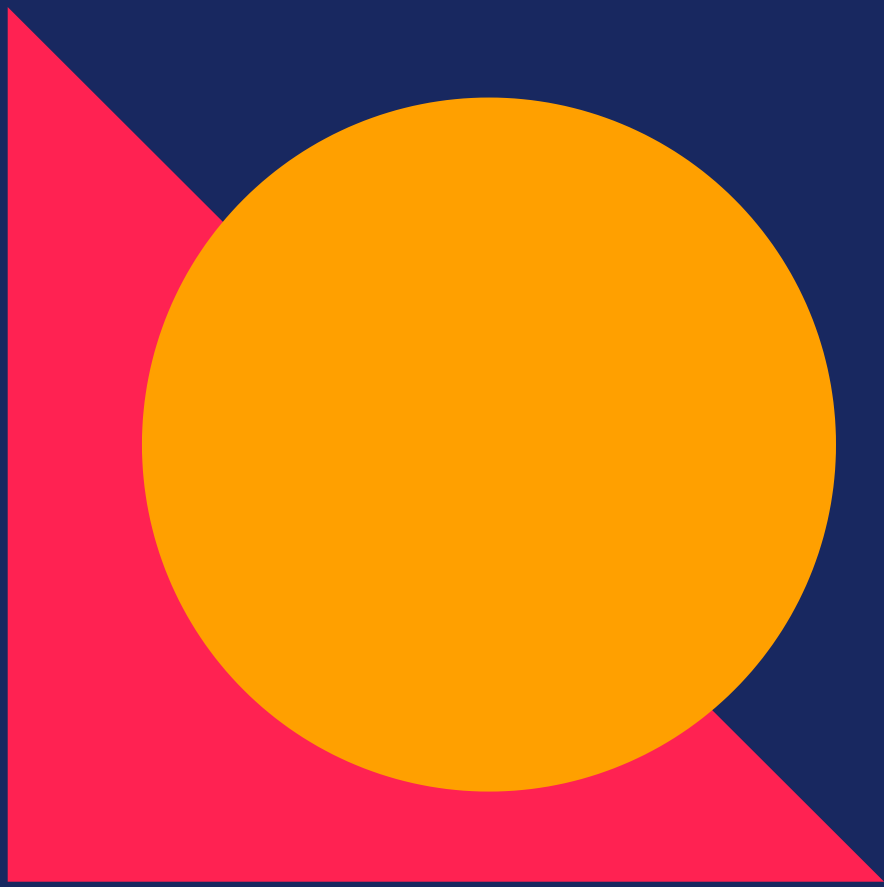


MTRN2500 19T3 ASSIGNMENT 3



Vehicle Game

PRESENTED BY
DYLAN SANUSI-GOH & JOSH BEHAR



Design Discussions

- Abstracted fundamental single base shapes (publish a single marker)
- Composition of multiple shapes (UAV, Landscape) as a multiple base shape (publish a marker array)
- UAV control and user interaction follow Observer and State Patterns
- Overall adherence to Design by Contract, SOLID, KISS, and DRY Principles.

**TODAY'S MAIN
TOPICS**

CONFIG_PARSER

- > REDUCE USER INPUT ERRORS
- > CONFIGURE WORKING ENVIRONMENT

MAIN

- > CALLS SINGLE SHAPE CONSTRUCTION THEN DISPLAY MARKER
- > CALLS MULTI SHAPE (UAV, LANDSCAPE) CONSTRUCTION THEN DISPLAY MARKER ARRAY

