ARES 007

VISION & Background

Team ARES 007 is a group of six highly motivated science enthusiasts from Netaji Subhas University Technology. To design and build a robot that can be used for autonomous task for day to day tasks is our endeavour. We aim to innovate in the field of Multitasking Robot technology with our conscience hard work and determination. As a team, our goal is to perform our best in global competitions and bring about a change in the current technology with effective and innovative ideas.

To build robots for all kinds of dedicated tasks such as cleaning shoes, planting crops, cleaning windows, etc.

Team Name: ARES 007
Team Leader Name: Bhavuk Grover
Institute Code (AISHE):U-1056

Team Member 1 Name: Mayank Pandit
Team Member 2 Name: Bhavuk Grover
Team Member 3 Name: Ritesh Saini
Team Member 4 Name: Satvik Sharma
Team Member 5 Name: Charu Singh Choudhary

Problem

- As we have faced in COVID, where human to human interaction has to be minimized to be safe from the virus. Still, humans have to be in contact with people because of absence of any element which can fulfill this gap. Thus, if a single robot can do tasks such as

    1. Cleaning
    2. Mopping
    3. Sweeping
    4. Food Serving

  It would be a boon for mankind

- Along with it serving, in the **hospitals** these robots can also be used at places where these day to day activities become very arduous task to perform. For Eg - Performing daily activities in **home**, **restaurants** etc

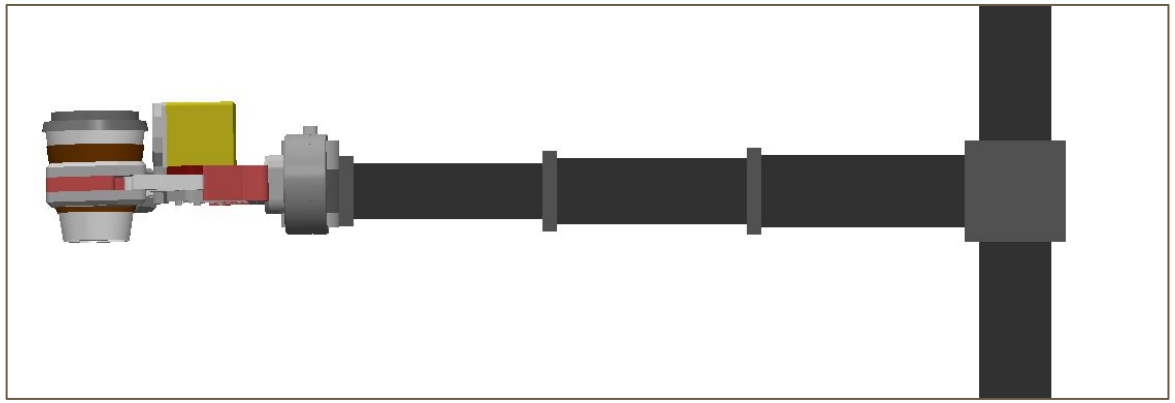
Solution

We came up with robot to perform dedicated day to day task to ease the workforce of the mankind along with it for betterment and fast completion of the task. Thus we have come up with the physical robot design as of now which will be able to perform the following task -

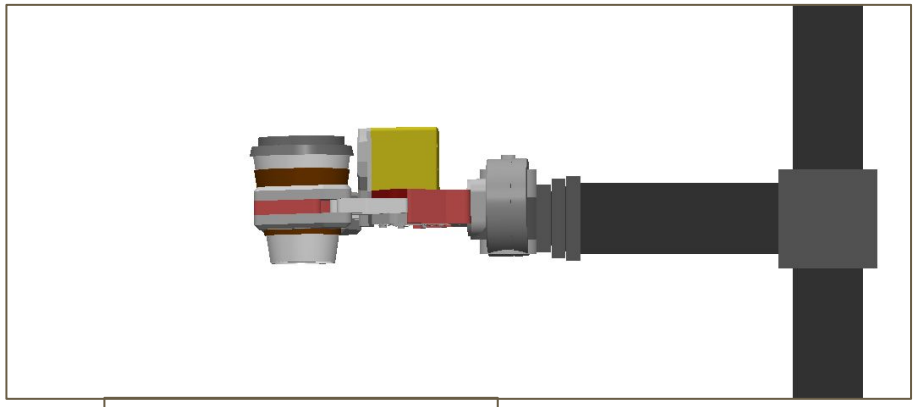
- 1) Cleaning of Window
- 2) Mopping of floor
- 3) Sweeping of floor
- 4) Objects pick and place

We as a team think that these are the basic tasks which if performed by the robot could save the time of human being which could be used to perform other productive tasks.

