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MISSILE TECHNOLOGY INFORMATICS

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ABSTRACT: This paper is to analyse and provide detailed information on five distinct missile types: Brahmos, Akash, Dhanush, Trishul, and Prithvi. Despite offering a user-friendly menu for selecting specific missiles and presenting key details such as weight, length, diameter, range, explosive charge, and total mass, the program exhibits numerous technical issues using the C program. The provided C program aims to analyse various missile types, including Brahmos, Akash, Dhanush, Trishul, and Prithvi. The program presents a menu to the user, allowing them to choose a specific missile for analysis. The analysis includes details such as weight, length, diameter, range, explosive charge, and total mass, among other parameters. Missiles are generally guided towards specific targets termed as guided missiles or guided rockets. Missile systems usually have five system components namely targeting, guidance system, flight system, engine, and warhead. Overall, this paper serves as a valuable resource for those seeking to leverage computational tools for in-depth analysis of missile systems.

Keywords: Lethality, Range, Explosive Charge, Projectile.

I. INTRODUCTION

In a world where military technology plays a pivotal role in shaping geopolitical landscapes, the ability to access comprehensive and accurate information about missiles is paramount. Welcome to Defence Technology Informatics, an innovative software solution designed to provide an insightful and user-friendly interface for accessing detailed information about India's finest missiles. In an era characterised by rapid advancements in missile technology, staying informed is not just a matter of strategic advantage, but one of necessity. Whether it's understanding the capabilities of intercontinental ballistic missiles (ICBMs), cruise missiles, or anti-ballistic missile systems, this program serves as a vital tool for defence analysts, policymakers, and enthusiasts alike. Through meticulous research and data aggregation, this project offers a comprehensive database that encompasses a wide array of missiles. Users can explore detailed specifications, physical specifications and impact specifications all within a single, intuitive platform. But this program is more than just a repository of information; it's a dynamic tool for analysis and insight as it provides brief information about the missile. Join us as we delve into the fascinating world of missiles, unravelling their complexities and exploring their profound implications for global security and defence. With this program at your fingertips, the future of missile intelligence is now within reach.

Types of missiles:

1. Surface-To-Air Missiles – SAM.
2. Air-to-air missiles AAM.
3. Surface-to-surface missiles.
4. Ballistic Missile Defense (BMD)/Interceptor Missiles.
5. Cruise Missiles.
6. Submarine Launched Ballistic Missiles.
7. Anti-Tank Missiles.

II. METHODOLOGY

In the initialization phase, necessary variables for user choice and missile details are declared, followed by the initiation of a do-while loop to repeatedly display the menu and execute operations until the user opts to exit. The display menu stage presents a list of missile options for the user to select from, prompting them to input their choice. Subsequently, user input is captured using `scanf()`. A switch statement is employed to facilitate distinct operations contingent on the user's selection. Under each case statement, corresponding to a missile choice, pertinent missile details and explosive power are computed and displayed, accompanied by a prompt for the explosive fragment weight. Specific attributes such as weight, length, diameter, range, explosive density, and warhead volume are calculated and exhibited. The total mass and explosive power of the missile are determined based on provided formulae and showcased to the user. A default case handles invalid inputs, notifying the user of such occurrences. The loop persists until the user decides to exit by choosing an option beyond the available choices.

The analysis yields a comprehensive set of outputs concerning the missile system, including its weight in the absence of payload, length, diameter, range, explosive density, warhead volume, explosive charge, total mass, and explosive power. These parameters collectively provide crucial insights into the missile's design, capabilities, and potential impact, offering valuable data for further assessment and optimization of the weapon system.

Figure 1: *Missile Impact Range.*

The above figure 1 is a pictorial representation depicting the range of the missile. The range of a missile refers to the maximum distance it can travel from its launch point to the target before its propulsion system or fuel is depleted, causing it to lose effectiveness or fall short. In simpler terms, it's the furthest distance the missile can reach. In summary, the range of a missile is a critical parameter that defines its operational capability and effectiveness in engaging targets at different distances.

