

A lifetime spent in innovations

State Award
West Bengal



Nitai Dasgupta
Murshidabad, West Bengal

Scout: Jaydeep Mandal

During the journey of over seven decades, Nitai Das Gupta, (78), a fabricator, has done a lot of work in developing customized solutions for his clients, for himself and for others. His skill lies in understanding the need and coming up with simple, cost-effective and efficient solutions.

Nitai Das was born in Berhampur, Murshidabad district of West Bengal in 1931. His father was a labourer in a tannery. He was average in studies and in fact did not like it much. But his school gave him something that has remained with him at all times- the skill to write with both hands and that too simultaneously. It so happened, that as a natural left-hander, he used his left hand to write and do things. He was punished by the teacher while thrusting out his left hand to take the chalk from him. (In some local traditions, left hand is considered inauspicious or socially unacceptable) The teacher asked him to use his right hand for writing. This made him train his right hand and he became ambidextrous in simultaneously writing with both hands with equal precision and speed.



Certain financial problems forced him to drop out of school after class eight. In 1942, at the age of eleven years, he opened a cycle repair workshop. Having no agricultural land, this was the main source of income. While picking up various skills in the workshop, he became a self-taught technician and a fabricator.

With a wide experience spanning over 50 years, he has developed a series of innovative applications, ranging from customized vehicles for land and water to developing rides and other structures for amusement parks. Currently, in his ripe old age, he has cut back on new innovations and spends his time supervising workers in his fabrication workshop, Das Gupta Engineering Works. He stays near his workshop, which is close to Berhampur railway station with his wife. He has three daughters; all are married.

The saga of innovative works

Nitai was doing routine bread and butter jobs in his workshop till a brainwave struck him in 1953. He thought of building a bicycle driven by two people. In three months, he built a unit with five gears with an average speed of 30 km per hour. The five gear system was used to drive on inclines as well as plain roads.

Encouraged by this success, the next year, he built a bicycle driven by three persons simultaneously. By this time he had become quite popular in Murshidabad district for his innovative vehicles and he started receiving orders for developing structural items used in amusement parks, circus and village fairs.

He started manufacturing and supplying wheel sets, merry-go-rounds and toy aero plane used in circus and specialized rigs for Durga puja pandals. He started fabricating and selling such custom products to customers all over West Bengal and Eastern India.

Later in 1958, impacted by frequent floods, which washed away roads and marooned people for days, he decided to build an amphibious three-wheeler,

which could pedalled across flooded lands and waterways alike. He developed the “Three Wheeler Amphibious Vehicle – Waland”.

In 1999, he developed “Motor Cycle Driven Ambulance”, which is used to carry patients to hospitals from remote villages. Earlier, considering the need of ambulances in remote villages without petrol pumps, he had developed ambulance unit driven by two people manually like a cycle rickshaw.

Improving it further, in 2002, he developed “Four Wheeler Vehicle Driven by Four People”, which can also be used for transportation or simply as a fun vehicle by tourists. The central portion of this vehicle had a caged receptacle to keep the luggage with the added seating facility for another passenger.



Having built many devices for amusement parks and fairs for decades, Nitai Das developed a good understanding of steel structures, trusses and their capacity. Trying to move off the beaten track, he took up a new challenge and then designed and built a suspension bridge at Jangipur in Murshidabad in 1995-96.

He feels blessed that he has consistently received the support of his family members, neighbors and friends in all his endeavours. Having built a lot of goodwill over five decades, it is not surprising that often customers have paid him full in advance for developing specific designs.

However, he feels he could have done much more in shorter time with the financial support from private organizations and government agencies which could also have expanded the scope and reach of his innovations. Nitai Das, inspite of his frail health participated in the 20th Shodh Yatra in West Bengal in 2007-08 along with his wife. His life story and the zeal to work even at such an age inspired most. He was also felicitated during the Shodh Yatra by the yatris.

The motorcycle driven ambulance

Rural India is witness to the difficulty and delay faced by lakhs of accident victims, patients and pregnant women in reaching the hospital in time. Most hospitals are located far way in developed areas. Ambulances and emergency response is almost non-existent in most hamlets.