Full CAD MODEL



Extended Form



Retracted Form

Market Size

- The global robotics technology market size was valued at 62.75 billion in 2019, and will reach 189.36 billion by 2027.[3]

- Rise in the need of automation and safety in household and availability of affordable, energy-efficient robots drive the growth of the global robotics market.

- Increase in labor & energy costs and upsurge in usage of robotic technology in different industry verticals fuel the growth of the market.

- Sales and distribution

- Foreseeing the increasing focus and global shift towards automation and robotic technology, development of autonomous robotic technology is inevitable.

Market Validation

- In July 2020, Softbank and Lippo Group's PT Link Net Tbk. ("Link Net") (Japan) signed an agreement to collaboratively develop Internet of Things (IoT) platforms to be deployed in various cities of Japan.[1]

- In January 2020, Honda launched 3E-A18 (Empower, Experience, Empathy) Robotics Concept at CES 2020. Honda has applied AI to its 3E-A18 device, which enables the robot to communicate and cooperate with people.[1]

- The European Union’s “Horizon 2020” program supports a wide variety of robotics R&D topics, including manufacturing, healthcare, transportation, agriculture, and consumer technologies, said the IFR. The European Commission has provided $780 million over seven years.[2]

Product

- **Architecture**
  - We are developing a Multitasking robot with USP of performing multiple tasks with single setup.
  - Dexterity and Flexibility is the key which has been inculcated to perform multiple tasks.
  - Future goal is to make "Fully Autonomous" multitasking robot.
- **Ecosystem**
  - With the proposed autonomy, flexible and durable design this robot can perform desired tasks in any demographic locations.
  - Adjacent markets
  - With various multitasking features this robot can be very well used in Hospitals , Restaurants , Waste Management Plants ets.
  - With future development and more integration of different technologies this robot can be modified according to the need.
- **Saleability**
  - Analysing from the current and future trends of the global robotic market it can be predicted that an autonomous multitasking robot will going to have a great saleability.
  - Different sales and marketing channels can be put in place to increase the outreach towards the target customer.

Business Model

- Robot can be sold as a product to the customer with a subscription model.
- Our direct source of revenue will generate through the direct sale of robot units.
- Services associated with the robot (setup and installation cost etc.)

Intended customer base

- Households
- Hospitals
- Restaurants
- Waste Management Plants
- Sewage Plants
- Big Building complexes
- Old age Homes

