Light Runner

Fiber Optic Benchtop Laboratory

PATENTED

LIGHT RUNNER

Jointly developed with IIT Delhi

AWARDS
&
RECOGNITION

Light Runner has been granted UK Patent in the year 2013

Fiber Optika has received Gold Medal in Innovators Competition for DST Lockheed Martin India Innovation Growth Program 2011

The Power of Ideas Initiative 2010, Economic Times & Dept. of Science & Technology Goverment of India - Winner

The Power of Ideas Initiative 2009, Economic Times & Dept. of Science & Technology Goverment of India - Finalist

Identified as Technology of Exceptional Potential as a part of Global Entrepreneur Programme 2011 by UK Trade & Investment

Features of Light Runner

An innovative and highly advanced training solution, LIGHT RUNNER is developed to provide industry oriented fiber optics training. This unique fiber optics laboratory teaching package offers an immediate solution for comprehensive and stimulating laboratory based courses in key areas of Optoelectronics, and optical communications.

Features:

• Integrated modular system offering over 40 experiments including EDFA, 4-channel WDM, OTDR, FBG, BER, Eye Pattern, OADM and Dispersion.

• Touch screen interface for optical monitoring and control.

• Robust hardware constituting industry grade components.

• Fully computerized operation with an interactive software that provides exhaustive information on how-to-do and what-to-expect from each optical experiment.

• Advanced proprietary software not only provides theoretical concepts associated with each optical experiment, but also allows saving results of individual students for later references by the tutor.

• Completely Stand-alone system- doesn't require any external equipments to operate.

• Use of industrial grade silica fiber.

• All supporting accessories- Fiber spools, Pathcords, Optical power meter, Multimeter, Optical cleaning kit etc are included.

• Components can be used independently for open ended project or research.

• External components/ devices can be used with Light Runner and vice versa.
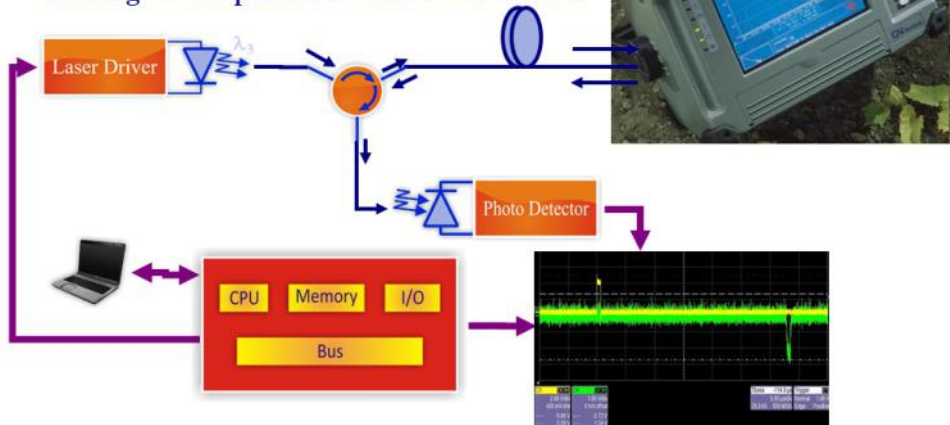
Light Runner
Graphical User Interface
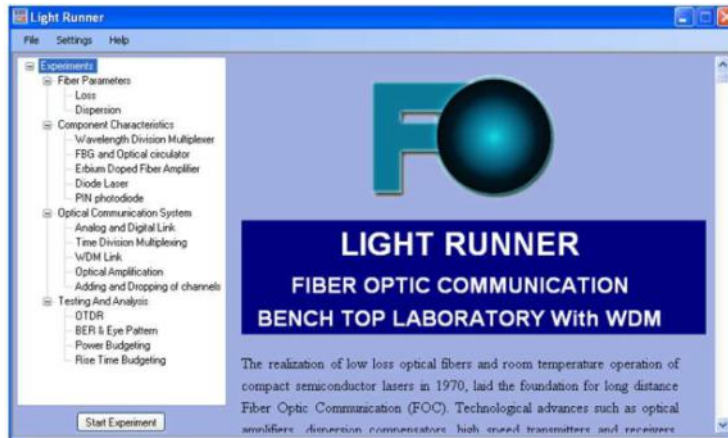
List of Experiments