Village communities and hospitals find it difficult to buy the existing ambulances, which cost a few lakhs and are expensive to run and maintain. Nitai first started work in 1970 and built a manual ambulance, driven by two people using a bicycle based mechanism. In the same year, he built another version, which could be pedaled by a single person. Since these units took only 15 days to build and could be made with an expense of a few thousand rupees, Nitai continued to make them by in dozens and sell them to customers in Murshidabad and other districts of West Bengal.

In 1999, he got a commercial order from Suman Mitra, the then district Superintendent of Police at Murshidabad, who asked him to develop a low-cost ambulance driven by motorcycle. The client provided Rs. 20,000 as an advance and two old motorcycles to be used for retrofitting. The innovator only took three months to retrofit the motorcycle with a custom built ambulance trailer unit to create a patient care and ferry unit.

Innovation details

The patient transportation unit consists of a 2.5 HP Yamaha motorcycle, which provides the traction to pull the trailer unit equipped with standard ambulance amenities. Apart from the driver, upto three people can be ferried in the ambulance unit, which also has a modified suspension to handle the rough road conditions.



The ambulance unit is provided with doors at the rear and has the facility to keep oxygen cylinder, first aid box and saline solution dispensing station and the attendants can sit inside at a seat height of 1.5 feet.

The ambulance cabin has a footprint of 8 feet by 5 feet and can be attached or detached from the motorcycle when required. The ambulance unit is provided with a stand to anchor it on to the ground to take the load when the motorcycle is detached. The linkage mechanism is similar to the mechanism used in tractors. It takes less than 2

minutes to fix the motorcycle unit to the trailer and make the system operational.

This unit provides a quick and cost effective way of providing emergency response and care and transported at upto 40 km/hour. Costing less than Rs. 60,000, this unit is an effective and affordable emergency response solution¹ at a fraction of the cost of conventional ambulances. The main cost is the cost of the motorcycle, tyres and fabrication of the ambulance unit. The commercial ambulance built around the Maruti Omni costs more than Rs. 2.6 lakhs and out of reach of thousands of rural clinics and hospitals. The innovator has made and sold two motorcycle driven ambulance units. These units are being used locally in Murshidabad.

The manual ambulance

For covering shorter distances of less than 30 km and for those village dispensaries with a tighter budget, Nitai has built and offered the “manual cycling version”, which can be driven by a single person or two people at a speed of 10 km/hour. For less than 10 km, the single person driven version is preferred. For longer distances of 10 to 30 km, the ambulance powered by two people can be used.

In the last few decades, the innovator has made and sold more than 2000 manually operated ambulances in Bengal and Bihar. In the rural areas, the high cost of the motorcycle ambulance unit has been a deterrent though there is a clear increase in demand in last five years.

Using a conventional motorcycle to drive the ambulance makes this a flexible and universal patient care solution. The same vehicle can suit different occasions for various mobile services. This approach is in synergy with the value proposition required in villages where one utility is used to deliver multiple conveniences in a cost effective manner.



The amphibious three-wheeler

Nitai Das lives in the flood prone Gangetic region where every year, a large number of people lose their lives. Whether it is women or children or those who do not know how to swim, many marooned people became flood victims. While fleeing to safer areas, quickly changing from boats to vehicles when encountering water and vice versa becomes difficult due to limited inland and water transport options.

Pondering on this universal problem, in 1954, Nitai conceived an idea about a three wheeler, which could be quickly deployed both on land and water. Due to lack of funds, he had to wait four years to start work on the first prototype. In 1958, he took three months and about Rs. 7000 to design and build his first amphibious three- wheeler to move on land and water.

Innovation details

The amphibious three wheeled Vehicle, named "Waland" is 8 feet long, 4.5 feet wide width and 3 feet height and weighs 120 kg. It is essentially built

as a boat on three wheels: two at the sides and one in the front. A pair of long cylindrical floats has been provided, which is parked inside when traveling on road. While in water, the floats are suspended on either side of the structure to act as buoyant stabilization arms.