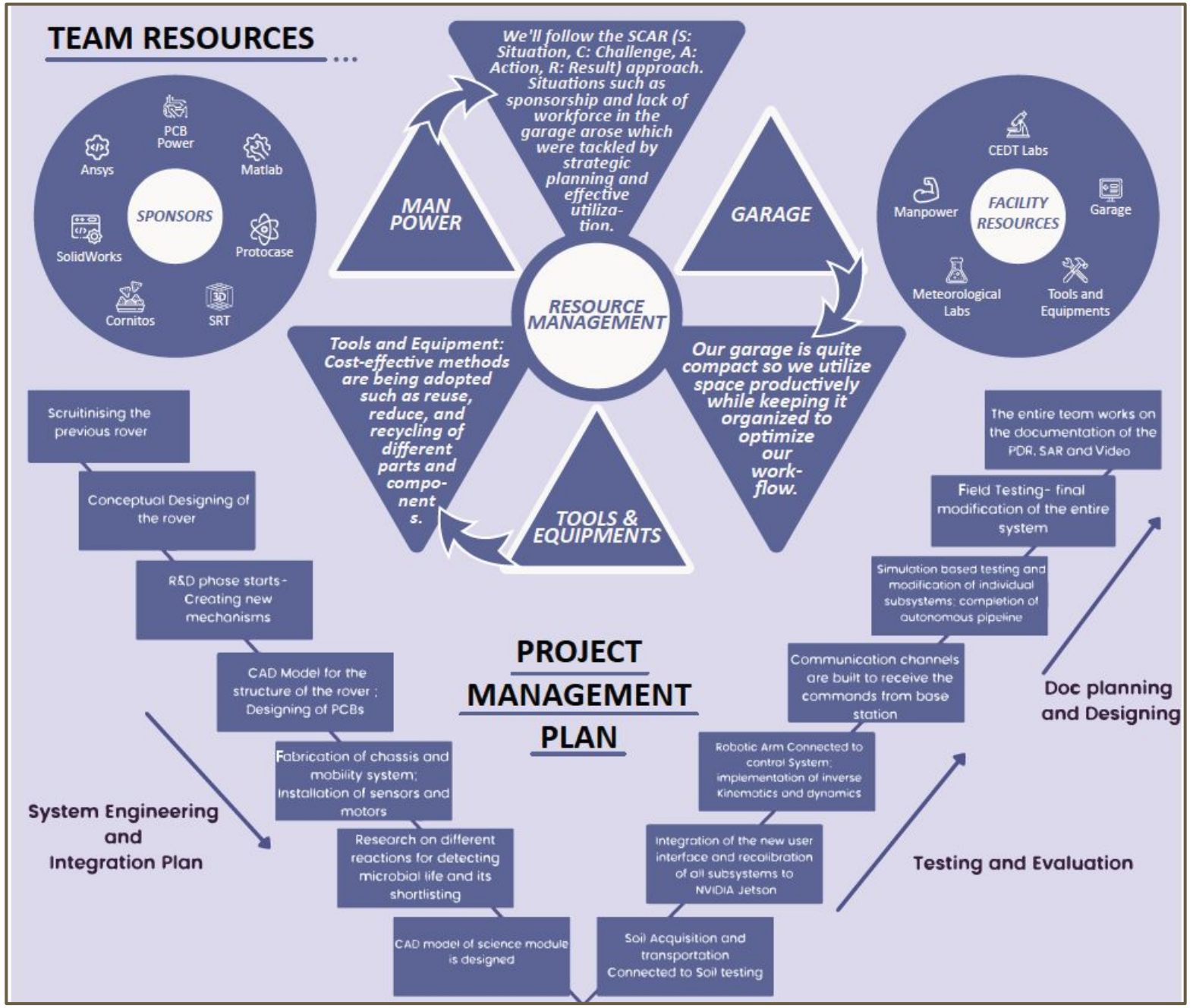
Competition

- Major players in the global robotic industry have developed their robots to perform certain specific functions at industry level which incentivize us to develop a multitasking robot to perform daily household tasks and can contribute to the betterment of human lives.
- With a flexible and durable design it can work under various circumstances such as a **caretaker in hospitals** and as a **caterer in restaurants.**

A few major players in the mobile robots market are:

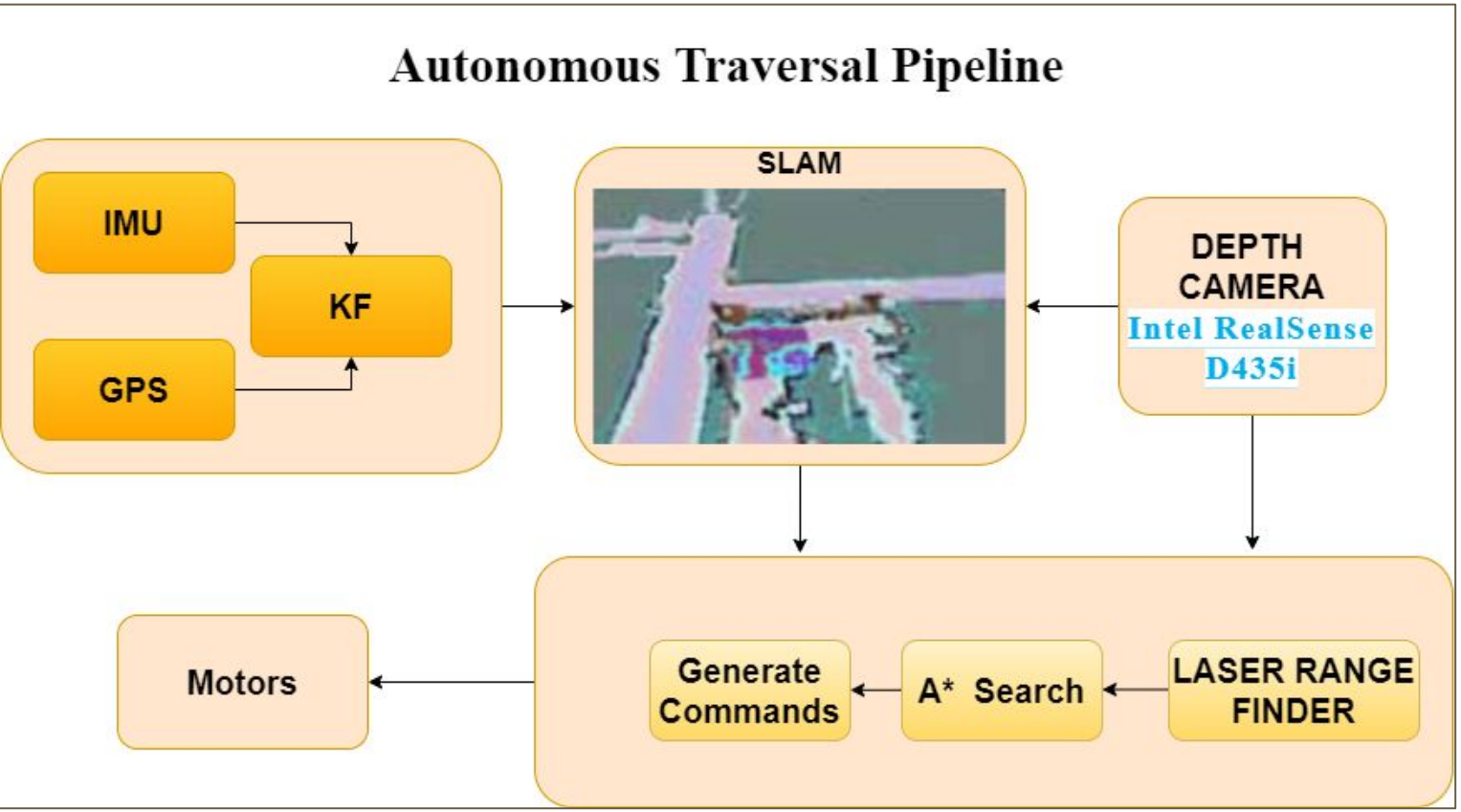
- ❏ Northrop Grumman (US)
- ❏ Honda Motor (Japan)
- ❏ Softbank (Japan)
- ❏ iRobot (US)
- ❏ DJI (China)
- ❏ Amazon Robotics (US)
- ❏ Mayfield Robotics (US)
- ❏ Promobot (Russia)
- ❏ Bluefrog Robotics (France)
- ❏ LEGO (Denmark)

