Detail Proposal Form - Ideate Stage of Quarter Finals

i.   **Registration ID**
     8811213

ii. **Name of Team Leader***

     Shashwat Kotiyal

iii. **Registered Email ID***

     kotiyalshashwat@gmail.com

iv. **Contact Number***
     8951575302

v.   **Correspondence Address***

     2nd Cross Shiva Mandir Rd, Udayanagar

     Mahadevapura, Bengaluru, Karnataka 560016

vi. **Name of Organization**

     CommScope

vii. **Address of Organization**
     CommScope Networks India Pvt Ltd
     Green Glen Layout, Bellandur, Bengaluru, Karnataka 560037

viii. **Team Name***
     Shakti Discovery

ix. **Team Member Details***

Name of Team Members	Email Id	Contact Number	Name of Organization with Address (If not working Professional, then write "not working")
Shashwat Kotiyal *	kotiyalshashwat@gmail.com	8951575302	CommScope
Anil Kumar	anilkumar.jan28@gmail.com	7358195563	Tivo
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Vipul Potdar	vipul.potdar@yahoo.in	9424890355	Accolite
Member 5			

Section-I: Hardware Resource Section

1. **Name of Hardware Resources** *

        a) SHAKTI Pinaka (E32-A35) on Artix7-35T FPGA,
        b) SHAKTI Parashu (E32-A100) on Artix7-100T FPGA,
        c) SHAKTI Vajra (C64-A100) on Artix7-100T FPGA,
        d) VEGA ET1031 on Artix7-35T FPGA,
        e) VEGA AS1061 on Artix7-100T FPGA,
        f) Other (FPGA Board other than Artix7-35T & Artix7-100T)

If selected Hardware Resources with ARTIX7-100T FPGA, then provide justification for not making use of the Hardware Resources with Artix7-35T FPGA, which may result in an optimal utilization of the Hardware Resources for the innovative solution proposed. (if not applicable put N/a)

N/a

If selected Hardware Resources as other (FPGA Board other than Artix7-35T and Artix7-100T), then please mention the details of FPGA Board of your choice (like Name of Vendor, Series etc.). (If not applicable put N/a)

N/a

If selected Hardware Resources as Other (FPGA Board other than Artix7-35T and Artix7-100T) then select processor eco system of your choice among SHAKTI – E32, SHAKTI- C64, VEGA ET1031 or VEGA AS1061. (if not applicable put N/a)

N/a

Section-II: Technical Aspects of Innovative Solution

1. **Proposal Title**

   Enabling old car with self-driving capability

2. **Proposal Summary**

   With the power of indigenous microprocessor, we are trying to provide enhancement for existing car for self-driving capability with minimum intervention of driver and some addon features for driver to be alert. We are trying to provide an interface to user by which he can take rational decision whenever need to operate.

3. **Please provide a concept note explaining the technology/ technical & other necessary details**

   Sensor Sensing and Computer vision to analysis position, orientation, velocity of object and surrounding based on taking decision and take action to control old cars.