Equipped with a steering system, two people sitting in the front seats can run it by pedaling. The pedaling unit rotates a set of blades that work as propeller to move the vehicle in water. Two people can sit in the rear also.

In 1959, a rigorous testing of the amphibious vehicle² was done by various users who used it across India. The route taken by road included traveling from Berhampur to Kolkata, then Kolkata to Delhi, then Delhi to Haridwar, which took one month and 5 days. While testing over waterways, first it was used to travel from Berhampur, in Murshidabad to link with the Brahmaputra river by traveling 700 kms. The return, from Haridwar to Kolkata on the Ganga, took two month and twenty days.

Starting with the very little exposure in 1959, over the next three decades, the amphibious vehicle garnered media attention with over 40 articles published till 1990. In 1990, Nitai sold this unit for Rs. 20,000 to the Assam government and personally handed this over to Prafulla Kumar Mohanta, the then chief minister.

Five gear bicycle pedaled by two people

In the early 1950s, Nitai started developing a series of vehicles built on extending the features and applications of human powered bicycles. After developing the amphibious three-wheeler, he started working on an all-terrain bicycle powered by two people requiring reduced driving effort.

Innovation details

The first model, built in the 1958, used 26" standard tyres and consisted of a steel frame body and weighed 60 kilograms. It could be driven by two people and was provided with five gears and a braking system for downhill

driving. Two gears were designed for use on level roads while other two gears were used for running on inclined slopes. The five sprockets were fitted in the bicycle and a small adjuster was located in the center of the chain drive.

No automatic gear shift was provided, and the driver had to get down and manually change the drive for the required sprocket set for climbing uphill. Costing less than Rs. 8000, this transportation unit found many buyers locally.

Prior art³ clearly discloses that multi-gear and multi-speed bicycles currently available in the national and global markets. All of them use the same chain and sprocket arrangement for power transmission. But at the time when Nitai made this innovation, in the late fifties, these types of cycles were unknown and unseen in Indian markets and his visionary thinking and development skill could be recognized here.

4 wheeler driven by 4 people

In 2002, the local Superintendent of Police asked Nitai to fabricate a custom vehicle, which could be driven by many people for a road show in South India. Sourav Das, the District Magistrate inspired him to go ahead and provided monetary help of Rs. 5000. Taking up the work, Nitai completed the design and fabrication in 15 days.

Innovation details

The overall dimension of the vehicle driven by four people is 8' length, 3.5' width and 2.5' height. The total weight of the vehicle is 80 kg and there is a provision provided in the center of the vehicle for keeping the luggage.

To conduct a thorough test of the vehicle, it was first used in a cross country tour by four people who traveled from Berhampur, Murshidabad, West Bengal to Chennai in Tamil Nadu. This tour was completed in two month and five days. Nitai observed that this unit delivered an average

speed of the 30 km per hour when operated by four people. At present, the working model of the vehicle is kept in the office of the District magistrate of Berhampur, Murshidabad.

¹ Prior art search disclosed the motorcycle driven ambulance of similar technologies and combination of technologies and instances of box attachment with motorcycle as per US 9,10,728-dated Jan 26, 1909, US 2007/0120340 A1, dated May 31, 2007, US 2007/0176396 A1-dated Aug. 2, 2007, US 7,011,320 B1-Mar. 14, 2006, US 3,840,085- dated Oct. 8, 1974 and US 2007/0216118 A1-dated Sep. 20, 2007.

² NIF database discloses amphibious vehicles made by Mohammad Saidullah, Dwarka Prasad Chaurasia and others. Prior art search disclose a human-powered wheeled amphibious vehicle (US 5782480), amphibious vehicle has a hull with a seat portion formed on its upper side (US 178088), a three wheeled amphibian vehicle operated by pedal power (US 3941075 & 4357893) and an integrated system for land and water (5803774). Also see *Let no Water Come in the Way: Traveling the Amphibian Way*. Honey Bee 19 (4): 16-17, 2008.

³The Prior Art Search discloses the variable speed bicycle, Hercules Wow, ranger DTB (Hero Cycles), US 4119326, US 4277077 and US 5342075 and discloses the tandem bicycles as in US 6612597 B2.