



SPYBOT

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PROBLEM STATEMENT

The AIM of our project is to create a spybot which can travel as commands are given and retreat whenever necessary.

1. On giving commands, the bot should move accordingly and also keep track of its coordinates with respect to the starting point.
2. There should be a camera mounted on the bot, which is able to give live feed of the current position of the bot.
3. The bot should override the user's commands in case of an obstacle ahead and also inform the user about.
4. On specifying retreat command, the bot should automatically retreat to the starting position, avoiding all obstacles in the way and reducing the path length.

Implementation

1. Commands are given wirelessly to the bot through XBee module
2. While manoeuvring, the bot keeps track of its current direction and also its current coordinates.
3. The bot has a mounted camera which provides live feed of the terrain to the user, helping him/her navigate the bot.
4. BCAS (Bot Collision Avoidance System) is also incorporated which prevents the bot from colliding with obstacles while manual control (by overriding the user's input) and also while retreating.

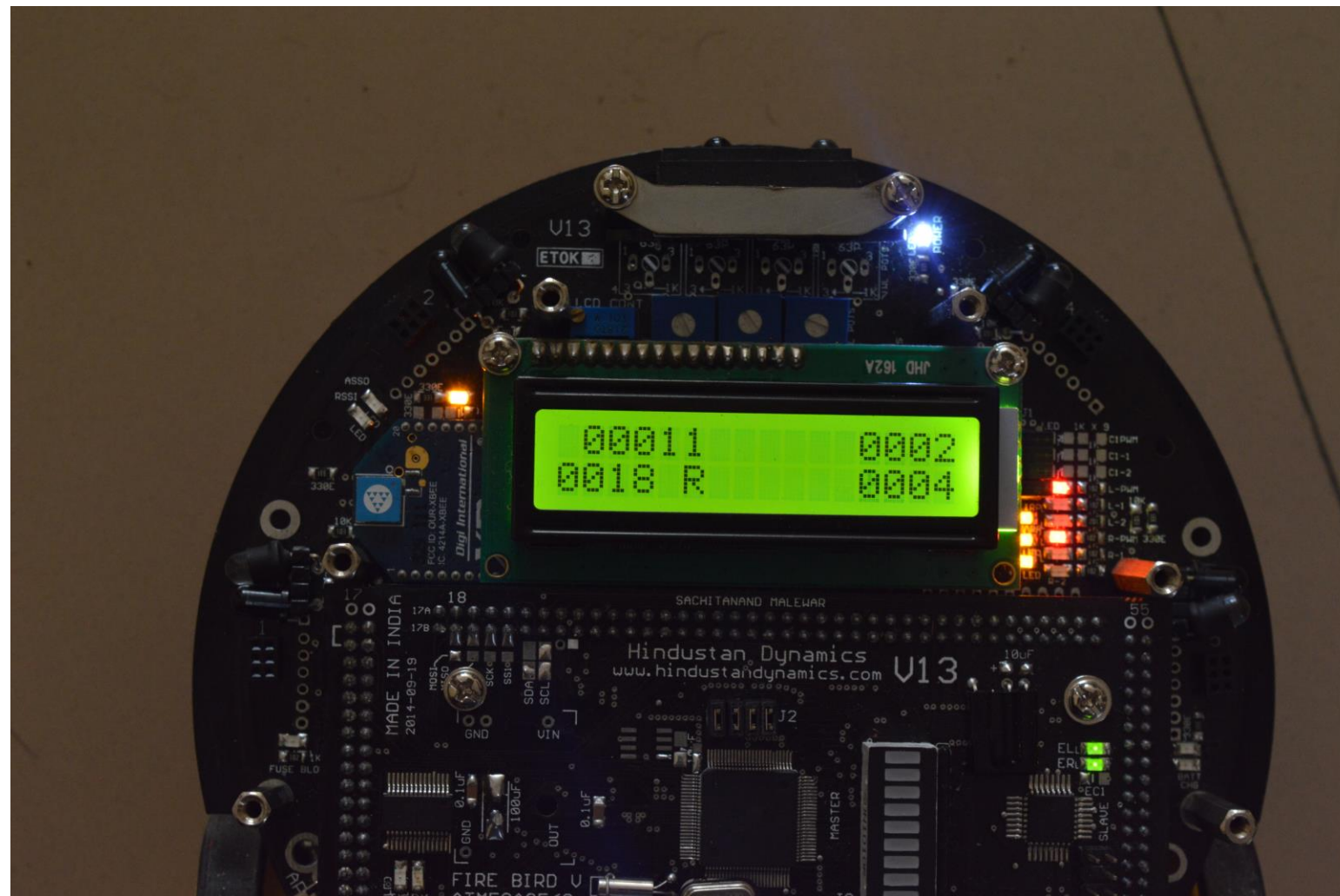
Implementation

5. ARA (Auto Return Algorithm) is used to recall the bot back to the starting position. It uses the coordinate tracking system to get the current position of the bot and use the BCAS to avoid obstacles.
6. Also the ARA tries to reduce the return path length (which saves power) and also ensures no physical impact to the bot.

Innovation

- The ARA is an innovation on our part which makes it easy for the user to retrieve the bot back. If there wouldn't have been ARA then user would have had to keep track of each individual movement.
- The ARA generates a straight line path from the initial to final position which ensure minimization of resources and time.
- The coordinate tracking system is a new feature.
- The BCAS mechanism which ensures that there is no physical impact to the bot by overriding the user's commands.

- Main Project Video





No Echo from the laptop....

Which means no
reception of
Signal from the bot.



Challenges (Solved)

1. Calibrating the bot for moving properly and for the bot to keep track of its coordinates has been the most difficult task for us till now. The rotation and movement of the bot always had about 15% error, which is not acceptable.

Hence we chose to reduce the Pulse Width Modulation (PWM) of the motor of the bot, which reduced the error significantly for us.

2. Reducing the Path length and also traversing through unknown terrain was a challenge.

We achieved through the coordinate tracking system and BCAS.

Challenges (Unsolved)

- Major challenge for us was to take serial input from Wiced Sense, which was provided to us for our idea of hand-gesture controlled movement. We could not find any way of transferring serial inputs from the sensor to our bot, and hence we have currently resorted to control by keyboard commands but we definitely will try to pursue it.

Future work

This project has various prospects of future improvements.

1. It can be enhanced in connectivity by satellite communications for military use, as it can be used to scan enemy territories, scout an area for explosives using explosive detectors, etc.
2. It can be used to make an automated goods transfer system, for use in factory, where goods can be transferred easily to a distant location and return back.
3. We can incorporate multiple proximity sensors for obstacle detection, thus making BCAS more accurate.



THANK YOU