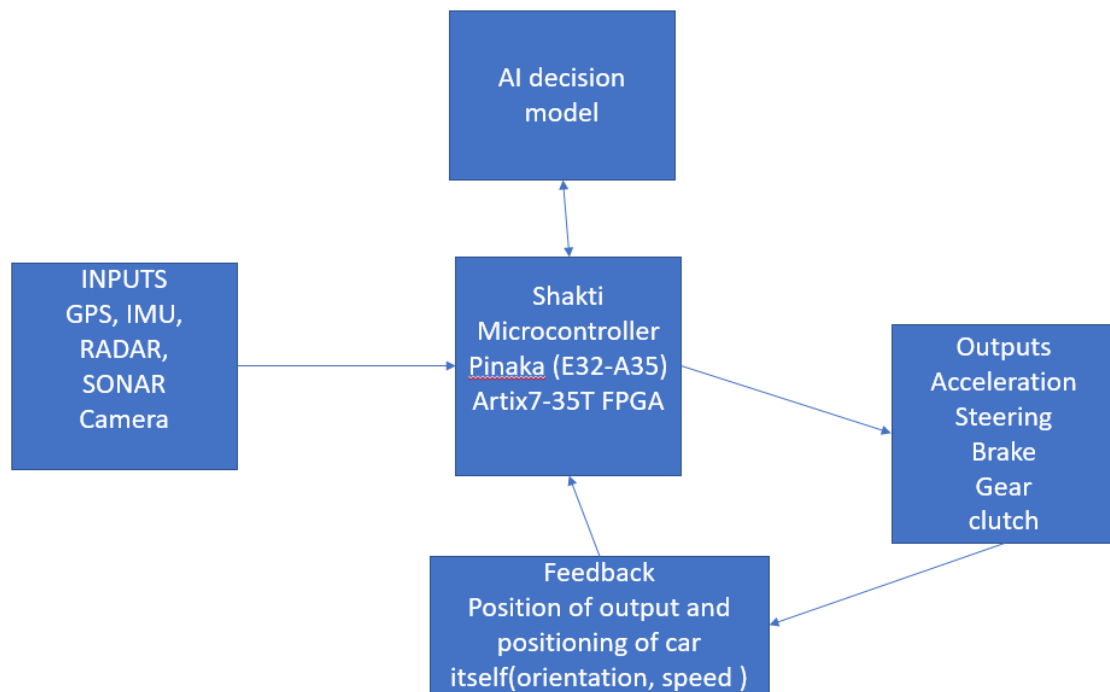4. **Briefly state the Objectives and Proposed Approach**

   The description should cover the following points:
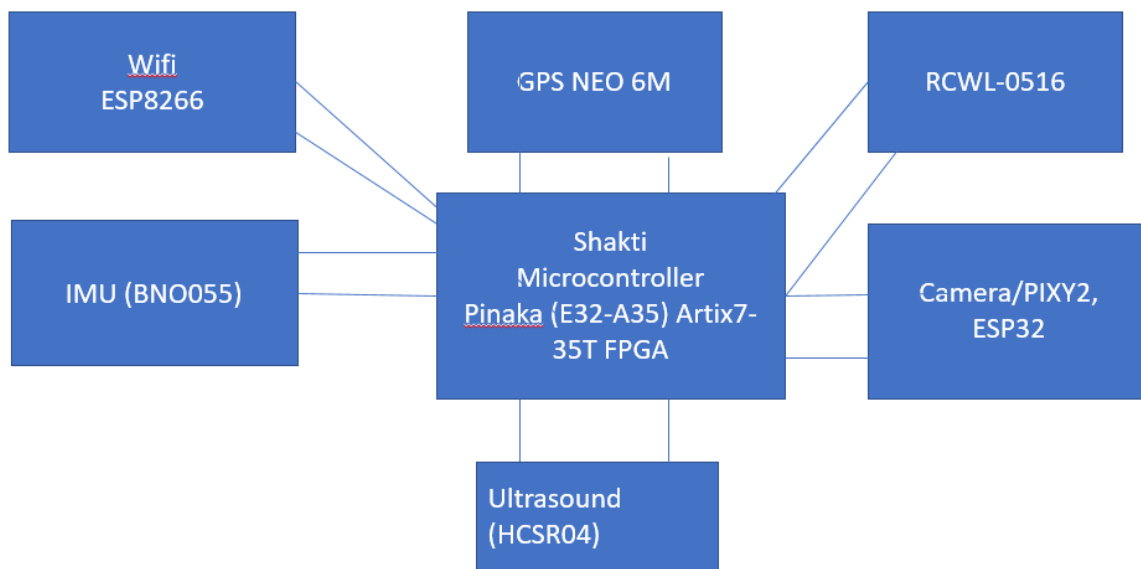
   1). Strategy and/or methodology of work.

   - Inputs from IMU, GPS will be fused together to find the orientation, direction and velocity of car.

   - For Visualizing of the surrounding, we will use proximity sensors, sonar and camera which will help in detection, identification recognition and distance from car, Movement prediction.

   - Both the surrounding and car inputs will be feed into microcontroller which will take decision from an API based AI model or directly after processing the input.

   - Which further delivers the output decisions to the output units which are pluggable robotic arms (mechanical gear control by motors) for clutch, gear, brake, accelerators and steering.

