



University of  
**Strathclyde**  
Glasgow

# Department of **Electronic & Electrical Engineering**

**“Making a world of difference”**  
**The Gambia Project**



The Institution of Engineering  
and Technology

Collective inspiration



## Foreword

The Department of Electronic & Electrical Engineering is one of the largest and most highly rated in the United Kingdom with a number of high level teaching programmes and leading-edge research initiatives.

As Head of Department, I take great satisfaction in all of our achievements but I take particular pleasure in the Gambia Project which has become part of our work for the last 3 years. This small but life-enhancing project strongly reinforces the usefulness and relevance of the teaching and research undertaken in this department and all of us – students and staff alike – feel that this can make a world of difference. Aside from the tangible benefits to the rural Gambian communities, the project has been of significant benefit to our own students in widening horizons and altering lives and ambitions forever.

I would like to thank all of the staff and students directly involved in the project, our industrial partners for donating funds and equipment, and everyone who has supported the project during the last few years.

I do hope that you enjoy reading our Gambia Story – the story does not end now and there is still a lot to be done. If you feel you can contribute to the project by giving directly or by holding a fundraiser at your school or workplace please contact us.

**Professor Scott MacGregor**  
**BSc PhD CPhys MIEEE**  
**Head of Department**



# Department of **Electronic & Electrical Engineering** and **The Institute for Energy & Environment**



Satellite Communications



Integration of renewable energy

## Department of **Electronic & Electrical Engineering**

Officially ranked by the UK Government as ‘excellent’ in both teaching and research, the Department has recently been ranked Number 1 in Scotland (The TimesOnline) and 4th in the UK (The Complete University Guide) for its discipline. More significantly, according to the National Student Survey (NSS) ([www.unistats.com](http://www.unistats.com)), our own students and graduates think we are doing a great job and are unanimous in the view that electronic and electrical engineering offers countless employment prospects with real opportunities to make a world of difference.

With a current research portfolio of £40 million, our research-led teaching is ‘state of the art’. Our extensive national and international links to the corporate and industrial communities enable us to provide financial support and vocational employment opportunities to a large percentage of our undergraduate and postgraduate Home and Overseas students.

Electronic and Electrical Engineering is a dynamic and exciting discipline. It drives all the major global technology manufacturing and service sectors that have a fundamental and long term influence on the world economy.

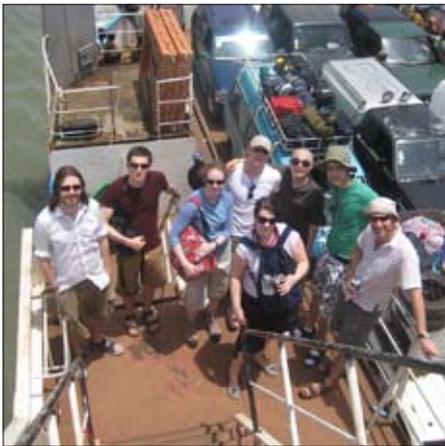
## The Institute for Energy & Environment (InstEE)

InstEE is one of the six specialist centres of research excellence within the Department of Electronic & Electrical Engineering. With over 100 researchers, it is a world leader in electrical power & energy technology, has an extensive research portfolio and the largest concentration of expertise in all aspects of energy in Europe. Its main areas of expertise are:

- › Advanced Electrical Systems
- › Pulsed Power & Electrical Materials
- › Electrical Plant & Diagnostics
- › Renewable Technologies
- › Power Electronics & Energy Conversion
- › Power Systems Analysis



## Background to the project



The Gambia Student Team, June 2008



Wiring a control panel

The Department's project in Gambia, West Africa started 4 years ago with an approach from local children from Fintry Primary School. They wanted our help to install solar power at their twin school at Sambel Kunda in rural Gambia.

The department willingly took up this challenge. A team of academics, researchers and students raised funds, sourced equipment, designed solar power systems and visited the Gambia in September 2006 and March 2007 to install power at the local school and health clinic in Sambel Kunda.