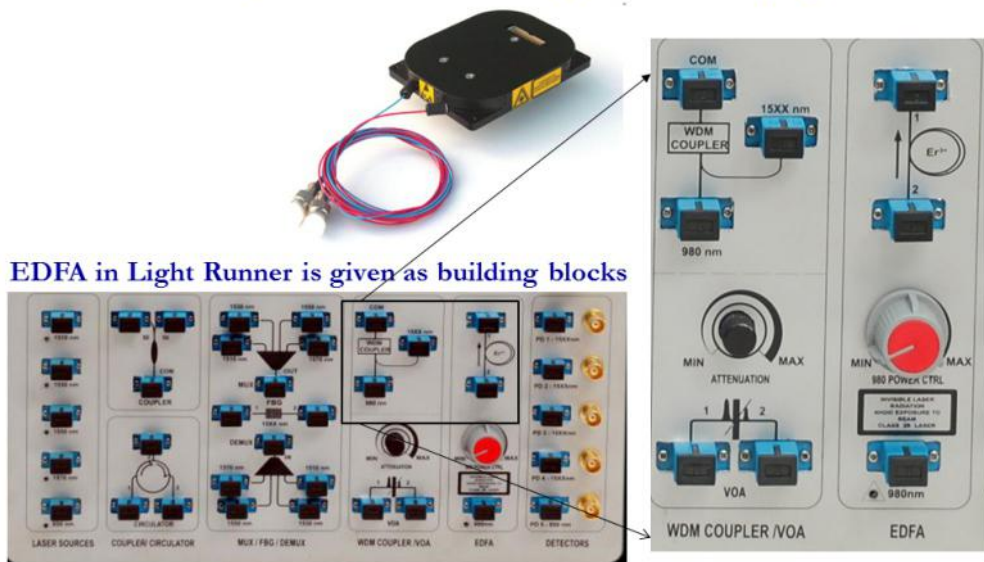| Sr. No.	LIST OF EXPERIMENTS
FIBER PARAMETERS	
1	Attenuation in Optical Fiber
2	Bending Loss
3	Dispersion in Optical Fiber
4	Numerical Aperture
5	Modes in Optical Fiber
COMPONENT CHARACTERISTICS	
6	Wavelength Division Multiplexer
7	Fiber Bragg Grating and Optical Circulator
8	Erbium Doped Fiber Amplifier
9	Diode Laser Characterization
10	PIN Photodiode Characterization
OPTICAL COMMUNICATION SYSTEM	
11	Analog and Digital Fiber Optic Trans receiver
12	8 channel Time Division Multiplexing
13	Wavelength Division Multiplexed Link
14	Optical Amplification in WDM Link
15	Adding and Dropping of Channels in WDM Link
TESTING AND ANALYSIS	
16	Optical Time Domain Reflectometer
17	Bit Error Rate & Eye Pattern Analysis
18	Power Budgeting
19	Rise Time Budgeting

OTDR in Light Runner

- OTDR is an instrument used primarily for locating fiber faults
- OTDR can be easily made from its basic building blocks present in LIGHT RUNNER

EDFA IN LIGHT RUNNER

EDFA is usually a black box with one input and one output ports

EDFA in Light Runner is given as building blocks

Benefits of our Extensive
Bench Top Laboratory Solutions

Features	Benefits
Self-contained open platform based integrated standalone lab solution	Offers a broad range of experiments, including but not limited to latest cutting edge technologies such as EDFA, WDM, OTDR, BER, Eye Pattern, OADM and Dispersion.
Value for money	Realistically priced to accommodate academic budgets
Comes with all experimental hardware and setup manual	Allows immediate installation in the laboratory. Straightforward to reconfigure for open ended projects and problem based learning laboratories
Ideal laboratory solution for conducting examinations and practical.	Allows provision to store and review the experiment results of individual students, making it a meritorious solution to execute examinations in optical labs
Comprehensive online literature support	Light Runner software provides theoretical concepts associated with each experiment for student's ready reference while conducting the experiments
Light Runner Proprietary Software	User friendly software for real time optical control and monitoring, allowing extremely precise experimental observations.
Designed in conjunction with leading academics from Indian Institute Of Technology, India	Ensures that all desired educational objectives are realized and that students investigate all major technical issues
Experiments for different student levels	Suitable for all undergraduate and master level photonics courses in Physics and Engineering
The only bench-top fiber optic solution to use original telecom grade silica fiber and components	Allows real industry based experience while understanding fiber optics concepts
No additional peripheral equipments required	Standalone fiber optic lab solution that contains CRO, pulse generator, power meter, inbuilt DSO, inbuilt EDFA and fiber spools
Examines fundamental principles, applications and key technical issues of the technology	Ensures that all desired educational objectives are realized and that students investigate all major technical issues
Several leading academic institutions world-wide are now enjoying fiber optic lab solution Light Runner and reverting with continued repeat business	Positive endorsement of the educational value of self-contained fiber optic lab solution: Light Runner by both academic and industrial conglomerates.
Full product support is available	We are just a call away to assist you with all your queries and issues. Contact us via phone, email or fax.

