

# SCIENCE SEMINAR

FRIDAY, NOVEMBER 6  
KNOTT HALL B01  
3PM

## A SYSTEM FOR FAST SPATIAL SEARCHES ON THE EARTH AND SKY USING THE HIERACHIAL TRIANGULAR MESH

GEORGE FEKETE

THE 'SPHERICAL' FRAMEWORK WE DEVELOPED ADDRESSES TWO SEPARATE MATHEMATICAL ISSUES. THE FIRST IS ABOUT THE CORRECT ABSTRACT MATHEMATICAL REPRESENTATION OF COMPLEX SPHERICAL REGIONS, AND ABOUT IMPLEMENTATIONS OF VARIOUS SET-THEORETICAL FUNCTIONS (UNION, INTERSECTION AND DIFFERENCE), MORPHOLOGICAL FUNCTIONS (DILATION AND EROSION) AND SCALAR FUNCTIONS (AREA).

THE OTHER PART IS A DISCRETIZATION OF THE SPHERE. FOR FAST SPATIAL SEARCHES WE USE DATA STRUCTURES SUITABLE FOR FAST SEARCH ALGORITHMS. WE USE THE SPHERE-QUADTRE TO BUILD A HIERARCHY OF TRIANGLE-SHAPED PIXELS (TRIXELS) ON THE GLOBE, THUS THE NAME: HIERARCHICAL TRIANGULAR MESH (HTM). WE DEMONSTRATE HOW WE EXTENDED THE RELATIONAL DATABASE FUNCTIONALITY WITH EXTENDED STORED PROCEDURES USING THE SPHERICAL AND HTM API TO IMPROVE QUERY EXECUTION TIMES FOR SPATIAL QUERIES.

REFRESHMENTS WILL BE SERVED