Figure 2: *Guidance system of a missile.*

The above figure 2 is a pictorial representation depicting a guidance system for a ballistic missile. The guidance system of a missile plays a crucial role in ensuring its accuracy and effectiveness in hitting its intended target. There are various types of guidance systems used in missiles, each with its own principles and methods. This consists of basic components like the aim point, launch site, the path and range of the missile as shown in the figure.

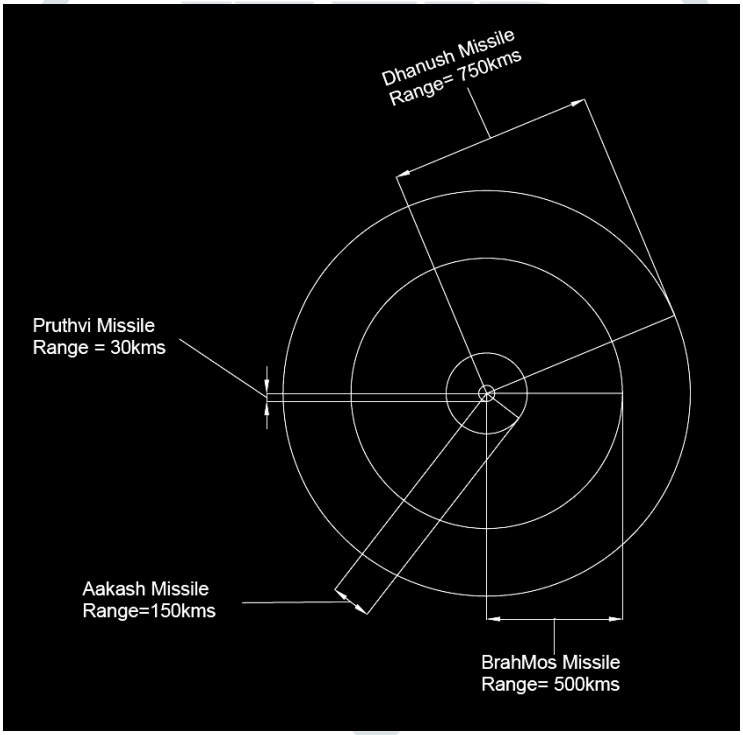

Figure 3: *Representation of ranges of Indian missiles.*

The above figure 3 is a pictorial representation depicting the comparison of the ranges of the missiles considered for the program. Amongst all the ballistic missile artillery the Indian military has at its disposal Dhanush is the most capable missile when it comes to ability and agility. It has the highest payload capacity and range and has capabilities which allows it to be launched from ground or from the air. BrahMos is another such missile with extremely versatile applications and a wide range of use cases.

FLOWCHART:

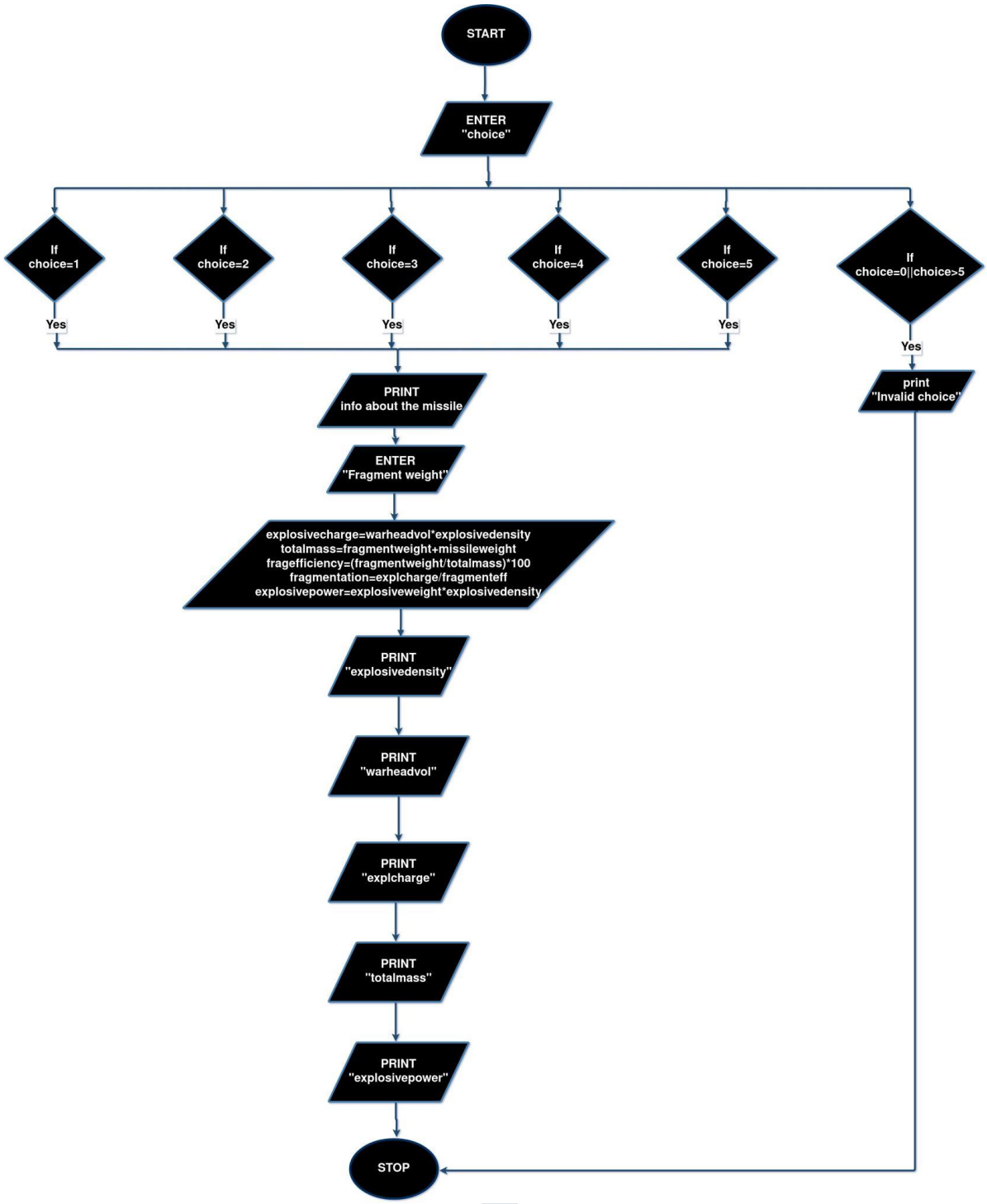

Figure 4: *Flowchart showing the execution order of the program*

In the initialization phase of the workflow of the program, necessary variables for user choice and missile details are declared as inputs by the user, followed by the initiation of a do-while loop to repeatedly display the menu and execute operations until the user opts to exit. This order of execution is explained in a simple manner through the above flowchart.

III. PERFORMANCE EVALUATION

The following figures 5,6,7,8 show us the outputs given by the compiler for various missiles i.e., BrahMos, Akash, Dhanush, Trishul respectively. These outputs show respective values of dimensions like height of the missile, weight without payload, diameter of the missile and the warhead volume of the missile. Fragment weight is taken as input to calculate properties such as explosive density, explosive charge and explosive power respectively.