Technical Specifications

Sr No	Technical Detail	Lists of Components	Light Runner Basic	Light Runner EDFA	Light Runner WDM	Light Runner Premium
				LASERS		
1	LASERS: 1510, 1530, 1550 and 1570 nm • Pigtailed DFB Laser • Output Power 1mW • Spectral width 50 pm	LS - 1510 nm	-	-	√	√
2		LS - 1530 nm	-	√	√	√
3		LS - 1550 nm	√	√	√	√
4		LS - 1570 nm	-	-	√	√
5	850 nm Laser • Pigtailed Laser • Output Power 2 mW	LS -850 nm	√	-	-	√
6	980 nm Laser • Pigtailed Laser • Output Power 50-60 mW	LS - 980 nm Pump	-	√	-	√
				DETECTORS		
1	**InGaAs**	PD1 – 15xx nm	-	-	√	√
2		PD2 – 15xx nm	-	√	√	√
3		PD3 – 15xx nm	√	√	√	√
4		PD4 – 15xx nm	-	-	√	√
5	**Silicon Photodiodes**	PD5- 850 nm	√	-	-	√
6	• Pigtailed Photodiodes	PD6 - 850 nm	√	-	-	√

Technical Specifications

Technical Detail	Lists of Components	Light Runner Basic	Light Runner EDFA	Light Runner WDM	Light Runner Premium
OPTICAL PASSIVE COMPONENTS					
3 dB Coupler • Splitting Ratio 50:50 • Insertion Loss of each Channel 1 dB	3 dB/50 - 50 Coupler	√	√	-	√
3 Port Circulator • Isolation 15 dB • Insertion Loss 0.5 -1 dB	3 port Circulator	√	-	√	√
4 Channel WDM Mux &DMux • Pass Channels at 1510, 1530, 1550 and 1570 nm • Channel spacing 20 nm	4*1 Multiplexer (MUX Block)	-	√	√	√
	1*4 Demultiplexer (DEMUX Block)	-	√	√	√
Fiber Bragg Grating • 30 dB isolation @ 1550 nm • 15 dB isolation @ 980 nm	Fiber Bragg Grating (FBG) for 1550 nm	-	-	√	√
980/15xx Mux • 30 dB isolation @ 1550 nm • 15 dB isolation @ 980 nm	WDM Coupler - 980/15xx nm	√	√	-	√

List of Accessories

- Digital Multimeter
- Head Phone
- Microphone
- Power Meter (Mini)
- Single Mode Fiber Spool 1KM,2KM,3KM
- Mains Power Cable
- BNC cables
- RS 232 (DB9) Cable Female-Female}
- SC-SC SM fiber patch Cords
- SC-SC Adaptor
- Mandrel
- Visual Fault locator
- Dispenser Bottle
- Tissue Papers
- Cleaning Sticks
- Connector Cleaning Spray

Value for Money

FiberOptika completely understands the cost concerns of our customers for their investment in. We recommend our customers to evaluate the cost and real value of FiberOptika's teaching package by comparing the ultimate cost and time required for multiple purchases of the independent teaching packages for separate experiments, with the direct purchase of a robust self-contained Light Runner solution. Light Runner is not just any other fiber optics kit but a comprehensive fiber optics bench-top laboratory solution that supports as many as 40+ experiments for optical labs using multiple technologies such as WDM, EDFA, OTDR and OADM.

✧ Light Runner successfully replaces the existing training kits that offer only a limited number of experiments and costs less than half of various kits put together to provide a broad range of 40+ experiments.

✧ Unlike the plastic fiber typically used in the training kits available in the market, Light Runner not only uses original telecom grade silica fiber and components, but also has been developed using high quality best industry practices.

✧ Several units of Light Runner have already been sold to our international clientèle, who have been using it for long time now. We take pride in the fact that so far we have not received any complaints or repair requests for Light Runner from any of our clients worldwide.

✧ Integrated modular nature of Light Runner further adds to the robustness of the kit as an issue in any particular module will not impact the functioning of other modules and hence will prevent the whole system from becoming obsolete.