   - There will be two mode available for the car Manual and automatic which can be easily switchable.

   - The statistical model can provide speedy online detection through image sampling. Gradually, it can extend to learn about other objects as well, without requiring substantial human intervention.

   2). Block Diagram/ images highlighting all the subsystems and supported with a broad detail of each block/subsystem.

Execution Flow Diagram

AI decision model

INPUTS
GPS, IMU,
RADAR,
SONAR
Camera

Shakti
Microcontroller
Pinaka (E32-A35)
Artix7-35T FPGA

Outputs
Acceleration
Steering
Brake
Gear
clutch

Feedback
Position of output and
positioning of car
itself(orientation, speed)

Component Block diagram

Wifi
ESP8266

GPS NEO 6M

RCWL-0516

IMU (BNO055)

Shakti
Microcontroller
Pinaka (E32-A35) Artix7-
35T FPGA

Camera/PIXY2,
ESP32

Ultrasound
(HCSR04)

3). Scope and boundaries of the work, including any issues that will not be covered.

Our scope and boundary are limited to fusion of sensors and performing basic computer vision using shakti microprocessor as part of POC.

4). Data analysis (sample size, data collection)

100 samples, via sensors and aggressive testing.

5. Has any preliminary work been carried out?

Give status of work done earlier and its timelines. If yes, please provide the background details.

NA

6. **Timelines**

   a) Quarterly timelines vis-a-vis activities

      First Quarter: Integration of IMU and GPS with microcontroller.

      Second Quarter: Integration Computer vision and Model correction.

   b) Factually verifiable Indicators or Physical deliverables or Output indicators

      First quarter: controlling car on a empty track

      Second Quarter: controlling car with environment variables and training and tuning Model

7. **Intellectual Property**

   NA

8. **Requirement of Equipment/ Accessories/ Components/ Resources other than the Hardware Resources provided under the Challenge**

   a) Requirement Equipment/ Accessories/ Components
      IMU (BNO055),
      Wifi ESP8266,
      GPS NEO 6M
      RCWL-0516
      Camera/PIXY2
      Ultrasound (HCSR04)
      Gears
      LED
      Motors

   b) Quantity

      POC:

      One each of the above component

      IMU (BNO055) 1, gps 1, Wifi x 1, RCWL-0516   1, Camera 2, Motor 4.

      Full solution:

      IMU (BNO055) 1, gps 1, Wifi x 1, RCWL-0516   8, Camera 8, Motor 4.

   c) Estimated Value

      70k

9. **Relevant References.**

      https://www.mathworks.com/products/sensor-fusion-and-tracking.html

      https://www.tesla.com/autopilot

      https://en.wikipedia.org/wiki/Waymo

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Section-III: Business Aspects of Innovative Solution

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1. **Novelty**

   Pluggable module which will transform a normal car to an automatic car.

2. **Opportunity**

   The base requirement of future cars is the automacity in it. But as a middle-class country we do require to achieve or get this so we have wide range of existing car which can be converted to the modern cars in cheap value. Which will anyway have market value more and more.

3. **Market Feasibility**

Automobile industry with existing cars.

Car Accessary market where it will be sold.

Competitor not in knowledge.

4. **Commercialization Roadmap**

What do you envision to be the key next step to making impact with this innovation/ commercialize this innovation? (e.g., Ssponsored research support, Licensing, Venture Financing).
What is the time frame?
Commercialization plan should indicate:
1). Market entry strategy & roadmap for scalability.
2). Timelines and Milestones.
3). Data analysis (sample size, data collection)

One Year would require for market analysis and establishment of the product.

Nothing much planned Yet for commercialization.

5. **Challenges or Risk factors associated with the project and the proposed mitigation strategies**

[What are the challenges and risk factors that you envision which may affect this project? What are the critical success factors/potential barriers?]

Integration of IMU and GPS with microcontroller.

Integration Computer vision and Model correction.

6. **Have you established the Link-up with any agency/ organization, other than the Team members, for joint- development of this innovative solution?**

NA

7. **Have you received any interest from the end user of this innovative solution?**

NA

8. **Have you approached any other organisation/agency for financial support for the present activity?**

NA

9. **Relevant References.**