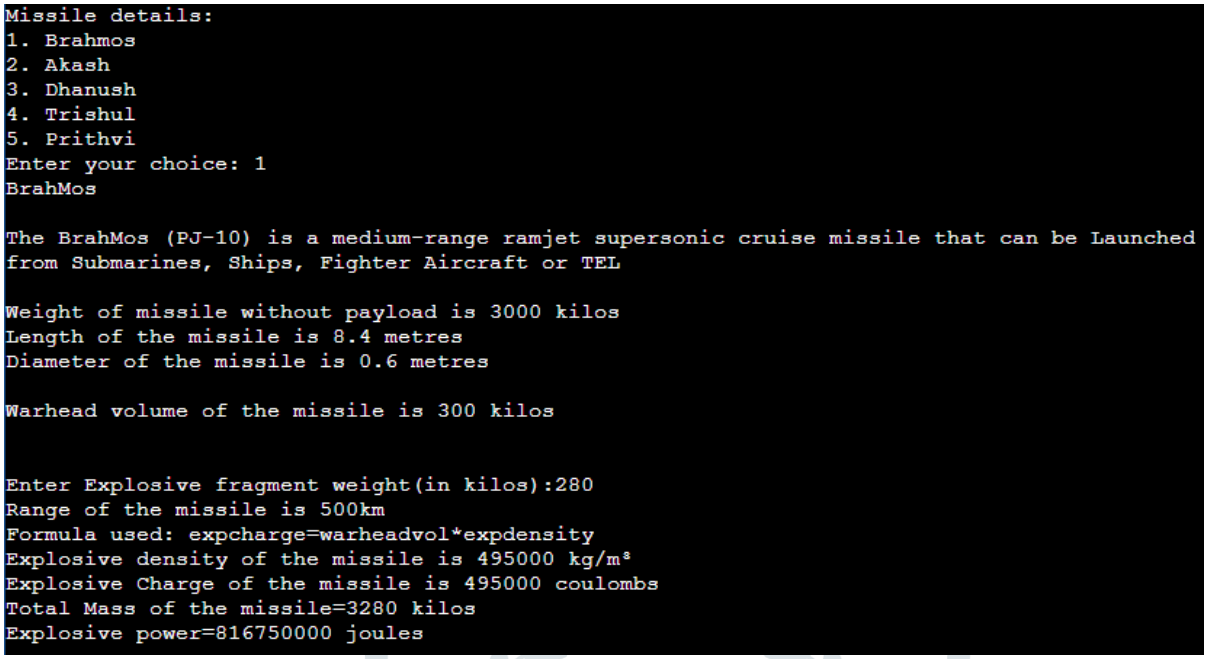

Figure 5: *Outputs obtained from the compiler for the input given (choice-1 'BrahMos')*

The above figure 5 shows the outputs obtained when choice is 1 thus displaying information about the BrahMos missile and the results of the calculations performed in the program.