✧ The other major aspect is the Light Runner proprietary software to support extensive literature including: student manuals which describe the relevant background theory and associated key fiber optic concepts and experimental procedures; instructor's manual with provision to store and review student's experimental results at any point in time; detailed lecture or background notes with case studies, design exercises and tutorials with solutions.

✧ Light Runner comes with a warranty period of 12 months. Under warranty period we take complete ownership of repair, replace or exchange of the kit without incurring any additional cost to our clients. Our post-sales services strongly rely upon business commitments, quick turnarounds and client satisfaction.

When compared to the real cost and time required in purchasing several kits for different laboratory experiments, we strongly believe that Light Runner offers the tutor excellent value for money. This is further supported by the fact that we have sold several Light Runner kits internationally and continue to generate regular repeat business from our worldwide customer base.

ORIGIN OF LIGHT RUNNER

A need for a modern Fiber Optic Training laboratory in a compact form for teaching fiber optics concepts in a user friendly manner was felt. Contacts with leading R&D organizations like IIT Delhi, who are pioneer in fiber optic education at India led to the conceptualization of Light Runner. With combination of 30 years of teaching and 20 years of Industrial experience, "Light Runner" was conceptualised and developed.

Hitesh Mehta   **Prof. K. Thyagarajan**   **Prof. M. R. Shenoy**

Competitive Advantages

The following are the competitive advantages that differentiate Fiber Optika Technologies Pvt. Ltd. from other manufacturers:

❖ **Company Recognition**

In business since 2008, Fiber Optika Technologies has helped clients around the world in achieving remarkable improvements in fiber optics training. Today, Fiber Optika stands as a creative and innovative leader, continuing to develop and improve the teaching, learning and training methodologies in optical technology.

❖ **Expertise & Stability**

We have proven expertise in identifying the gap between industry and academia and translating them into innovative solutions.

- ❖ Tie-ups wih premier educational institutes and research labs
- ❖ Strong In-house R&D
- ❖ Reasonable Prices
- ❖ History of Success

Recognitions and awards won by Fiber Optika speak volumes about its success.

- ❖ Winner of 'Innovators' Competition' at Innovation Growth Programme 2011. Jointly awarded by Lockheed Martin Corporation (USA) and Department of Science & Technology, Government of India.
- ❖ Identified as a 'Technology of Exceptional Potential' as a part of Global Entrepreneur Programme 2011 by UK Trade & Investment.
- ❖ Winner of 'Aegis Graham Bell Award 2010' for Innovative Business & Products in Telecom Hardware.
- ❖ Winner of 'The Power of Ideas Initiative 2010' as organized by Economic Times and Department of Science & Technology, Government of India.
- ❖ Nominated for' Leaders of Tomorrow Awards 2010' as organized by The Nielsen Company, Indiamart and The Times Group (ET Now).
- ❖ Finalist in 'The Power of Ideas Initiative 2009' as organized by Economic Times and Department of Science & Technology, Government of India.

❖ **Customer Service**

- ❖ 24x7 support available from FiberOptika's highly qualified personnel.
- ❖ Consultancy is designing and setting up optical communication laboratory and courses.
- ❖ Training to teachers based on Light Runner at nominal fees at our training centre.
- ❖ Product Warranty of One Year for manufacturing defects.
- ❖ Annual Maintenance Contract after the warranty period.
- ❖ Free Software up-gradation for One Year