These initial installations were so successful that the department was approached directly by neighbouring communities asking for help. A second round of fund raising and organising commenced, and a team of 3 staff, 2 doctoral students and 5 undergraduates visited Gambia in June 2008 to install solar power at Sinchu Gundo and Kudang Lower Schools. After the lights had been turned on at both schools, the team returned to Sambel Kunda to check the initial installation and to install power at the local Horse & Donkey Laboratory. The latter underlines the importance to subsistence farmers of maintaining healthy working animals. It is hoped that this laboratory will eventually be extended to create a facility for diagnosing malaria, one of the most prevalent causes of death in Gambia.

More requests for solar power installation have followed and, funding permitting, we plan to action these in the near future.



Installing Solar Panels

“As Team Leader of the 2008 expedition to The Gambia, I was privileged to see first hand the difference the Gambia Project makes to the lives of those living in conditions that we can barely imagine. The appreciation of the Gambian people for the donations and work that have made the Gambia Project a reality is clearly apparent in the smiles, hospitality and the sincere gratitude offered to everyone involved back in Scotland.

Witnessing young, aspiring engineers become actively involved in all aspects of the project, grow in confidence and build friendships with the people of the local communities, underlines the benefits to our own students as well as to the people of the Gambia. By engaging students in a genuine life-changing opportunity, the Gambia Project offers them a rare insight into life in a developing country.

This unique experience enhances the development of our students, both as individuals and engineers whilst making a positive and lasting impact on the lives of others.”

**Dr Scott Strachan**  
**Research Fellow**  
**Institute for Energy and Environment**  
**Department of Electronic & Electrical Engineering**

## Projects

### September 2006

Sambel Kunda Lower Basic School:  
 Power & Lighting  
 Telecommunications Link (Internet & Telephone)

### March 2007

Alexander Edwards Health Clinic,  
 Sambel Kunda:  
 Power & Lighting  
 Medical Refrigeration

### June 2008

Power & Lighting in:  
 Sinchu Gundo Lower Basic School  
 Kudang Lower Basic School  
 H&D Laboratory

### 2009 and beyond...

Bantano Lower Basic School  
 Mamudfana Lower Basic School  
 Njie Kunda Lower Basic School  
 Sotokoi Lower Basic School  
 Existing site maintenance...



## Gambia: at a glance

“The Energy Paradox of Developing Countries is that those most in need of electricity are those least able to afford it”

The World Bank estimates that approximately one third of the world's population - over two billion people - live in poor rural conditions without access to modern energy services. Consequently, 80% of the world's population living in developing countries consume only 30% of the world's energy.

In sub-Saharan Africa more than half a billion people rely on fuelwood for energy, many of whom are exposed to the daily inhalation of carbon monoxide from indoor biomass pollution. It is estimated that this results in 1.6 million respiratory-related deaths every year in the developing world. Only 2% of The Gambia's total energy consumption is supplied in the form of electricity, while 80% relies on fuelwood. The correlation between the development of a nation and its modern energy consumption is widely recognised.

The energy paradox of developing countries like The Gambia is that those most in need of a reliable and safe supply of electricity are those least able to afford it. As a consequence of this, the World Bank estimates that 90% of energy-related Government subsidies for the poor in developing countries ultimately benefit the non-poor. The United Nations' Millennium Development Goals, designed to make developing nations and institutions more proactive in issues ranging from the eradication of poverty to the combating of HIV/AIDS, make no explicit reference to the energy sector of developing nations. Yet it is widely accepted that a reliable energy infrastructure is a pre-requisite for socio-economic growth in the developing world.

The Gambia is Africa's smallest nation with a population of around 1.5 million people. Two thirds of the nation's population reside in rural floodplains flanking both sides of the Gambia River. The remaining urban dwelling population is concentrated in the Greater Banjul Area on the tip of the country's West Coast. The current socio-political and economic climate has created an environment where it is difficult, if not impossible, for Gambians to achieve their true potential.

The Gambia is a nation with no significant minerals or natural resources to use or trade, relying on agriculture and more recently tourism to buoy its struggling economy. The United Nations Development Programme uses a Human Development Index to rate 177 nations across the globe - The Gambia ranks 155th.

