

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JNANASANGAMA” BELGAUM-590014



## PROJECT REPORT

ON

### “ADVANCED MULTIPURPOSE MULTIGRID EMBEDDED DC MICROGRID SYSTEM”

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE AWARD OF THE DEGREE

BACHELOR OF ENGINEERING  
IN  
INFORMATION SCIENCE & ENGINEERING

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## ABSTRACT

Our electric power system was designed to move central station alternating current (AC) power, via high-voltage transmission lines and lower voltage distribution line to households and businesses that used the power in incandescent lights, AC motors, and other AC equipment. Today's consumer equipment and tomorrow's distributed renewable generation requires us to rethink this model. Electronic devices (such as computers, florescent lights, variable speed drives, and many other household and business appliances and equipment) need direct current (DC) input. However, all of these DC devices require conversion of the building's AC power into DC for use, and that conversion typically uses inefficient rectifiers. Moreover, distributed renewable generation (such as rooftop solar) produces DC power but must be converted to AC to tie into the building's electric system, only later to be re-converted to DC for many end uses. These AC-DC conversions (or DC-AC-DC in the case of rooftop solar) result in substantial energy losses.

One possible solution is a DC microgrid, which is a DC grid within a building (or serving several buildings) that minimizes or eliminates entirely these conversion losses. In the DC microgrid system, AC power converts to DC when entering the DC grid using a high-efficiency rectifier, which then distributes the power directly to DC equipment served by the DC grid. On average, this system reduces AC to DC conversion losses from an average loss of about 32% down to 10%. In addition, roof top photovoltaic (PV) and other distributed DC generation can be fed directly to DC equipment, via the DC microgrid, without the double conversion loss (DC to AC to DC), which would be required if the DC generation output was fed into an AC system.