysis
•Material/surface interaction

Awards:
•Prof. Suresh Ramaswamy Fellowship
• Mantra Entrepreneur of the year award
•Technology Business Incubator (TBI), Govt of India, 2 year fellowship.

Conferences:
•Harvard Project for Asian And International Relations '18, Malaysia
• Advances in Robotics, International Conference, Goa

Public lectures:
•Application of Quantum Technology in resource exploration: SEDS Celestia
•Hardware product design: NVC 2020
•Role of mechanical engineering in Quantum Technology: Cummins University
•Developing innovative and sustainable mechanical systems, University of Western Sydney

Morphle Labs, YC W20 (First Robotics Engineer) R&D 2018-2019
Digital Pathology
https://www.morphlelabs.com/

Morphle builds robotic whole slide scanners for histopathology. Digitising tissue slides in 400x zoom enables doctors to tele-report cases and run AI assistive diagnostics.
I was responsible for designing the 3-DOF translation platform, optomechanical assembly and motion control system. My work on glass fabrication and backlash compensation significantly boosted the precision of the instrument.
Our scanners are deployed in 100+ labs and have taken more than 1 million scans till date.

- Replaced metal linear guides with acid etched glass to trap air pockets thereby considerably reducing the friction and error in the tissue slide movement.
- Solved the backlash problem by developing a movement compensation algorithm (80% linear and 20% radial movement for each stroke). Combination of this algorithm with the etched glass technology increased the accuracy of the system allowing the elimination of optical encoders thereby reducing overall cost and complexity.
- Designed and fabricated X-Y translation stage with 50 µm precision for X-Y axis and 10 µm for Z axis.
- Designed the LED strobing circuit for high speed imaging and the PCB of the main electronics driver board.

Crosscharge Technologies (Founder) 2014 - 2018
Hitch Tag, Consumer electronics
https://www.youtube.com/watch?v=tZD70GqXt2A&t=20s

An anti-theft, anti-loss tag to keep track of valuables like keys, wallet, luggage etc. A Bluetooth low energy tag that links to a mobile phone and alerts when the tag moves far away.
I came up with the product idea in 2014 as a sophomore. After three years of research and product development, the product was launched in India's largest gadget store. The start up got funded and incubated by Dept. of Information Technology, Govt. of India

- Developed firmware and the wireless electronic circuit using TI CC2541 chip, Used the Kalman filter for locating positions using RSSI (signal strength)
- Designed the enclosure for circuit housing; prototyped using 3D printer and batch-produced using injection molding.
- Designed cardboard packaging using 2D projections and kirigami concepts.