Extended List of Experiments

- Attenuation in Optical Fiber.
- Calculation of additional loss due to patch cord.
- Determine the connector loss into the fiber path.
- Measurement of bending loss in the fiber. (Bend diameters of 30 mm/ 50 mm).
- Dispersion in Optical Fiber Measurement of distortion in the output at 660nm/1550 nm.
- Measurement of delay between 660 nm and other C-band pulses,
- Observation of various mode patterns by slightly bending the fiber at 660 nm. Characterization of WDM Mux and Demux
- Determine the insertion loss and cross talk at each port of Mux and Demux.
- Characterization of FBG and Circulator
- To explore FBG dependence on the direction of light launching to it.
- To demonstrate Add/Drop filter using FBG/Circulator. Characterization of Erbium Doped Fiber Amplifier
- Measurement of the power exiting the fiber for input
- wavelength as well as other wavelengths.
- Measurement of gain at a given wavelength in the presence/ absence of other wavelengths.
- Diode Laser Characteristics
- Photodiode Characteristics
- Study the linearity of the photodetector in photoconductive modes.
- Study the linearity of the photodetector in photovoltaic modes.
- Analog and Digital Fiber Optic Links
- Analyse laser power for the signal transmission of analog source.
- Time Division Multiplexing of Digital Signals
- WDM Fiber Optic Link Optical Amplification in a WDM Link
- Measurement of exiting power at different wavelengths.
- Calculation of exiting power at different fiber length.Adding and Dropping of Channels in a WDM link
- Designs add / drop multiplexer
- Optical Time Domain Reflectometer
- Analysing spatial resolution technique through OTDR
- Differentiate the OTDR signal by varying the Wavelength and study the trace
- Bit Error Rate and Eye Pattern Analysis
- Analyse the effect on eye pattern in the presence of additional channels.
- Measurement of the additional noise introduced by EDFA into the system.
- Power Budgeting of a Fiber Optic Link
- Rise Time Budgeting of a Fiber Optic Link.
- Calculation of transmission distance with the given power and rise time budget for a bit rate of 100kb/s, 1Mb/s and 10Mb/s.

Variants of Light Runner

Light Runner - BASIC

Light Runner- WDM

Light Runner- EDFA

Light Runner - PREMIUM

LIST OF EXPERIMENT-BASIC

Numerical Aperture

Modes in Optical Fiber

Attenuation in Optical Fiber

Bending Loss in Optical Fiber

Dispersion in Optical Fiber

Characteristics Of Laser Diode

Characteristics Of Photo Diode

Analog and Digital Fiber Optic Links

Time Division Multiplexing of Digital Signals

Optical Time Domain Reflectometer

Bit Error Rate and Eye Pattern Analysis

Power Budgeting of an Optical Fiber Link

Rise Time Budgeting of an Optical Fiber Link

LIST OF EXPERIMENT - WDM

Attenuation in Optical Fiber

Bending Loss in Optical Fiber

Characteristics Of Laser Diode

Characterization of WDM Mux & Demux

Characterization of Erbium Doped Fiber Amplifier

Analog and Digital Fiber Optic Links

Time Division Multiplexing of Digital Signals

WDM Fiber Optic Link

Optical Amplification in a WDM Link

Bit Error Rate and Eye Pattern Analysis

Power Budgeting of an Optical Fiber Link

LIST OF EXPERIMENT - EDFA

Attenuation in Optical Fiber

Bending Loss in Optical Fiber

Characteristics Of Laser Diode

Characterization of WDM Mux & Demux

Characterization of FBG and Optical Circulator

Analog and Digital Fiber Optic Links

Time Division Multiplexing of Digital Signals

WDM Fiber Optic Link

Adding and Dropping of channels in a WDM Link

Optical Time Domain Reflectometer

Bit Error Rate and Eye Pattern Analysis

Power Budgeting of an Optical Fiber Link

LIST OF EXPERIMENT - PREMIUM

Attenuation in Optical Fiber
Bending Loss
Dispersion in Optical Fiber
Numerical Aperture
Modes in Optical Fiber
Wavelength Division Multiplexer
Fiber Bragg Grating and Optical Circulator
Erbium Doped Fiber Amplifier
Diode Laser Characterization
PIN Photodiode Characterization
Analog and Ditial Fiber Optic Trans receiver
8 channel Time Division Multiplexing
Wavelength Division Multiplexed Link
Optical Amplification in WDM Link
Adding and Dropping of channels in WDM Link
Optical Time Domain Relectometer
Bit Error Rate & Eye Pattern Analysis
Power Budgeting
Rise Time Budgeting

Testimonials

Light Runner is one of the most versatile optical communication lab with various lasers sources, detectors and abundant passive components, which helps the students to perform various advance experiments such EDFA, OADM, WDM and many more.

-Dr. Yogita Kalra, Assistant Professor, Department of Applied Physics, Delhi Technological University Delhi

I am very glad to see that Light Runner is capable of performing various experiments, which will be helpful for our students to get an industrial exposure. The experiment list is designed in such a way that it can provide basic to advance level of experience in the field of optical fiber communication; Light Runner is compact, portable, standalone system and user friendly laboratory.