Suffering widespread poverty, 60% of rural Gambia's population of one million live below the poverty line. Access to clean and safe drinking water or electricity is not available and one in five people are malnourished. The average per capita Gambian household income is estimated to be \$1 a day, with two thirds of the annual household salary spent on food; a classic indicator of third world poverty. The impact of such poverty on public health and education is compelling. The average life expectancy in The Gambia is 53 years, where 30% of Gambians will die before they reach 40. Only 11 doctors exist to attend to the health care of every 100,000 people, contributing to the rising infant mortality rate and increasing number of HIV/AIDS and Malaria cases.

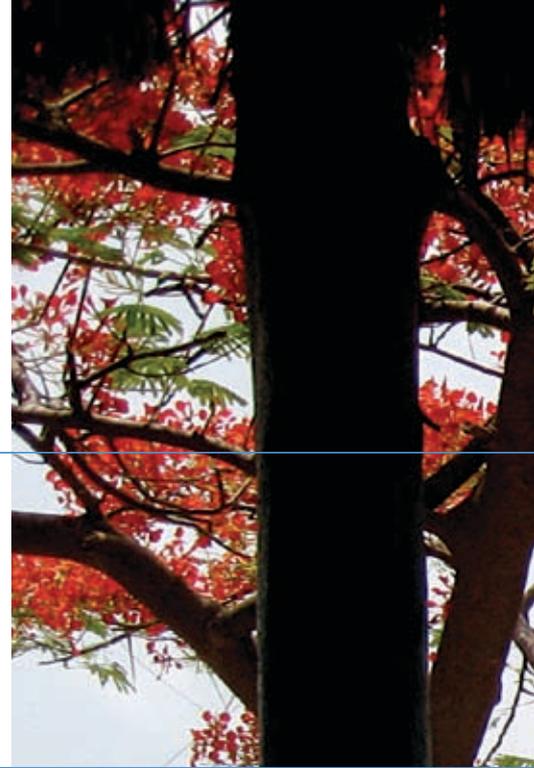
While state subsidised primary education has recently been made compulsory for children below 8 years of age, this has failed to benefit the 63% of Gambia's adult population who remain illiterate and many of its children (particularly females), where household duties take priority over education.

The inability of rural consumers to pay for energy services offers little incentive to energy suppliers to invest in the upkeep and expansion of their energy infrastructures. Such a drastic lack of investment has resulted in poor design and maintenance, and a consequently unreliable electrical network serving a meagre 2,500 of the one million rural population. Rural grid electrification projects have so far proved fruitless, with stifling tariff structures making electricity unaffordable for rural consumers surviving on \$1 a day. However, there is a 'ray of light' offering an alternative means of rural electrification; utilising the one natural resource The Gambia has in abundance but which as yet remains largely untapped - sunshine.

Harnessing solar energy from the sun presents a more affordable and sustainable alternative to rural grid electrification. A decentralised, community based approach to the supply and use of this energy offers villages across these remote rural floodplains a real opportunity to improve their own socio-economic welfare, and go some way to achieving wider development goals.



## What our friends say



“

Please allow me to express my profound appreciation to you and your philanthropic and caring institute for such a magnificent gift to Sinchu Gundo Lower Basic School. Both the Village Head and the School Management Committee also express their gratitude for a job well done.

”

*Ousman Le M'Boc  
Head teacher of Sinchu Gundo Lower Basic  
School Gambia*

“

Having studied at Strathclyde University for two years as an overseas student I have experienced a lot of changes but the Gambia Project has been for me a really unique experience. I was very excited to contribute to the Gambian schools and communities by using my practical engineering skills and knowledge. The project was very challenging: from planning the work to fundraising and to the actual installation. There were lots of hot and exhausting days but when I saw the bright classrooms and smiling faces, I felt that all the hard work was worth it. My Gambian experience was so special that I will remember it for my whole life. If there is another chance to go again, I will certainly do it without a second thought.

”

*Sikai Huang  
Student Volunteer*

“

As an established company we have been involved in many prestigious electrical & mechanical projects across the UK; however it was an interesting and welcome diversion from our usual business to be approached to assist the Gambia Project. It is difficult to imagine how people live without electricity, clean water and the adequate medical provision we take for granted.