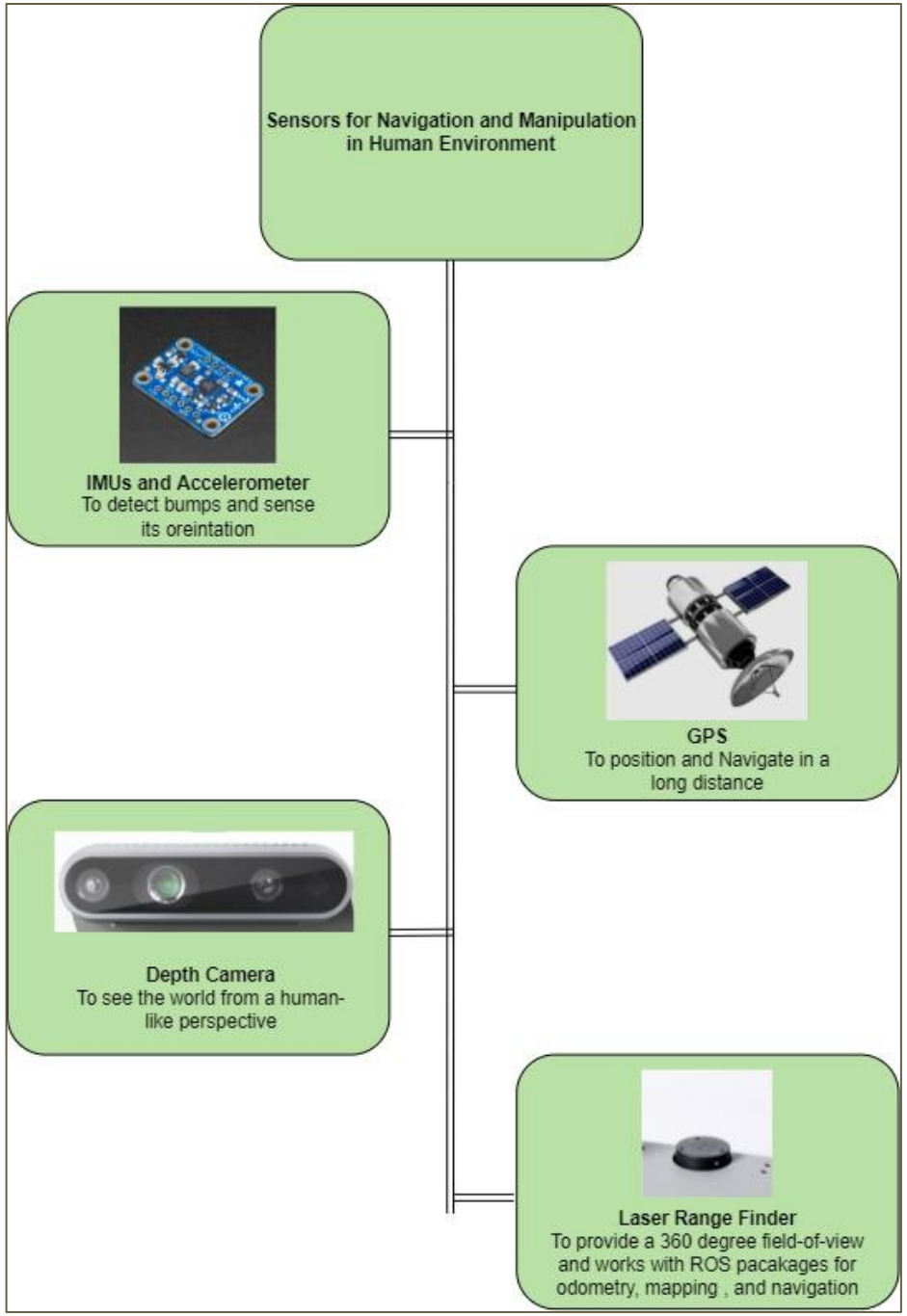
Financial model and Project Management Plan



Competitive advantages

- Strengths of technology/Team (USPs)





Assumptions and risks

Risks	Description	Mitigation
Wireless Communication failure	Busy channels in the given bandwidth.	Redundant frequency bands are being considered to be used especially frequencies like 144MHz to avoid frequency congestion.
Battery failure	When the system draws more current than the battery's max current rating can cause overheating of the battery.	Self made BMS for battery protection and real time monitoring. Dual battery setup for control and power electronics to avoid blackout and burnout conditions.
Stalled motors and the runaway condition	Motor stalling that occur due to uneven and excessive load on any of the propulsion motor, melting the windings and can damage the motor permanently.	Custom made and tested drivers have been deployed with closed loop feedback for both position and current to detect and avoid such a runaway condition.
Error in Sensor Data	Temperature drift, phase noise, non standard atmospheric conditions, EM interference can result in ambiguous data.	Redundant, shielded and calibrated sensors have been deployed. Complementary filters can be used to increase the reliability of the readings further.

Summary

- Our aim is to develop a Multitasking robot with USP of performing multiple tasks with single setup.
- Dexterity and Flexibility is the key which has been inculcated to perform multiple tasks.
- KISS (Keep it Simple & Stupid) design principle is used to make it simple, so it could be used by anyone with extensive training.
- Future goal is to make "Fully Autonomous" multitasking robot.

APPENDIX/BACKUP

1..https://www.marketsandmarkets.com/Market-Reports/mobile-robots-market-43703276.html[1].

2. https://www.therobotreport.com/robotics-rnd-still-driven-government-support-worldwide-says-ifr/[2].

3.https://www.alliedmarketresearch.com/robotics-technology-market[3].