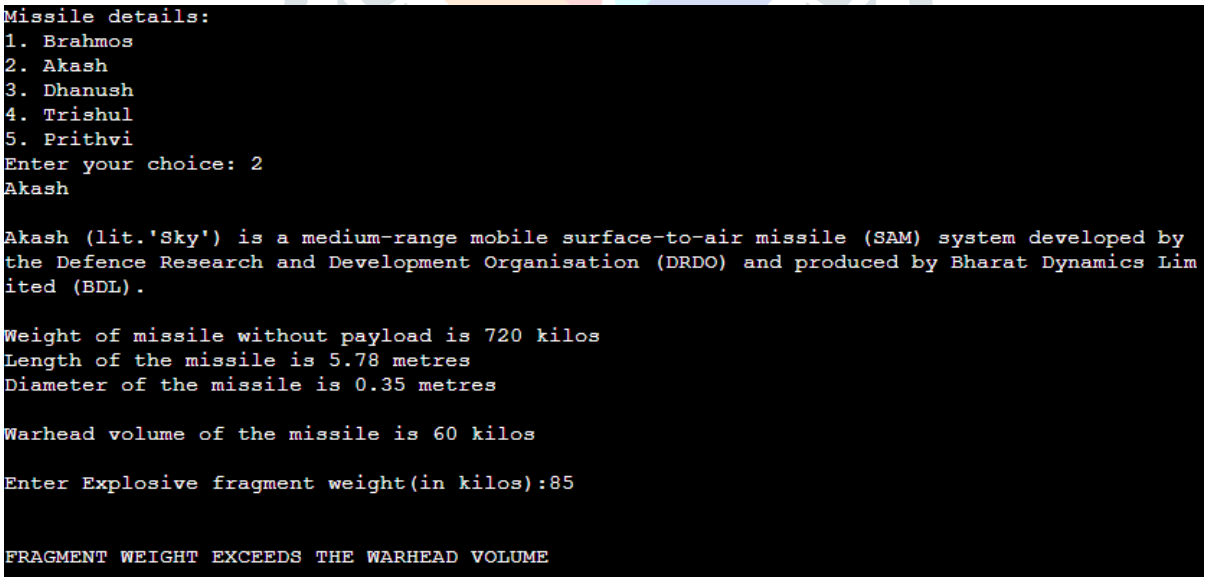

Figure 6: *Outputs obtained from the compiler for the input given (choice-2 'Akash')*

The above figure 6 shows the outputs obtained when choice is 2 thus displaying information about the Akash missile but all the calculations are not performed as condition (fragment weight<warhead vol) not satisfied.

```
Missile details:
1. Brahmos
2. Akash
3. Dhanush
4. Trishul
5. Prithvi
Enter your choice: 3
Dhanush

Dhanush (Sanskrit:धनुष, Bow) is a variant of the surface-to-surface or ship-to-ship Prithvi I
II missile, which has been developed for the Indian Navy.

Weight of missile without payload is 5600 kilos
Length of the missile is 8.53 metres
Diameter of the missile is 0.9 metres

Warhead volume of the missile is 250 kilos

Enter Explosive fragment weight(in kilos):248
Range of the missile is 750km
Formula used: expcharge=warheadvol*expdensity
Explosive density of the missile is 412500 kg/m³
Explosive Charge of the missile is 412500 coulombs
Total Mass of the missile=5848 kilos
Explosive power=680625000 joules
```

Figure 7: *Outputs obtained from the compiler for the input given (choice-3 'Dhanush')*

The above figure 5 shows the outputs obtained when choice is 3 thus displaying information about the Dhanush missile and the results of the calculations performed in the program. As the condition (fragment weight<warhead vol) is satisfied.

```
Missile details:
1. Brahmos
2. Akash
3. Dhanush
4. Trishul
5. Prithvi
Enter your choice: 4
Trishul

Trishul (IAST:triśūla Trident) is a low-level quick-reaction short range surface-to-air miss
ile developed in India by Defence Research and Development Organisation (DRDO) as part of th
e Integrated Guided Missile Development Programme (IGMDP).

Weight of missile without payload is 130 kilos
Length of the missile is 3 metres
Diameter of the missile is 0.2 metres

Warhead volume of the missile is 15 kilos

Enter Explosive fragment weight(in kilos):200


FRAGMENT WEIGHT EXCEEDS THE WARHEAD VOLUME
```

Figure 8: *Outputs obtained from the compiler for the input given (choice-4 'Trishul')*

The above figure 8 shows the outputs obtained when choice is 4 thus displaying information about the Akash missile but all the calculations are not performed as condition (fragment weight<warhead vol) not satisfied.

IV. CONCLUSION

In conclusion, the development of the missile information display program represent a significant stride towards enhancing accessibility and understanding within the domain of missile technology. Through meticulous design and thorough coding, we have crafted a platform that not only provides vital data regarding various missiles but also fosters a deeper comprehension of their complexities and applications. Our project to make a program that shows info about missiles is a big step forward. We've worked hard to create a tool that's easy to use and gives a lot of useful details about different missiles. Our aim is to help people understand more about these weapons and how they're used.

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