SINGLE SHAPE CONSTRUCTION

- > CALLS SINGLE SHAPE GENERATOR
- > METHODS TO MODIFY/ACCESS FROM BASE SINGLE

MULTI SHAPE CONSTRUCTION

- > CALLS SINGLE SHAPE GENERATOR
- > METHODS TO MODIFY/ACCESS FROM BASE MULTI
- > PUSH BACK INTO MARKER ARRAY

SHAPE GENERATOR

- > CALLS MULTI SHAPE GENERATOR
- > METHODS TO MODIFY/ACCESS

SINGLE SHAPE DISPLAY

- > PUBLISHES MARKER TO RVIZ

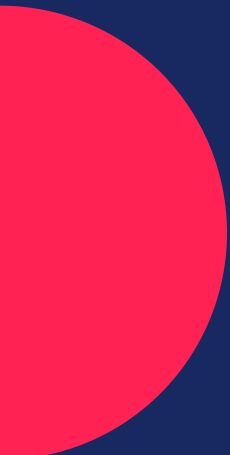
MULTI SHAPE DISPLAY

- > PUBLISHES MARKER ARRAY TO RVIZ

PROGRAM STRUCTURE & DESIGN DECISIONS



Polymorphism



PRISM(NUMBER OF SIDES, INPUT ANGLE, RADIUS, HEIGHT)
> OCTAGONAL, RECTANGULAR, TRIANGULAR PRISM

PYRAMID(NUMBER OF SIDES, INPUT ANGLE, RADIUS, HEIGHT)
> OCTAGONAL, RECTANGULAR, TRIANGULAR, SQUARE PYRAMID



Inheritance

SHAPE_BASE(HEADING, FRAME NAME, MARKER)
> SPHERE, CUBE, FLAT_PLANE, PRISM, PYRAMID,
PARALLELEPIPED, TRIANGLE

SINGLE GETTER AND SETTER METHODS ARE SHARED.

SINGLE BASE FUNDAMENTAL SHAPE STRUCTURES ARE INHERITED FROM
THE SHAPE_BASE.

Inheritance

SHAPE_BASE_MULTI(HEADING, FRAME NAME, MARKER ARRAY)
> UAV, LANDSCAPE

MULTI GETTER AND SETTER METHODS ARE SHARED.

MULTI BASE FUNDAMENTAL SHAPE STRUCTURES ARE INHERITED FROM
THE SHAPE_BASE_MULTI

Composition

SHAPE_BASE_MULTI(HEADING, FRAME NAME, MARKER ARRAY)
> UAV, LANDSCAPE

SHAPE_GENERATOR.HPP

- > RECTANGULAR_PRISM_GEN(ID, X, Y, Z)
- > TRIANGULAR_PRISM_GEN(ID, RADIUS, HEIGHT)
- > OCTAGONAL_PRISM_GEN(ID, RADIUS, HEIGHT)
- > CYLINDER_GEN(ID, RADIUS, HEIGHT)
- > PARALLELEPIPED_GEN(ID, DIAG1, DIAG2, HEIGHT)
- > RECTANGULAR_PYRAMID_GEN(ID, X, Y, HEIGHT)
- > TRIANGULAR_PYRAMID_GEN(ID, RADIUS, HEIGHT)
- > SQUARE_PYRAMID_GEN(ID, RADIUS, HEIGHT)
- > OCTAGONAL_PYRAMID_GEN(ID, RADIUS, HEIGHT)
- > CONE_GEN(ID, RADIUS, HEIGHT)
- > SPHERE_GEN(ID, RADIUS)
- > CUBE_GEN(ID, RADIUS)
- > FLAT_PLANE_GEN(ID, LENGTH, WIDTH)



Functions

MAIN HANDLES:

- > SINGLE SHAPES + SINGLE DISPLAYS
- > MULTI SHAPES + MULTI DISPLAYS
- SETTER AND GETTER METHODS TO MODIFY SHAPES I.E. UAV CONTROL LOGIC

SHAPE ITSELF HANDLES:

- > COMPLEX METHODS WITHOUT OVERSHARING
 - METHODS TO MODIFY SHAPE PROPERTIES I.E. RADIAN AND QUATERNION ROTATION LOGIC
- 



DRY Principle

BASE SHAPE AVOIDS REPEATED METHOD DEFINITIONS

SHAPE GENERATOR AVOIDS REPEATED SHAPE CHECKS/DEFINITIONS

MULTI BASE SHAPE (MARKER ARRAY) AVOIDS REPEATED MARKER PUBLISHING

CONFIG PARSER/HANDLING PREVENTS AMBIGUOUS USER EXPERIENCES





SOLID Principle

SINGLE RESPONSIBILITY

- SHAPES AND METHODS ACCESS/CONTROL OVER SELF ONLY

OPEN/CLOSED PRINCIPLES

- SINGLE AND MULTI SHAPE BASES CAN BE EXTENDED BUT NOT MODIFIED

LISKOV'S SUBSTITUTION PRINCIPLE

- SINGLE AND MULTI SHAPES CAN BE SUBSTITUTED WITHOUT ALTERING CORRECTNESS

INTERFACE SEGREGATION PRINCIPLE

- INTERFACES AND METHOD CALLS ARE RESTRICTED TO USE BY INDIVIDUAL CLIENTS ONLY

DEPENDENCY INVERSION PRINCIPLE

- SHAPE INHERITANCE/COMPOSITION BUILDS AROUND MODULARITY, WITH NO UNNECESSARY DEPENDENCIES ON OTHER CLIENTS
- 



Design by Contract



MINIMISE SIDE EFFECTS DURING DEVELOPMENT
BY PRESERVING SOLID PRINCIPLES

I.E. SINGLE SHAPE AND MULTI SHAPE DEVELOPMENT CAN OPERATE IN
PARALLEL AND INDEPDENTLY