-Dr.S.K.Sudheer, Assistant Professor, Department of Optoelectronics, University of Kerala, Kariavattom Campus Thiruvananthapuram

Photonics components are very expensive and the process of buying the components from foreign country is very elaborative and not cost effective, specially when budget is not so high. In this respect "Light Runner" is a great set-up to assemble laser sources, related detectors, and various components in one place. I purchased it on behalf of NITTTR, Kolkata for providing lab-based training to technical teachers, who can transfer knowledge to their students in due course. It will be very helpful set-up for technical students if the set up get a place in the related laboratory. I express congratulation and best wishes for the company on my behalf and I am optimistic of getting after sales support from the company

-Dr.Anuradha De, Prof. & Head, Department of Science, National Institute of Technical Teachers' Training & Research (NITTTR),Kolkata

On the LR kit, I think it has many advantages and interests: it is modular, complete, requires no additional measuring equipment (oscilloscope). The proposed documentation (in the software interface and on the book) is very well done. It is quite detailed and clear drawings make it easy to perform the experiments. I have also appreciated: the possibility of other experiments than those offered. It is possible to imagine their own specific manipulations. In summary, I was pleasantly surprised by the ease of use of this LR Kit and very grateful to Abhay Katrela for the quality of training that he has produced.

-Dr. Pascal Ney, Company Manager, DIDA Concept, France

At the Institut für Hochfrequenztechnik of the Technische Universität Braunschweig, we are doing research work and teaching on optical communication for several decades now. When we ordered our first Light Runner system from Fiber Optika in 2009, our plan was to replace some outdated experiments in our student laboratory on optical communication systems by a setup with up-to-date components. However, we found that the Light Runner system was fitting our needs perfectly and with some additional systems we are now running all experiments of the student laboratory with Light Runner systems. We found the included manual very helpful for the preparation of the students as well as for the laboratory tutors.

-Dr. Ing. Reinhard Caspary (Institut für Hochfrequenztechnik)

Light Runner has made it reality to have well versed optical fiber laboratory with minimum cost. Six optical sources, optical detectors, EDFA, FBG, MUX/DEMUX, circulator and couplers available on Light Runner Bench Top laboratory covers basic experiments to advance level experiments in OFC which is unique feature of this stand along system. Operating process of every experiment is user friendly and fast due to touch screen facility which attract learner to be familiar with OFC light Runner Bench top laboratory.

-Dr. Subhash C. Arya, Associate Professor(ECE), North-Eastern Hill University,Shillong

Very nicely designed apparatus with a very good set of experiments! Good documentation for students.

Testimonials

I would like to appreciate and congratulates the team of light runner for manufacturing such a versatile and sophisticated experiment kit. Light runner is kit having 16 experiments on optical communication system; many of them are advanced level. The kit is useful for training purpose, for those who want to gain working knowledge on optical communication systems.

- Dr. Sanjeev Kumar Raghuwanshi(Assistant Professor, Dept. of Electronics Engineering, Indian School of Mines, Dhanbad, Jharkhand (India))

In the year of 2011, IIITDM Kancheepuram procured the three Light Runner kits (Basic, WDM and EDFA) for the Data Networks Lab. It has been observed that the kits are working effectively and are liked by the UG/PG students. The kits are also being employed in carrying our regular research activities in fiber optics.

- Dr. Naveen Kumar (IIITD&M Kancheepuram)

I am quite happy to see a standalone solution to fiber optic communication labs. The kit has been designed to provide exposure to advanced optical communication experiments such as those based on WDM, OADM, EDFAetc, and is capable of providing many more experiments over and above the 16 experiments claimed. More so, it does not require any external instruments and such as oscilloscope, couplers, power meter, etc. It is quite user friendly and comprehensive laboratory.

-Dr Vijay Janyani Associate Professor Department of ECE Malaviya National Institute of Technology Jaipur-Rajasthan

I am very glad to see that Light Runner is c apabl e of pe rforming va rious experiments, which will be helpful for our students to get an industrial exposure. The experiment list is designed in such a way that it can provide basic to advance level of experience in the field of optical fiber communication; Light Runner is compact, portable, standalone system and user friendly laboratory.

-Dr.S.K.Sudheer Assistant Professor Department of Optoelectronics University of Kerala Thiruvananthapuram

I have conducted almost five experiments on Light Runner uptil now and I am very happy that your product had been very useful for students to actually understand glass fiber and its characteristics. Students are keen in doing projects using Light Runner. All the experiments and the detailed manual provided by you explain the basic to advanced level of experiments in the field of optical fiber communication and we find it very much user friendly. We are glad to possess a Light Runner experiment module for our communication lab.

-Ms. Nilashree Wankhede Associate Professor Department of EXTC Fr. C. Rodrigues Institute of Technology Vashi- Navi Mumbai

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