We were delighted to donate some equipment and tools and, in doing so, felt we had contributed directly to the welfare and education of the children of rural Gambia. Helping to provide these basic amenities is something we are extremely proud of; and we look forward to hearing more about the positive changes that the Project is making. We hope to remain an integral part of that change as regular donors and enjoy regular updates as part of the “Gambia Team.”

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*Jean Arbuckle  
Managing Director  
P&I Supplies & Repairs, Glasgow*



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“

I was thrilled at the prospect of being able to use my engineering skills and knowledge to help children and communities in Gambia. The work was challenging: from organising to fundraising right through to the actual installations that involved working in the midday African heat!

But like anything, the greater the challenge, the greater the reward. The thing that struck me most about Gambia was that the people who have relatively little by our standards, are the happiest people I have ever had the pleasure of meeting.

My experience in Gambia was most definitely life-changing and I'd jump at the chance to do it again.

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*Stephanie Hay*  
Student Volunteer

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“

I would like to thank the team from Strathclyde very sincerely for travelling to Kudang to provide the local school with lighting. I urge the local community to take ownership of this newly installed technology and to utilise it for the greater benefit of the village.

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*Mr Suwareh*  
Director of Education, Central River Region at the 'switching on' ceremony at Kudang Lower Basic School

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“

The solar energy system has made a big difference to the length of the day and opportunities for reading and learning for all of the children.

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*Dr Stella Marsden OBE*  
Conservationist

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“

As Executive Chairman of The Institution of Engineering and Technology (IET), one of the world's leading professional institutions for engineering and technology communities, I am delighted to support The Gambia Project. The project run by the staff and students in the Department of Electronic & Electrical Engineering at Strathclyde is a great example of how the application of engineering know-how really can make a world of difference. Congratulations to everyone associated with the Gambia Project.

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*Suli Yacoob*  
Executive Chairman, IET Scotland



## Sponsoring the initiative



Representatives of The University of Strathclyde's 'Gambia Team' gratefully receiving a cheque from Rolls Royce's graduate students.

If you, your friends & neighbours, your school or organisation would like to become involved, sponsor future projects, make a donation or simply receive more information, please contact us.

Alternatively if you would like someone to visit your organisation or school to talk about the Gambia Project please get in touch.

Our contact details are as follows:

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A Village House at Sinchu Gundo



## The end, or just the beginning...

“In 2006 Fintry Primary School, Stirlingshire, twinned with a school in rural Gambia’s Central River Region. Our aim was to enrich both Gambian and Scottish pupils’ lives with each other’s culture. After an initial visit, it was apparent how little Sambel Kunda Primary School had, along with the others in the region, in term of resources and training. We set out to provide teacher training and supply essential resources.

During my annual visits to the Gambia, I have been delighted to see traditional rote learning being replaced by proven motivational techniques and group work activities used in Scottish schools. We are now working with 100 Gambian schools. With training events, resources and solar electricity we hope to enhance the education of rural communities in The Gambia.”

**Anna McCallum**  
Deputising Head, Fintry Primary School



The First Installation at Sambel Kunda



Dr Graham Ault, Department of Electrical & Electronic Engineering, at Fintry Primary School



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## Undergraduate (MEng/BEng)

### Mainstream degree courses in

Electronic & Electrical Engineering  
Electronic & Electrical Engineering with Business  
Electronic & Electrical Engineering with European Studies

### Specialised degree courses in

Digital Communications & Multimedia Systems  
Electrical Energy Systems  
Electronic & Digital Systems

### Multi-disciplinary degree courses in

Computer & Electronic Systems  
Electrical & Mechanical Engineering

## Postgraduate

### MSc taught programmes include

Communications, Control & Digital Signal Processing  
Communications Technology & Policy  
Electrical Power Engineering with Business  
Electronic & Electrical Engineering  
Control Engineering with Business  
Digital Multimedia & Communication Systems  
System Level Integration

### Postgraduate Research

The Department has the largest research portfolio in the University with MPhil & PhD opportunities available in each of its six specialist research institutes and centres.

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